

Exchange Rate Fluctuations and Financial Performance of Manufacturing Companies Listed in Nigeria

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Abstract

This study examined the effect of exchange rate fluctuations on the financial performance of manufacturing companies in Nigeria using a panel of 10 quoted manufacturing companies in Nigeria. Data for the study was obtained from the published financial statement of the quoted companies, the Organization for Economic Cooperation and Development (OECD), and the Central Bank of Nigeria (CBN). Data collected was analyzed using Random Effects (RE) and Fixed Effects (FE) techniques. Inferences were drawn at 5% significance level. Results from the empirical analysis showed that exchange rate fluctuation had a significant effect on ROA; an insignificant effect on ROE, and an insignificant effect on EPS. The study, therefore, concluded that there was a negative significant relationship between fluctuations in exchange rate and the financial performance of manufacturing firms in Nigeria when ROA is used as a proxy for financial performance. Therefore, the study recommends among others that there may be a need for a fixed exchange rate to limit the fluctuation that may negatively affect the financial performance of Nigerian manufacturing companies. Allowing the fluctuation in the exchange rate will significantly affect the profitability of manufacturing firms in Nigeria thus, negatively affecting their financial performance.

Keywords: Earning per share; Exchange rate fluctuations; Return on assets; Return on equity

JEL Codes: F31, L25

1. Introduction

Nigeria's manufacturing sector from time immemorial has struggled to balance the effect of major macro-economic factors on the sector. This sector has been thriving assiduously to catapult, drive and translate the needed development of the Nigerian economy. Among these macro-economic factors is the exchange rate whose fluctuation has directly affected manufacturing companies' financial performance at the levels of economic, transaction, and translation exposures (Agubata & Odubuasi, 2018). Currently, the challenges posed by the international market in this era play a vital role as a result of the involvement of the different currencies used in the international market for international trade; the variability of foreign exchange rates is a potentially interesting factor that drives the level of profitability of manufacturing firms as it affects their financial intermediation process (Chiira, 2009).

Furthermore, maintaining exchange rate stability over time has been a challenging concentration of most developed and developing countries as it is a significant macroeconomic variable due to the negative repercussions its depreciation or appreciation has on all the sectors of the economy especially the manufacturing sector (Aizenman & Marion, 1999; Odili, 2014).

Todaro and Smith (2008) expatiated further that through international trade among countries, economies have experienced periods of exchange rate fluctuations, slower growth among others

which has exposed many developing countries to periods of imbalances. Notwithstanding, exchange rate fluctuations do not only affect economic growth but also the performance of firms. For instance, exchange rate depreciation increases the cost of imported capital goods for manufacturing firms, and this results in a fall in domestic investment among others. Therefore, the firms in the manufacturing sector play a vital role in the modern economy worldwide and have the potential benefits that are key for economic transformation (Ayobami, 2019) Nigeria inclusive.

Nigeria has experienced chronic fluctuations in the exchange rate which is informed by various policies of the federal government, starting from the post-independent period when the country maintained a fixed parity with the British pounds, through the oil boom of the 1970s, and then the floating of the currency in 1986, following the near-collapse of the economy between 1982 and 1985 period (Eme & Akpan, 2012). In each of these eras, both economic and political considerations sustaining the exchange rate policy had important repercussions to manufacturing companies and the development of the economy in its broader sense. The manufacturing sector continues to play a vital role in the economy and contributed an average of 9.02% in 2019 to Gross Domestic product as against the 9.2% recorded in 2018 (Oyekanmi, 2020). The sector also contributes to employment creation, corporate social responsibilities, and foreign exchange earnings, promote the growth of investment, increasing productivity among others as these translate to improvement in the socio-economic welfare of the individuals in the country. Notwithstanding the contribution of the Nigeria's manufacturing to economic growth cum the improvement in the socio-economic welfare of the populace, one key problem faced by manufacturing in Nigeria is exchange rate fluctuation. This is so because the manufacturing sector depends highly on imported capital goods or raw materials to undertake their production activities hence any fluctuations in the exchange rate has negative repercussion on the financial growth (performance) of the sector among others.

However, any economy driven by the importation of capital goods and raw materials needed by the manufacturing sectors which has been beleaguered by numerous setbacks as a result of exchange rate oscillations will be less competitive locally and globally. Consequently, exchange rate fluctuation has led to the failure and shutdown of many manufacturing firms and also created an atmosphere of macroeconomic uncertainty which reduces firms' profit, reduces employment levels as well as investment levels, and also decreases in firm productivity (Buabeng, *et al*, 2019).

