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Exchange Rate Volatility and Stock Market Capitalization in Nigeria

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Abstract

Background: The Nigeria Stock market is the place where stocks are transacted between the issuing companies and the prospective investors buying the stocks. Funds raised are used to increase capacity utilization, production, consumption of goods and services, employment opportunities and standard of living in such a given economy. However, based on some factors, it turns out to become very difficult to raise the required funds from the stock market through the Nigeria Stock Exchange (NSE) to finance the desired projects to expand economic development. The experience is caused by the shallowness of the stock market capitalization which is one of the indicators often used as a measure of market size defined as the total values of all listed securities. Therefore, this study examined the effect of exchange rate volatility on stock market capitalization in Nigeria between the periods of 1999 to 2022.

Material and methods: The study employed an ex-post facto research design while some pre-estimations were applied. The estimation techniques for the study was the generalized (GARCH). The inferences were also made using 5% significant level.

Findings: Findings from the study showed that both exchange rate volatility have negative and insignificant effect on stock market capitalization (β= -0.04979, P-value > 0.05) while consumer price index (β= 0.29818, P-value > 0.05) have positive but insignificant effect on stock market capitalization.

Conclusion: The study concluded that exchange rate volatility does not have any significant effect on stock market performance in Nigeria. The study therefore recommended that Policymakers should prioritize implementing measures aimed at stabilizing the exchange rate to mitigate its adverse effects on stock market performance. This could involve adopting prudent monetary and fiscal policies to manage exchange rate fluctuations effectively. Additionally, efforts should be made to enhance transparency and predictability in exchange rate management to instill investor confidence and promote market stability.

1. Introduction

The Nigerian capital market plays a crucial role in the country's economy, serving as a source of financing for businesses and a channel for investment. Market capitalization, which represents the total value of all listed companies' outstanding shares, is a key indicator of the size and performance of the capital market. Funds raised are used to increase capacity utilization, production, consumption of goods and services, employment opportunities and standard of living in such a given economy (Onisanwa & Adaji, 2020). However, based on some factors, it turns out to become very difficult to raise the required funds from the stock market through the Nigeria Stock Exchange (NSE) to finance the desired projects to expand economic development. The experience is caused by the shallowness of the stock market capitalization which is one of the indicators often used as a measure of market size (Etale & Tabowei, 2019).

The issue of low stock market capitalization continued to decline occasioned by the low volume of stocks/ securities traded in the Exchange when compared with other stock markets in the developed countries. The difficulty by medium scale enterprises to raise fund in the capital market is another problem noted with the Nigeria stock market. The level of illiteracy and ignorance is another problem characterizing the development of the stock market in Nigeria. Poor infrastructural development is another major challenge of the capital market in Nigeria (Andy, 2015). A country with over 200 million people, with bad roads and poor technological infrastructure, poor internet connection and paucity of other modern enablers of economic development would not develop a capital market that can compete with the developed nation. Macro-economic variables of exchange rate, interest rates and inflation no doubt will affect economic transactions of any nation. Exchange rate has the most potent effect due to its impact on both exports and imports, including Foreign Domestic Investments (FDI) (Ewubare, Chukwu & Ezekwe, 2022).

The exchange rate is a crucial factor that can significantly impact the stock market capitalization. The fluctuation in the exchange rate can affect international trade, investment decisions, and cross-border transactions, which in turn can lead to changes in stock prices and market volatility. The relationship between exchange rate volatility and stock market performance can be complex and dynamic, as it depends on various economic, political, and financial factors. A volatile stock market affects the investor’s decision making. The debate on exchange rate variability and uncertainty has long divided economists. At one end, the argument supports the fixed exchange rate while the other, the floating system. Nigeria started with the fixed exchange rate regime in the 60s by benchmarking its local currency to the British Pounds. One major problem was that, when Britain devalued its Pounds, Nigeria government did not find it imperative then to devalue the Naira. This regime climaxed with the Stabilization Act. (Ignatius & Ogbonna, 2020)