The history of exchange rate could be traced to 1925 when the foremost Gold Standard by which a country's standard monetary unit was equivalent to a defined amount of gold of certain purity signifying that note of a country on such system was convertible on-demand on its Central Bank into the equivalent gold coin or the modified Gold Bullion Bars (Eme & Olugboyega, 2012). The system of Gold Standard was halted in 1944 before the end of World War II by the Bretton Wood's Conference, which instituted a successful effort that created a legal and institutional framework that facilitated global monetary cooperation as well as managing international exchange rates. While the term exchange rate refers to the price at which the currency of one country can be converted to the currency of another. Boykorayev (2008) also explained it as the price of one country's currency expressed in terms of some other currency.

Meanwhile, fluctuation in exchange rate involves the changes and variability in the rate of exchange that affects either positively or negatively the financial performance of manufacturing companies because their projected revenue and costs, alongside profit margin and earnings per share (EPS), are affected. In the words of Boykorayev (2008) exchange rate depreciation results in the high cost of importing raw materials and capital goods and this, in turn, raise the cost of production and reduces profits of the firm importing these items. If the firm attempts to pass the high cost of production to the consumers through raised prices, this will reduce its chance of national and international competitiveness, which will shrink the firm's revenue base. Flexibility

in the exchange rate was introduced by the departure from Gold Standard which had a fixed rate of exchange between the currencies. The flexibility in exchange rate that was the result of the fall of Bretton Wood imposed greater tasks of ensuring stability and fair exchange of its currency with other nations, on each government of the world.

Enekwe, Ordu & Nwoha (2013) said the breakdown of the Bretton woods system-induced variability in the rate of exchange worldwide, and the behaviour of exchange rate is said to determine the behaviour of several other macroeconomic variables. Subsequently, Nigeria embarked on currency devaluation to promote export and discourage import, to stabilize the exchange rate (Ayinde, 2014). Pertinently, exchange rate movement affects the competitiveness of a firm, the value of its funds, given that many companies borrow in foreign countries to fund their operations (Agubata & Odubuasi, 2018). On the other hand, the state of a country's economy affects the financial performance of the organizations operating within its border. The general expectation of most investors and shareholders is that companies would perform well when the economy performs well (Dickson, 2012).

Furthermore, a company's financial performance is judged by financial indicators such as profit before and after tax (PAT), Earnings Per Share (EPS), Price Earnings Ratio (PER), Return on Assets (ROA), Return on equity (ROE) and Net Assets per Share (NAS). The manufacturing industry in Nigeria has been faced with many macroeconomic challenges some of which have been high instability and fluctuations to her exchange rate (Inyama & Ozuoli, 2014). To this end, this study aims to quantify the relationship between exchange rate fluctuations and the financial performance of manufacturing companies in Nigeria. The remaining part of the study is as follows: section 2 lays out the summary of empirical literature for the study; section 3 contains a description of data and methodology adopted for the study, while section 4 contains results and discussions. Finally, section 5 contains the summary and conclusion of the study.

2. Literature and Hypothesis Development

Several empirical studies have been carried out on the relationship between exchange rate and the financial performance of manufacturing companies. From developed countries, studies such as Muhammad, Erich & Robert (2012), Kogid *et al.* (2012), Korkmaz (2013), Tiwari & Sharma (2015), and Fabling and Grimes (2015) have all examined the effect of exchange rate on financial performance of firms. The scope of these studies has been as varied as examining the effect of exchange rate volatility on industrial production (Muhammad, Erich & Robert, 2012); and economic growth (Kogid *et al.*, 2012; Korkmaz (2013). Others are studies linking exchange rate with trade and exports such as Fabling & Sanderson (2015).

Studies in developing countries such as McPherson & Rakovski (2000), Musyoki, Pokhariyal & Pundo, (2012), Oseni (2016), Adeoye (2016), Alagidede & Muazu, (2016), Jibrin *et al.* (2017), Achouak *et al* (2018), Hussain, et al (2019) focused on the relationship between exchange rate, economic growth, and general macroeconomic performance; while others such as Serenis & Tsounis (2014); Mohagheghzadeh, *et al* (2014) linked exchange rate to trade.