The failure of the Stabilization Act to address the economic problems resulted to the adoption of the Structural Adjustment Programme (SAP) in 1986. The Structural Adjustment Programme was targeted at having a realistic exchange rate by floating a flexible exchange regime. The flexible exchange rate regime

produced a significant volatility and uncertainty in the exchange rate of the naira which account for fluctuations in import bills. This aroused a great concern as exchange rate volatility, which stems from shock in the financial markets, level of output, income amongst others, yield conflicting results about its impact on trade Arize (1998). The volatility of the exchange rate resulted into some undesirable macro economic impacts like high inflation rate, high interest rate, and balance of payment deficits among others. Nigeria being an import dependent nation with a mono based source of foreign exchange has witnessed significant drop in its foreign reserves which consequently resulted into serious exchange rate volatility. This consequently affect stability of the economy. Therefore, this study examine the effect of exchange rate volatility on stock market capitalization in Nigeria. The following section is structured in literature review, methodology, result and discussion and conclusion and recommendations.

2. Literature review

2.1 Conceptual Review

2.1.1 Exchange Rate Volatility

Exchange rate is the value of one currency for the purpose of conversion to another. Exchange rate movements greatly affect the stock market return volatility owing to its information content to the investors. When there are high fluctuations in the exchange rates, there would be high movements of market return volatility. Some studies have concluded that there is a strong relationship between exchange rate movements and market capitalization, while others have not. Specifically, the information content of exchange rate movements would be carried to the securities business (Etale & Tabowei, 2019).

Volatility represents the estimate of variation in a variable, with the main characteristic of not being an observable variable (Salisu, D & Gupta, 2022). In the financial market, volatility portrays the fluctuation of asset prices and denotes an impasse when trying to anticipate their fluctuations (Jebabli; Kouaissah; et al, 2022). As a monetary phenomenon, exchange rate is linked to the stock market performance. This has its foundation to established theoretical and empirical relationships between financial and real sector development (Ewubare et al, 2022). Abimbola & Olusegun (2017) are of the view that changes in the stock market development are closely linked to exchange rate fluctuations in addition to other macroeconomic outcomes.

2.1.2 Stock Market Capitalization

Market capitalization is the total monetary value of all outstanding shares of a company (Chen, 2018). It is calculated by multiplying the current share price by the number of outstanding shares. Market analysts normally apply this figure to represent a company's size, as many stock market indexes are weighted by market capitalization. Owing to the fact that market capitalization is a function of share price, it can vary

greatly from month to month, or even from day to day (Chen, 2018; Maverick, 2019). Outstanding shares refer to a company's existing stock in the hands of its shareholders, including share blocks held by institutional investors and restricted shares owned by the company's officers and insiders (Chen, 2018). Outstanding shares are shown on a company's balance sheet under the heading "Capital Stock." The number of outstanding shares is used in calculating key metrics such as a company's market capitalization, as well as its earnings per share (EPS) and cash flow per share (CFPS). A company's number of outstanding shares is not static and may fluctuate wildly over time. Market capitalization does not measure the equity value of a company. In Nigeria, Market capitalization (also known as market value) is the share price times the number of shares outstanding (including their several classes) for listed domestic companies. Shareholder equity is referred to as a more accurate assessment of a company's actual net worth (Maverick, 2019). Equity is a simple statement of a company's assets minus its liabilities; it could also be seen as the net profit that would remain if the company was sold or liquidated at fair value. Unlike market capitalization, equity does not fluctuate day to day based on stock price (Maverick, 2019). The capitalization of a company is the product of the price of a share for the number of shares issued and listed. The sum of the capitalizations of companies listed on a market is equal to the value of the total capitalization of that financial market. Market capitalization is an important market indicator of the value of shares and the value of companies in general (Pavone, 2019)

Market capitalization refers to the total value of shares traded on the stock market with respect to the number of shares and the share prices. The stock market is also known as the equity market and is one of the important areas of a market economy as it provides access to capital for companies, ownership in the company for primary investors and the potential of gains based on the firm's future performance for secondary investors (Osoro, 2013). Capitalization entails the number of listed securities in the exchange. Liquidity of the market indicates the extent to which shares can be traded with ease. It is measured through the stock value traded as a percentage of GDP and the turnover ratio which is stock traded as a percentage of market capitalization (Wakilat, Jauhari et al, 2016). Market capitalization (also known as market value) is the share price times the number of shares outstanding.

2.2 Theoretical Review: International Fisher Effect Theory

The International Fisher Effect (IFE), proposed by Irving Fisher in 1930, serves as an international extension of the Fisher Effect, incorporating elements of the Purchasing Power Parity theory. The Fisher Effect posits that real interest rates should equalize across countries due to arbitrage opportunities, implying that differences in nominal interest rates between countries stem from discrepancies in expected inflation

(Lagat & Nyandema, 2016).

At its core, the IFE asserts that changes in the spot exchange rate between two currencies will mirror differences in their nominal interest rates. For instance, if the inflation rate in Sweden rises relative to the US, the Swedish Krona would depreciate against the US dollar, adjusting to the disparity in nominal interest rates (Lagat & Nyandema, 2016).

Investors seeking profit through speculation on future spot rates would shift capital from countries with lower interest rates to those with higher rates, facilitating equilibrium in exchange rates. This movement of capital, whether directly through international money markets or indirectly through cross-border investment or changes in trade patterns, prompts adjustments in exchange rates, nullifying arbitrage opportunities (Lagat & Nyandema, 2016).

While nominal interest differentials are viewed as unbiased predictors of future spot exchange rate changes, they may not provide precise forecasts. Nevertheless, the expectation is that prediction errors will balance out over time, leading to a convergence between nominal interest differentials and actual spot rate movements (Kane & Rosental, 2012).

This implies that the purchase of a foreign asset is not just an investment in security that pays a given rate of interest; it is also an investment in a foreign currency, where the return depends on the appreciation or depreciation of the exchange rate. The International Fisher Effect says that the return on foreign investment will be offset by an exchange rate change. Consequently, an investor that consistently purchases foreign assets will on average earn a similar return as investing in purely domestic assets.

Thus, the International Fisher Effect equation can be written as:

$$\mathrm{E} = \frac{i1-i2}{1+i2} \approx i1 - i2$$

Where:

E = the percent change in the exchange rate

$i1$ = country A's interest rate

$i2$ = country B's interest rate

Furthermore, the International Fisher Effect theory proposes that higher interest rates will devalue currencies due to the higher nominal rates that replicate higher anticipated inflation. The International Fisher's Theory establishes connections between variances in the interest rate of two nations and their conforming differences in inflation, to the level that high inflation rates countries would possess nominal interest rates that are higher than the ones with lower inflation rates (Ebiringa & Anyaogu, 2014). The IFE states that the future foreign currency spot rate will be different in proportion from the current/existing spot rate by a quantity that equals the nominal interest rate differential percentage between the foreign and home countries. This study uses the IFE theory to link the nominal risk-free rates of interest which comprise a

real return rate and the expected inflation.

2.3 Empirical Review

Previous studies have explored the relationship between exchange rate volatility and stock market performance. For example, Adedeji (2023) examined the impact of the Exchange Rate on stock market indicators in Nigeria from 1985 to 2020. Using a simple static regression model with an autoregressive adjustment component, the study found a negative impact of the Exchange Rate on stock market development, including returns, capitalization, and volume. The analysis also revealed varying impacts of other correlated control factors on stock market indicators.

Chan and Patricia (2023) analyzed the effect of macroeconomic variables on stock market performance in Malaysia from January 2015 to December 2021. Using the Johansen Cointegration Test and regression analysis, the study found that the real effective exchange rate had a moderate positive effect on the KLCI index, while the inflation rate and overnight-policy rate had long-term positive effects. M2 money supply had a long-term negative effect on the KLCI index, contributing to the understanding of macroeconomic variables' impact on stock market performance in emerging markets.