The pattern of studies for Nigeria have followed what has been reviewed for the developed and developing countries. That is, while studies such as Akpan (2008), Ofurum and Tobira (2011), Shehu (2012), Oyovwi (2012), Azeez *et al.* (2012), Akpan & Atan (2012), Dada & Oyeranti (2012), Asher (2012), Adeniran *et al.* (2014), Ugochuchukwu, (2015), Jugu & Soeding, (2015), Isola *et al*, (2016), Iyeli, & Utting (2017), Nsofo, *et al.* (2017), Ajinaja, *et al.* (2017), Obianuju & Timothy (2017), Abiola & Ajibola (2017), Andohol (2017) emphasize the relationship between exchange rate, economic growth, stock market performance and macroeconomic performance; studies such as Aliyu (2010), Dickson & Andrew (2013), Akinlo & Adejumo (2014), Olufayo & Fagite (2014), Imoughele & Ismaila (2015), Oriavwote & Eshenake (2015), Adaramola (2016), Gatawa & Mahmud (2017), Aro-Gordon (2017), Akanbi, *et al* (2017), Uduakobong & Williams

(2018), Dania & Ogedengbe (2019), Yakub, *et al.* (2019) examined the relationship between exchange rate and trade. Meanwhile, sectorial studies on exchange rate have examined its effect on manufacturing sector growth (Opaluwa, Umeh & Ameh, 2010, King-George, 2013; Omotola (2016), industrial growth (Usman & Adejare, 2012), industrial performance, and manufacturing sector performance (Akinlo & Lawal, 2015; Ojeyinka (2019))

Studies that are concerned with the relationship between exchange rate and bank performance include Owoeye, & Ogunmakin (2013), while Ikechukwu (2016) examined the relationship between exchange rate and firm performance, while Okika, et al (2018) examined the effect of exchange rate on firm profitability. It is obvious from the empirical literature that few studies in Nigeria have been focused on the effect of exchange rate fluctuations on the financial performance of listed manufacturing companies. On this premise, the study hopes to test the following hypotheses:

H₀₁: There is no significant relationship between exchange rate fluctuations on return on assets (ROA)

H₀₂: There is no significant relationship between exchange rate fluctuations on return on equity (ROE)

H₀₃: There is no significant relationship between exchange rate fluctuations on earnings per share (EPS)

3. Data and Methods

Data on ten (10) manufacturing companies spanning 2010 to 2019 were considered for this study. These companies are considered because they are among the most quoted on the stock exchange and have available data to cover the study period. They include: Dangote Sugar, Nestle, Cadbury, Dangote Cement, Guinness, Vitafoam, PZ, Honeywell, Nigerian Breweries and International Breweries. Table I contains the variable names, variable measurements and sources. The inferential analysis for this study was built on multivariate regression models specified within the static analytic framework of fixed effects (FE) or random effects (RE).

3.1 Model Specification

The static model for this study is thus specified, accounting for inherent fixed and random effects in the cross-sections:

$$ROA_{it} = \beta_0 + \beta_1 ExchF_{i,t} + \beta_2 InMr_{i,t} + \beta_3 INr_{i,t} + \beta_4 lnGCF_{i,t} + v_{1i} + u_{1i,t} \dots\dots\dots I$$

$$ROE_{it} = \lambda_0 + \lambda_1 ExchF_{i,t} + \lambda_2 InMr_{i,t} + \lambda_3 INr_{i,t} + \lambda_4 lnGCF_{i,t} + v_{2i} + u_{2i,t} \dots\dots\dots II$$

$$EPS_{it} = \theta_0 + \theta_1 ExchF_{i,t} + \theta_2 InMr_{i,t} + \theta_3 INr_{i,t} + \theta_4 lnGCF_{i,t} + v_{3i} + u_{3i,t} \dots\dots\dots III$$

Where the models have been operationalized on Return on Asset (ROA), Return on Equity (ROE), and Earning per Share (EPS) serving as the endogenous variables. The variables to be used as explanatory variables will be exchange rate fluctuation (ExchF), interest rate (INr), Import duty (IMr), and Gross capital formation (GCF). Furthermore, β_0 , λ_0 , and θ_0 respectively, are intercepts of the models. Each shows the value of the respective financial performance metric at zero value of the exchange rate fluctuation variables, while β_a , λ_a , and θ_a ($a = 1, 2, 3, 4$) were coefficients of the independent variables. According to Stock and Watson (1988), fluctuations in a macroeconomic variable can be represented as changes in that variable over time. Thus, as indicated in Table I, exchange rate fluctuation is the change in exchange rate between two time periods.

i depicted each of the manufacturing firms in the cross-section, and t denoted each of the points

in time at which data values of the variables were considered, v_i is the entity fixed effects while u_i is the random term. The residual term for equations I to III VII to IX is given as $v_i + u_i = \varepsilon_{it}$.

In the three equations, we expect that the explanatory variables will behave thus:

For $\text{ExchF}_{i,t}$, $\beta_1 > 0$; $\lambda_1 > 0$; $\theta_1 > 0$; for $\text{INr}_{i,t}$, $\beta_2 < 0$; $\lambda_2 < 0$; $\theta_2 < 0$; for $\text{IMr}_{i,t}$, $\beta_3 < 0$; $\lambda_3 < 0$; $\theta_3 < 0$; and for $\text{GCF}_{i,t}$, $\beta_4 < 0$; $\lambda_4 < 0$; $\theta_4 < 0$.

Table 1: Summary of variables, definitions and sources

Variables	Measurement	Sources
Earnings per share	Manufacturing companies' net profit divided with the number of circulated share (#'Billion).	Selected companies financial report
Return on Capital Employed	Manufacturing sector return on assets. Return on Asset is measured by Earnings before Interest and Tax / Capital Employed	Selected companies financial report
Return on Equity	Manufacturing return on equity. Net Income / Total Equity	Selected companies financial report
Exchange Rate Fluctuation	Exchange rate fluctuation is measured as the difference in two time periods in the series.	To be computed using nominal exchange rate data from World Development Indicators (WDI)
Import duty	This is tax collected on goods imported into Nigeria from other countries.	Organization of Economic Cooperation and Economic Development (OECD)
Interest rate	Bank rate that meets the need of the private sector. it is measured in percentage	Central Bank of Nigeria (CBN)
Gross capital Formation	Outlays on additions to fixed assets, plus the net change in inventories. Fixed assets include plant, machinery, equipment, and buildings. all used to create goods and services. It is measured in billions of Naira	WDI

Source: Authors' Compilation, 2021

Note: Financial reports for listed companies were sourced from <https://africanfinancials.com/>

4. Data Analysis and Discussion of findings

4.1 Descriptive Statistics

The descriptive statistics are shown in Table 2 on the variables of interest – return on assets employed (ROA), return on equity (ROE), earnings per share (EPS), exchange rate fluctuation (EXCHF), imports duty (IMr), interest rates (INr) and gross capital formation (GCF). For the period under review, there were positive and negative values posted for ROA, ROE, and EPS. Careful observation will show that the difference between the minimum and maximum values is revealed in their range, which shows that there is a significant movement away from the average of these values. The kurtosis of the variables shows that they are leptokurtic, apart from ROA. Also, apart from ROA and IMr, the other variables are not normally distributed judging by the probability values of their Jarque-Bera (J-B) statistic which are less than the significance threshold of 0.05 for this study.

On the independent variables, a cursory observation reveals that fluctuation in exchange rate (EXCHF) is confirmed by the value of the standard deviation which is significantly far from the mean. Exchange rate for the period is positively skewed, with a leptokurtic kurtosis. The probability of the Jarque-Bera statistic of 0.00 is less than 0.05 for this study, indicating that the series is not normally distributed.

It is observed that the maximum value of import duty (IM) is almost twice as much as the minimum value. However, the variability in the series can be seen in the standard deviation value which is significantly larger than its mean. The series is negatively skewed with a platykurtic

kurtosis (which is less than three). From the J-B statistic whose probability is more than the 0.05 statistical threshold for this study, the series is normally distributed.

From the Table, it is observed that the value of the mean of interest rate and gross capital formation are very close. However, their maximum and minimum values indicate potential variability, which is further confirmed by the value of the standard deviation. Both series are observed to be negatively skewed with a leptokurtic kurtosis for interest rate and a platykurtic kurtosis for gross capital formation. The probability of the Jarque-Bera statistic for the interest rate and gross capital formation indicates that they are not normally distributed.

Table 2: Descriptive Statistics

Variables	ROA	ROE	EPS	EXCHF	IMr	INr	GCF
Mean	0.105240	0.130762	68.89719	0.025518	675738.6	12.02809	9643.220
Median	0.086248	0.187473	1.850000	0.011716	679485.3	12.00000	9631.696
Maximum	0.298659	1.168759	5429.000	0.111898	884760.0	14.00000	10571.74
Minimum	-0.152075	-9.762849	-38.13000	0.001766	429555.4	6.250000	8425.762
Range	0.450734	10.931608	5467.13	0.110132	455,204.6	7.750000	2145.978
Std. Dev.	0.090808	1.088015	574.7884	0.034900	124179.0	2.312404	762.6727
Skewness	0.115177	-8.559171	9.266219	1.687592	-0.314084	-1.571882	-0.189547
Kurtosis	2.695321	78.60439	86.91323	4.467363	2.844097	4.670696	1.710014
Jarque-Bera	0.541017	22283.60	27385.60	50.22946	1.553427	47.00120	6.703835
Probability	0.762991	0.000000	0.000000	0.000000	0.459915	0.000000	0.035017

Source: Authors' Computation, 2021

4.2 Correlation Analysis

The essence of the correlation matrix in Table 3 is to ascertain the degree of association of the independent variables. From the result, the paired relationship existing among the variables is positive. The explanatory variables are moderately related, except for the relationship between interest rate and import duty.