Azeem et al., (2023) studied the impact of stock market capitalization on carbon emissions in forty high carbon-emitting countries from 1996 to 2018. Using the Driscoll-Kraay method, the study found an inverted U relationship between stock market capitalization and environmental degradation. The study proposed an extended environmental Kuznets curve based on stock market capitalization, highlighting the need to integrate stock market capitalization into climate change adaptation strategies to address the adverse effects of environmental degradation.

Asiedu and Boahen (2022) analyzed the impact of Belgium's stock market capitalization, international investment, and clean energy on CO2 emissions from 1990 to 2018. Using cointegration analysis, they found long-run links between stock market capitalization, international investment, clean energy, and environmental quality. Granger causality tests showed that international investment had a unidirectional relationship with environmental quality, while clean energy had a bi-directional relationship. Stock market development had the most significant impact on carbon dioxide emissions, and renewable energy had a positive impact. Economic growth negatively affected environmental quality in Belgium.

Ewubare et al (2022) investigated the effects of nominal exchange rate, real effective exchange rate, real interest rate, and inflation rate on market capitalization from 1993 to 2020. Using unit root tests, cointegration tests, and ARDL estimation, they found that real effective exchange rate positively impacted market capitalization, indicating that a depreciation of the naira could increase the capital market size. Nominal exchange rate had an insignificant positive effect, possibly due to inconsistent official exchange rate policies. Real interest rate negatively affected market capitalization in the long run, and inflation rate

also negatively affected it. Granger causality tests showed a unidirectional causality from real interest rate to market capitalization.

Alshubiri (2021) analyzed the stock market capitalization and financial growth nexus of Western European countries from 1989 to 2018, finding positive significant relationships between stock market capitalization, foreign direct investment, and stocks traded, and financial growth. Negative and significant relationships were found between GDP per capita growth and inflation, and financial growth. Makoni (2021) investigated the relationship between foreign direct investment, stock market development, and institutional quality in nine African countries from 2009 to 2016, finding a positive and statistically significant relationship between foreign direct investment and stock market development. Institutional quality had a negative effect on FDI inflows. Onisanwa and Adaji (2020) studied the performance of the stock market and investment growth nexus in Nigeria, finding that market capitalization had a negative impact on gross capital formation in the short run but a positive impact in the long run. Turnover ratio had a negative impact on investment growth, while the total value traded ratio had a positive impact on gross capital formation in both the short and long run.

Dabwor, Iorember et al (2020) found that globalization has a positive, elastic, and statistically significant effect on economic growth in Nigeria, recommending policy measures to stabilize and reposition the stock market for continued economic growth. Hariyanto (2020) examined the effect of trading volume, market capitalization, and firm size on return on shares in Indonesia, finding significant negative effects of trading volume, market capitalization, and firm size on return on shares. Almutiri (2020) determined that foreign investors' buying and selling have a significant impact on the Saudi stock market performance, suggesting that policymakers and financial institutions should pay attention to foreign investors' activities. Etale and Tabowei (2019) investigated the effect of macroeconomic variables on market capitalization in Nigeria, finding that gross domestic product had a significant positive effect, exchange rate had a significant negative effect, while interest rate and inflation had insignificant negative associations with market capitalization.

Pavone (2019) examined the effect of financial variables on market capitalization in Italy, finding positive relationships between market capitalization and Price/Earnings Ratio, Operating income/Turnover per share, and Working Capital per Share, and negative relationships with ROE, ROA, and Earnings Yield. Adokwe, Agu et al (2019) investigated the effect of Exchange Rate on foreign direct investment in Nigeria from 1986 to 2016, finding a negative but significant effect of Exchange Rate on Nigeria’s foreign direct investment. Enoruwa Ezuem et al (2019) examined the impact of the capital market on the economic growth of Nigeria from 1985 to 2015, finding significant relationships between predictors and economic growth, suggesting the need for innovation and fairness in information management in the capital market to attract

investors and promote economic growth. Nyanaro and Elly (2017) established an existence of long term relationship between the stock market performance variables (market capitalization and liquidity) and economic growth in the East African community. The study established that there was no relationship between the share price volatility of the stock market and economic growth.