Table 3: Partial Correlation Coefficient

	EXCH	LOG(IM)	INr	LOG(GFC)
EXCH	1.000000			
LOG(IM)	0.202580	1.000000		
INr	0.318380	0.780482	1.000000	
LOG(GFC)	0.395100	0.623412	0.323453	1.000000

Source: Authors' Computation, 2021

4.3 Hausman Test

The analysis will facilitate the quantitative determination of the nature, magnitudes and statistical significance, of the exchange rate fluctuation and its indicators on the financial performance of the selected manufacturing companies during the study covered period. The FE model estimates the relationship between the dependent and independent variable within a unit in the cross-sections given that each entity may have its characteristics that may affect the predicted variable. More specifically, in the FE model, it is assumed that there is a correlation between the entity error term and predictor variable, which may bias the outcome variable. The FE model removes these effects (Torres-Reyna, 2007). The RE model is used when we assume that differences across entities influence the dependent variable. One of the advantages of the RE model is that time-invariant variables can be added (Torres-Reyna, 2007). In essence, when we assume that the

unobserved effects of each entity are uncorrelated with each explanatory variable, the RE model is appropriate (Wooldridge, 2013).

Choosing between the FE and RE models is not done arbitrarily, the Hausman test is used to choose the two models. The test was proposed by Hausman (1978) to choose between the FE and RE models. In the Hausman test, the hypothesis to be tested is stated below:

H_0 : Random effects model estimator is correct

H_1 : Fixed effects estimator is correct

The result of the Hausman test for the three models is contained in Table 5.

Table 5: Hausman Test Result

	Model I (ROA Model)	Model II (ROE Model)	Model III (EPS Model)
Hausman (Chi-Sq. Statistic)	0.08 (0.9992)	9.19 (0.0024)	0.12 (0.9982)
Preferred model	Random effects	Fixed effects	Random effects

Source: Authors' Compilation, 2021

4.4 Exchange rate fluctuations on return on assets (ROA)

The model in equation was estimated using the RE, and result is presented Table 5

$$\text{Model 1: } ROA_{it} = \beta_0 + \beta_1 \text{ExchF}_{i,t} + \beta_2 \text{LnMR}_{i,t} + \beta_3 \text{IN}_{i,t} + \beta_4 \text{LnGCF}_{i,t} + v_{1i} + u_{1it}$$

Table 5: Random Effects Model

Random Effects Model				
Dependent Variable: ROA				
Variable	Coefficient	Std. Error	z-statistic	Prob.
Constsnt/Intercept	1.208677	0.8501072	1.42	0.155
ExchF	-.6686447	.2700265	-2.48	0.013
LnIM	.1335163	.1391074	-0.96	0.337
IN	-.0000685	0.0100112	-0.01	0.995
LnGCF	.0767344	.1790127	0.43	0.668
Adjusted R-squared	0.1495			
	31.53			
Wald Chi ² (Prob)	(0.0000)			
Hausman (Chi-Sq. Statistic)	0.08 (0.9992)			

Note: IM and GCF are expressed in their natural log forms

Source: Researcher's computation, 2021

The estimated model for objective one in Table 5 shows that ExchF exerts a negative and significant effect on return on assets ($\beta = -0.6686447$, $z = -2.48$, $p = 0.013$). This indicates that rising fluctuation in exchange rate reduces returns on assets for manufacturing firms in Nigeria. *Ceteris paribus*, the result shows that a rise in exchange rate fluctuation by 1% will lead to a fall in return on assets by about 0.007 units. The p-value of the z statistics of ExchF of 0.013 is less than 0.05 level of significance for this study, showing that the negative relationship exchange rate has with return on assets is statistically significant.

The relationship between import duties (IM) and return on assets (ROA) is positive. At the 0.05 level of significance, this relationship is not statistically significant ($\beta = -0.1335163$, $z = -0.96$, $p = 0.337$). Looking at the slope coefficient, it is shown that for a 1% rise in import duties, ROA will rise by about 0.0013 units.

The results in Table 5 also indicate that the relationship between interest rate (INr) and ROA is negative and statistically not significant ($\beta = -0.0000685$, $z = -0.01$, $p = 0.995$). From the output, it is found that for a 1% rise in interest rate, ROA falls by about 0.007%. This effect is not statistically significant, given that the p-value of the z-statistics of the coefficient is greater than 0.05 level of significance for the study.

From the estimated result, it is found that gross capital formation (GFC), as expected, exerts a positive but insignificant effect on ROA ($\beta = -0.0767344$, $z = -0.43$, $p = 0.668$). From the results, a 1% increase in GFC leads to an increase in ROA by about 0.0008 units. This magnitude of effect is small and as evidenced from the probability value of the z-statistics, the effect is not statistically significant.

The result indicates an overall adjusted r-square of about 15%. Following this, the explanatory variables explain only about 15% of variations in ROA. However, this is expected in a panel data analysis where the time dimension and cross-section are short. The overall joint significance of the explanatory variables on ROA is found to be significant given that the p-value of the Wald chi-square statistic is less than the 0.05 significance level.

4.5 Exchange rate fluctuations on return on equity (ROE)

Having discussed the findings in the estimated equation for model 1, we present the result for the estimated equation for model two in Table 6. The model is estimated using the FE.

$$\text{Model 2: } ROE_{it} = \lambda_0 + \lambda_1 \text{ExchF}_{i,t} + \lambda_2 \text{LnMr}_{i,t} + \lambda_3 \text{INr}_{i,t} + \lambda_4 \text{LnGCF}_{i,t} + v_{2i} + u_{2i,t}$$

Table 6: Fixed Effects Model

Fixed Effects Model				
Dependent Variable: ROE				
Variable	Coefficient	Robust Std. Error	z-statistic	Prob.
Constant/Intercept	-23.08048	28.12151	-0.82	0.433
ExchF	-.4166607	1.039609	-0.40	0.698
LnIM	.5336277	.6212088	0.86	0.413
IN	-.0887367	.0883276	-1.00	0.341
LnGCF	1.868501	2.291637	0.82	0.436
Adjusted R-squared	0.0359			
	5.65			
Wald Chi ²	(0.0148)			
(Prob)	9.19			
Hausman	(0.0024)			
(Chi-Sq. Statistic)				

Note: IM and GCF are expressed in their natural log forms

Source: Authors' computation, 2021

In the model for the effect of exchange rate fluctuation (ExchF) on return on equity (ROE), it is found that ExchF is negatively related to ROE. This relationship is statistically not significant ($\beta = -0.4166607$, $z = -0.40$, $p = 0.698$). By implication, the higher the fluctuation in exchange rate, the lower the return on equity. More specifically, with a 1% rise in ExchF, ROE declines by 0.004 units. As observed from the p-value of the z-statistics of 0.698 that is greater than the

significance level of 0.05.

From the results, the relationship between import duties (IM) and return on (ROE) is seen to be positive ($\beta=0.5336277$, $z=-0.86$, $p=0.413$). This relationship is not statistically significant given that the p-value of the z-statistic of 0.413 is greater than the 0.05 significance level allowed for this study. It is shown that a 1% increase in IM increases ROE by about 0.05 units, *ceteris paribus*.

As expected, interest rate (INr) is negatively related to ROE ($\beta=-0.0887367$, $z=-1.00$, $p=0.341$). From estimates, for every 1% increase in INr, ROE declines by about 0.009 units. Given that the p-value of the z-statistics of 0.341 is greater than the 0.05 significance level, it can be concluded that the negative relationship is not statistically significant.

Finally, the results show that GCF is positively related to ROE ($\beta=1.868501$, $z=0.82$, $p=0.436$). Parameter estimates suggest that for every 1% increase in GCF, there is about 0.019 units increase in ROE. This positive effect of GCF on ROE is found not to be statistically significant given that the p-value of the z-statistics of 0.436 is greater than the significance level of 0.05.

The adjusted r-square (within) of the model indicates that about 4% of changes in ROE are explained by the explanatory variables. The overall effect of the independent variables is however statistically significant given that the p-value of the Wald chi-square of 0.0148 is less than the 0.05 level of significance.

4.6 Exchange rate fluctuations on earnings per share (EPS)

Finally, equation 3 was estimated using the RE model. The result of the estimation is presented in Table 7.

$$\text{Model 3: } EPS_{it} = \theta_0 + \theta_1 ExchV_{i,t} + \theta_2 InMr_{i,t} + \theta_3 INr_{i,t} + \theta_4 lnGCF_{i,t} + v_{3i} + u_{3i,t}$$

Table 6: Random Effects Model

Random Effects Model				
Dependent Variable: EPS				
Variable	Coefficient	Std. Error	z-statistic	Prob.
Constant/Intercept	3.007607	12.69053	0.24	0.813
ExchF	-6.346963	3.991618	-1.59	0.112
LnIM	-1.341079	2.018665	-0.66	0.506
IN	.1101553	.1451057	0.76	0.448
LnGCF	1.623389	2.557691	0.63	0.526
Adjusted R-squared	0.0138			
	2.82			
Wald Chi ²	(0.5887)			
(Prob)				
	0.12			
Hausman	(0.9982)			
(Chi-Sq. Statistic)				

Note: EPS, IM, and GCF are expressed in their natural log forms

Source: Authors' computation, 2021

In the estimated model for the effect of exchange rate fluctuation (ExchF) on earnings per share (EPS), the expected negative effect is realised. This effect is not statistically significant given that the p-value of the z-statistic of 0.112 is greater than the 0.05 level of significance ($\beta=-6.346963$, $z=-1.59$, $p=0.112$). From the estimated model, a 1% rise in ExchF will induce a fall in EPS by about 6.4%.