3. Methodology

3.1 Research Design

The research design is structured to investigate the effect of exchange rate volatility of stock market capitalisation in Nigeria. The study make use of ex-post facto research design. An ex-post facto investigation seeks to reveal possible relationship by observing an existing condition or a state of affairs and searching back in time for plausible contributing factors. Specifically, the nexus of this research design is on the premise that this study will rely on historical data that will be obtained from the database of the bureau of statistics and local financial regulators and their relevant publications.

3.2 Model Specification

The study will use monthly data for twenty-three years between 1999 and 2022 which span through 276 months' period. The data will be obtained through secondary sources such as annual reports of the Central Bank of Nigeria, monthly reports from the Nigeria Sock Exchange Ltd, the National Bureau of Statistics (NBS). This period will cover the period of the recent Nigeria democracy as well as the pre and post global recession. The data will be ideal in answering the research questions and also empirically test the research hypothesis in order to achieve the objectives of the study.

The long run relation of exchange rate volatility and stock market performance in Nigeria is given in equation 3.1 as,

$$SMP_0 = b_0 + b_1 ERV_t + b_2 CPI_t + \varepsilon_t \qquad (3.1)$$

The variables are Stock Market Performance (SMP), Exchange Rate Volatility, Consumer Price Index (CPI). The measure of exchange rate volatility is constructed using the GARCH (generalized autoregressive conditional heteroskedasticity) approach. The approach is discussed below,

Let the variable of concern to be exchange rate volatility (Y). GARCH allows the variance of Y change over time by assuming Y to be a random variable, which is drawn from a conditional density function $f(Y_t|Y_{t-1})$.

A simple GARCH model assumes that Y follows a first-order autoregressive process, i.e. $Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \varepsilon_t$, where ε_t is white noise with $E(\varepsilon) = 0$and $V(\varepsilon) = h^2$. In order to forecast the variance of Y, there is a need to estimate the conditional variance of ε_t which is a time-varying variable.

The theoretical specification of a GARCH model, which is being used is as follows:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \varepsilon_t \quad (3.2)$$

$$\varepsilon_t | I_{t-1} \sim N(0, h_t^2) \quad (3.3)$$

$$V(Y|I_{t-1}) = V(\varepsilon_t|I_{t-1}) = h_t^2 \quad (3.4)$$

$$h_t^2 = \beta_0 + \beta_1 \varepsilon_{t-1}^{2+} \beta_2 \varepsilon_{t-2}^2 + \cdots + \beta_q \varepsilon_{t-q}^2 \varphi_1 h_{t-1}^2 + \varphi_2 h_{t-2}^2 + \cdots + \varphi_p h_{t-p}^2 \quad (3.5)$$

Where, I_{t-1} includes all available information and h_t^2 is the conditional variance. The GARCH (p,q) model outlined by Equation (3.5) is used to generate predicted value of h_t^2 as a measure of volatility of Y.

Before estimating the GARCH model outlined by Equation (3.5) the study must establish the ARCH effect in Y. The ARCH effect states that the variance of the current error term is a function of the variance of error term in the previous periods. The following ARCH (q) equation is usually estimated:

$$\varepsilon_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-2}^2 + \cdots + \alpha_q \varepsilon_{t-q}^2 \quad (3.6)$$

A few significant $\alpha's$ supported the ARCH effect. After establishing the ARCH effect, the study estimated Equations (3.2)–(3.5) simultaneously. The order of GARCH was determined by significance of $\beta's$ and $\varphi's$ in (5). In most instances, a GARCH (1,1) specification is sufficient. Following other studies, the study also assume a GARCH (1,1) specification of the type: $h_t^2 = \beta_0 + \beta_1 {\varepsilon_{t-1}}^2 + \varphi_1 {h_{t-1}}^2$ which yielded significant coefficients.

To distinguish the short-run effects of volatility measures from their long-run effects, Equation (3.7) is specified in an error–correction modeling form. Following Pesaran *et al*.'s (2001) bounds testing approach and rewrite (1) as follows:

$$\Delta SMP_t = \alpha + \sum_{i=1}^{n1} \beta_i \Delta SMP_{t-i} + \sum_{i=0}^{n2} \delta_i \Delta ERV_{t-i} + \sum_{i=0}^{n3} \theta_i \Delta CPI_{t-i} + \rho_0 SMP_{t-1} + \rho_1 ERV_{t-1} + \rho_2 CPI_{t-1} + \varepsilon_t \quad (3.7)$$

Without lagged level variables equation (3.7) will be a standard VAR model. The linear combination of lagged level variables has replaced the lagged error term from equation (3.1), resulting in error–correction model expressed in equation (3.7). To test for cointegration, the Pesaran *et al*. (2001) F-test for joint

significance of the lagged level variables was used. Once cointegration is established, estimates of $\rho_1 - \rho_4$ normalized on ρ_0 will yield the long-run effects of all exogenous variables. The short-run effects are reflected by the estimates of coefficients attached to first-different variables.

In determining the effect of exchange rate volatility on the stock market capitalization, the long-run model is of the form;

$SMC_t = f(ERV_t, CPI_t)$ 3.14

The structural form equation of the model is given as;

$$SMC_0 = b_0 + b_1 ERV_t + b_2 CPI_t + \varepsilon_t \qquad (3.15)$$

The long run and the short run equations of equation 3.15 is given expressed in equation 3.16 below;

Model III Exchange Rate Volatility and Stock Market Capitalization

$$\Delta SMC_t = \alpha + \sum_{i=1}^{n1} \beta_i \Delta SMC_{t-i} + \sum_{i=0}^{n2} \delta_i \Delta ERV_{t-i} + \sum_{i=0}^{n3} \theta_i \Delta CPI_{t-i} + \rho_0 SMC_{t-1} + \rho_1 ERV_{t-1} + \rho_2 CPI_{t-1} + \varepsilon_t \qquad (3.16)$$

Where:

SMC = Stock Market Capitalisation

(ER) = Exchange Rate

(CPI) = Consumer Price index

α is the intercept

ρ_i is the estimated coefficients for the explanatory variables

t represents the periods under study

ε_t are the error term

3.3 Estimation Techniques

This study employed Autoregressive Conditional Heteroscedasticty (ARCH) and its variants; Generalized Autoregressive Conditional Heteroscedasticty (GARCH), Threshold Generalized Autoregressive Conditional Heteroscedasticty (TGARCH) model in order to capture conditional variance, volatility clustering, volatility persistence and asymmetric effect for exchange rate volatility on stock market performance ib Nigeria. GARCH is employed because it captures volatility clustering and persistence (Bollerslev, 1986), while TGARCH is used because it captures asymmetric effects on volatility (Zakoian,

1994)

The mean equation is specified as

$$R_t = \vartheta + \varepsilon_t$$

$$\varepsilon_t \sim Niid(0, \vartheta^2)$$

The GARCH model is specified as

$$\partial_t^2 = \propto_o + \propto_o + \varepsilon^2_{t-1} + \beta_1 \vartheta^2_{t-1}$$

Where R_t is returns, ϑ is intercept, ε_t is white noise error term, $\propto_o$ is constant representing the long-term average, $\propto_1$ is the ARCH term which captures the last period information about volatility, β_1 is the GARCH term which captures the forecasted variance from the previous period and ($\propto_1 + \beta_1$) is coefficients which governs both the stationarity of the GARCH model and persistence of volatility.