In the estimated model, it is found that import duty (IM) is negatively related to EPS. the negative effect of IM on EPS is not statistically significant ($\beta=-1.341079$, $z=-0.66$, $p=0.506$). From the results, for every 1% rise in import duties, EPS will fall by about 1.34%. Judging by the p-value of the z-statistic of 0.506 which is greater than the significance level of 0.05.

Results from the analysis show that interest rate (INr) exerted a positive effect on EPS. The parameter estimates show that a 1% increase in interest rate increases EPS by about 0.11% ($\beta=0.1101553$, $z=0.76$, $p=0.448$). The positive effect of INr on EPS is not statistically significant given that the p-value of the z-statistics of 0.448 is greater than the 0.05 significance level.

Finally, the results show that gross capital formation (GCF) is positively related to EPS, as expected ($\beta=1.623389$, $z=0.63$, $p=0.526$). More specifically, *ceteris paribus*, a 1% increase in GFC induces about 1.62% increase in EPS. While this parameter estimate may seem larger than the ones for the ROA and ROE models, it is not statistically significant given that the probability value of the z-statistics of 0.526 is greater than the 0.05 level of significance.

The result indicates that the r-square does not sufficiently explain variations in EPS. Additionally, the p-value of the Wald chi-square shows that the overall significance of the explanatory variables in explaining EPS is low.

4.7 Discussion of Findings

This study has demonstrated that fluctuation in exchange rate has more effect on return on asset than the other measures of financial performance – return on equity and earnings per share. This implies that the ability of manufacturing firms in Nigeria to use their economic resources – assets – profitably is severely hampered by fluctuation in exchange rate. Put differently, with continued exchange rate fluctuation, the assets of manufacturing firms in Nigeria are not productive. This calls for concern given that the country needs more efficient manufacturing sectors to boost production and reduce unemployment.

This finding is in line with Owoeye & Ogunmakin (2013) who found that exchange rate fluctuation affected the performance of banks in Nigeria when loan loss to total advance ratio was used to proxy bank performance and the study by Ikechukwu (2016). Strangely, import duties are seen to be positively related to ROA. This is strange because it should be expected that the higher it costs to import materials meant for production, the lower productive activities in manufacturing firms will be. However, it seems manufacturing companies in Nigeria may be sacrificing other aspects of production – perhaps quality – as they brave the higher import duties and maintain a healthy financial performance.

It was proven that the financial performance of manufacturing companies in Nigeria was affected, even if not severely, by interest rate. The negative effect that the high cost of capital puts on the financial performance of manufacturing firms in Nigeria including the already established negative effect of exchange rate fluctuation may lead to lower investment by the firms, default in loan repayment, and the overall drop in productivity. The non-statistical significance of interest rate on the financial performance of manufacturing companies in Nigeria simply indicates that financial decisions in these firms may not be made based on the cost of capital alone. The positive effect of gross capital formation on ROA shows that investment in the larger economy rubs off positively on the performance of manufacturing companies in Nigeria. This is however not significant, indicative of either a slow pace of capital formation to match the needs of manufacturing firms or the inadequacies of the capital already formed.

In the equation for ROE, the effect of exchange rate fluctuation remained negative, like the ROA equation, but insignificant. This indicates that the negative effect of fluctuation in exchange rates on the financial performance of manufacturing companies is persistent. The model essentially showed that the ability of manufacturing companies in Nigeria to generate profits from the

shareholder equities is hampered by fluctuation in exchange rate. The link between this measure of financial performance and exchange rate fluctuation may be indicative that most equity holdings in Nigerian manufacturing firms are not subject to foreign ownership, which could have made it respond significantly to the uncertainties in exchange rate. This implies that the profitability of shareholder equity in Nigerian manufacturing, though negatively affected by an exogenous event like exchange rate volatility, is not severely affected by it. Like the ROA model, import duty does not have a significant positive effect on the financial performance of manufacturing firms in Nigeria, sadly for an economy that depends on imported raw materials for production to take place Opaluwa, *et al.* (2010), it is instructive to find that performance increases as import duties increase.

The expectation of a negative effect of interest rate on the financial performance of Nigerian manufacturing firms is confirmed. The more expensive capital is, the more it eats into the ability of manufacturing firms to be profitable. It was confirmed that gross capital formation in the economy helps Nigerian manufacturing firms become more profitable. This implies that macro capital can enhance the ability of equity of manufacturing firms to return a profit. Like in the ROA model, the statistical insignificance of this may be explained on the grounds that it is possible that the capital formation is not adequate or is taking too long to form.