If ($\propto_1 + \beta_1$)> 0, then the model is stationary and volatility is mean reverting. On the contrary if $\propto_1 + \beta_1 = 1$, then the model have long memory and volatility is persistent.

The TGARCH (1.1) is specified as;

$$\vartheta^{\varepsilon}_t = \propto_0 + \propto_1 \varepsilon^2_{t-1} + \gamma . z_{t-1} \varepsilon^2_{t-1} + \beta_1 \vartheta^2_{t-1}$$

Where,

$z_{t-1} = 1$, if $\varepsilon_{t-1} < 0$ *and* 0 otherwise; the TGARCH model assumes that the effect of good news and bad news volatility ϑ^2_t *are* different, while $\varepsilon_{t-i} > 0$ indicates good news, $\varepsilon_{t-1} < o$ indicates bad news. Further, while $\propto$, captures the effect of goods news.

$\propto_1 + \gamma$ captures the effect of bad news. There is asymmetric effect if $Y \neq 0$, and leverage effect γ is positive.

4. Result and Discussion

4.1 Descriptive Statistics

These descriptive statistics provide a snapshot of the variables related to economic globalization and stock market performance in Nigeria. They offer insights into the central tendencies, variability, and ranges of the data, allowing for initial observations and comparisons

Table 4.1: Descriptive Statistics

	Exchange_Rate	Stock Market Capitalizat	Consumer Price Index
Mean	137.8190	9323.951	18.04470
Median	128.9370	4010.480	12.87658
Maximum	401.1520	42054.50	72.83550

Minimum	8.038285	16.30000	5.388008
Std. Dev.	106.9853	11433.30	16.10759
Skewness	0.792016	1.310056	2.206693
Kurtosis	2.960799	4.125234	6.849218
Jarque-Bera	3.347592	10.84152	47.15487
Probability	0.187534	0.004424	0.000000
Sum	4410.210	298366.4	595.4752
Sum Sq. Dev.	354821.2	4.05E+09	8302.538
Observations	32	32	32

Table 4.1 presents the descriptive statistics. The result shows that the mean exchange rate stands at 137.8190, representing the average value in the dataset. This variable reflects the monetary value of one currency in terms of another. The median, which represents the middle value, is observed at 128.9370. The maximum and minimum values, 401.1520 and 8.038285, respectively, provide insights into the range of exchange rate fluctuations. The standard deviation of 106.9853 indicates considerable variability, while the positive skewness of 0.792016 suggests a longer right tail in the distribution. The kurtosis value of 2.960799 indicates heavier tails, and the Jarque-Bera test suggests non-normality with a probability of 0.187534.

The mean stock market capitalization is 9323.951, representing the average total market value of a country's outstanding shares of stocks. The median is 4010.480, and the standard deviation of 11433.30 indicates substantial variability. The skewness of 1.310056 suggests a right-skewed distribution, and the kurtosis of 4.125234 indicates substantially heavy tails. The Jarque-Bera test with a probability of 0.004424 strongly rejects normality.

The mean consumer price index is 18.044, reflecting the average inflation in the economy over the observed years. The median is 12.876, and the standard deviation of 16.107 indicates variability in consumer price index values. The skewness of 2.2066 suggests a right-skewed distribution, and the kurtosis of 6.849 indicates leptokurtic in nature and heavy tails. The Jarque-Bera test with a probability of 0.000 denotes that the distribution is not normally distributed.

4.2. Unit Root Test

Table 4.2: Augmented Dickey Fuller (ADF) Unit root Test Result

Variable	Level	1st difference	Conclusion
LER	-1.287	-3.485***	**Stationary at first difference**
SMTR	-3.700***	-12.16***	**Stationary at level**
CPI	-2.155***	-4.598***	**Stationary at First Difference**

Statistical significance at the 1%, 5%, and 10% levels is denoted by ***, **, and *, respectively for ADF at level and first difference

Table 4.2 presents the results of the Augmented Dickey Fuller (ADF) unit root test, a critical analysis for

assessing the stationarity of the variables under consideration. The variable "ler" and CPI indicate stationarity at the first difference, with ADF statistics of -3.485 and -4.598 respectively, emphasizing that the variables are stationary only after their first differences. While, SMTR exhibit strong evidence of stationarity at the level, with highly significant ADF statistics of -3.700. These results depicts that this variables have mixed stationarity.