In the EPS model, exchange rate fluctuation continued to have a negative relationship with the financial performance indicator – EPS, but with a larger coefficient than the coefficient of the other two performance indicators. The implication is that a volatile exchange rate reduces the value of manufacturing companies in Nigeria through how much they can earn per share more than ROA and ROE. Despite this negative effect, it is not significant, which suggests that the manufacturing firms in Nigeria may not be exposed to as many foreign sales as to be significantly affected by exchange rate fluctuation. Import duty in the EPS model is shown to affect the growth prospects and profitability of manufacturing firms in Nigeria. While this effect is not significant, it shows how vulnerable the financial performance of manufacturing firms in Nigeria can be to rising duties on imports.

5. Conclusion and Recommendations

This study hypothesized that exchange rate fluctuation affected the financial performance of manufacturing firms in Nigeria. In the static model, it was confirmed that exchange rate fluctuation had a negative effect on the financial performance of manufacturing companies in Nigeria, with its effect on return on assets (ROA) being more significant than on ROE and EPS.

In the equation for ROE, the effect of exchange rate fluctuation remained negative, like the ROA equation, but insignificant. This indicates that the negative effect of fluctuation in exchange rates on the financial performance of manufacturing companies is persistent. The model essentially showed that the ability of manufacturing companies in Nigeria to generate profits from the shareholder equities is hampered by fluctuation in exchange rate. The link between this measure of financial performance and exchange rate fluctuation may be indicative that most equity holdings in Nigerian manufacturing firms are not subject to foreign ownership, which could have made it respond significantly to the uncertainties in exchange rate. This implies that the profitability of shareholder equity in Nigerian manufacturing, though negatively affected by an exogenous event like exchange rate fluctuation, is not severely affected by it.

Like the ROA model, import duty does not have a significant positive effect on the financial performance of manufacturing firms in Nigeria, sadly for an economy that depends on imported raw materials for production to take place Opaluwa, *et al.* (2010), it is instructive to find that performance increases as import duties increase. The expectation of a negative effect of interest rate on the financial performance of Nigerian manufacturing firms is confirmed. The more expensive capital is, the more it eats into the ability of manufacturing firms to be profitable. It

was confirmed that gross capital formation in the economy helps Nigerian manufacturing firms become more profitable. This implies that macro capital can enhance the ability of equity of manufacturing firms to return a profit. Like in the ROA model, the statistical insignificance of this may be explained on the grounds that it is possible that the capital formation is not adequate or is taking too long to form.

In the EPS model, exchange rate fluctuation retained its negative relationship with the financial performance indicator – EPS, but with a larger coefficient than the fluctuation coefficient of the other two performance indicators. The implication is that a volatile exchange rate reduces the value of manufacturing companies in Nigeria through how much they can earn per share more than ROA and ROE. Despite this negative effect, it is not significant, which suggests that the manufacturing firms in Nigeria may not be exposed to as many foreign sales as to be significantly affected by exchange rate fluctuation. Import duty in the EPS model is shown to affect the growth prospects and profitability of manufacturing firms in Nigeria. While this effect is not significant, it shows how vulnerable the financial performance of manufacturing firms in Nigeria can be to rising duties on imports.

Financial performance in manufacturing companies in Nigeria is shown to suffer negatively from the fluctuation in exchange rate. That is, the ability of manufacturing companies in Nigeria to generate profits with their assets, generate returns on investment, and distribute dividends per share is affected by the movements in exchange rate. Other macroeconomic controls – import duties, interest rates, and capital formation – did not exert significant effects on firm financial performance. Following the findings in the study, these recommendations are made:

1. A fixed exchange rate to limit fluctuations that may negatively affect the financial performance of Nigerian manufacturing companies may be needed. Allowing the fluctuation in exchange rate will significantly affect the profitability of manufacturing firms in Nigeria thus, negatively affecting their financial performance.
2. It was found in the study that financial performance is positively related to import duties, which may not be an ideal on the part of the consumers who may have to bear the rising cost of import. These firms may forego investments in other areas to be able to bear the cost of importing raw materials for production. Thus, the government can help manufacturing firms in Nigeria raise their financial performance by reducing import duties.
3. The monetary policy of the Central Bank of Nigeria should be expansionary, given that the financial performance of manufacturing firms in Nigeria largely responds negatively to tighter monetary policy. The lower the cost of interest rate for manufacturing firms, the more they can expand production and increase performance.
4. Given that gross capital formation positively influences financial performance in manufacturing firms, but insignificantly, there is a need for the government to invest more in infrastructure. The effect of such investment will create a more conducive environment for manufacturing firms to function.

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