4.3 Exchange Rate Volatility and Market Capitalization

Table 4.3: MODEL ON Exchange Rate Volatility and Market Capitalization (Rmarketcap)
Dependent Variable: RMARKETCAP

GARCH (1,1) RESULTS			Asymmetric GARCH - T-GARCH		
Variable	Coefficient	Std. Error	**Variable**	Coefficient	Std. Error
MEAN EQUATION			**MEAN EQUATION**		
RMARKETCAP(-1)	0.250971***	0.075560	**C**	0.000843**	0.000342
RCPI	0.298189	0.266639	**RESID(-1)^2**	0.102421	0.063123
			RESID(-1)^2*(RESID(-		
REXCHRATE	-0.049792	0.116460	**1)<0)**	0.341853**	0.144247
C	0.016162***	0.004480	**GARCH(-1)**	0.592788***	0.104108
Variance Equation					
C	0.000739**	0.000293	**C**	0.000843**	0.000342
RESID(-1)^2	0.259808**	0.087847	**RESID(-1)^2**	0.102421	0.063123
			RESID(-1)^2*(RESID(-		
GARCH(-1)	0.628176***	0.098937	**1)<0)**	0.341853**	0.144247
			GARCH(-1)	0.592788***	0.104108
R-squared	0.030057		**R-squared**	0.039360	
Adjusted R-squared	0.019739		**Adjusted R-squared**	0.029140	
S.E. of regression	0.072304		**S.E. of regression**	0.071957	
Durbin-Watson stat	2.224724		**Durbin-Watson stat**	2.188545	

Where: RESID(-1)^2 and RESID(-1)^2*(RESID(-1)<0) represents the arch (captures shocks in the previous period) and asymmetric terms respectively. GARCH(-1) is the GARCH term measuring volatility in the previous period. ***,**,* indicates statistical significance at 1%, 5% and 10% respectively, indicating the rejection of the null hypothesis of no effect (slope coefficient is zero).

The result on exchange rate volatility and market capitalization is reported in Table 4.4. The coefficient for lagged market capitalization returns (RMARKETCAP(-1)) is positive and statistically significant, suggesting that past market capitalization returns have a substantial impact on the current level of volatility. This implies persistence in market reactions to changes in market capitalization, influencing subsequent volatility. However, the coefficients for lagged returns of the Consumer Price Index (RCPI) and exchange rate returns (REXCHRATE) are not statistically significant at conventional levels. This suggests that past returns of these variables do not robustly affect the current volatility within the specified statistical threshold. The constant term (C) in the model has a significant coefficient, indicating a baseline level of

volatility when all other variables are zero.

The variance equation components in the GARCH(1,1) model play a crucial role in unveiling the intricate dynamics of conditional variance, providing key insights into the temporal patterns of volatility within the financial context. Specifically, the squared lagged residuals and the GARCH term are paramount in understanding how past market conditions contribute to the current level of volatility.

The significant coefficients associated with both the squared lagged residuals and the GARCH term highlight their substantial impact on the determination of conditional variance. The squared lagged residuals, representing the historical shocks or unexpected events in the market, contribute significantly to the current volatility. This implies that periods of heightened volatility, characterized by unforeseen market movements, tend to leave a lasting impact and persist over time. Investors and risk managers should take heed of this phenomenon, recognizing that past instances of market turbulence can have a lasting influence on current volatility levels.

Similarly, the GARCH term's significant coefficient emphasizes the persistence of past conditional volatility in shaping the present level of volatility. This component captures the influence of squared lagged conditional volatility on the current volatility, indicating that periods characterized by high volatility tend to cluster over time. This phenomenon, known as volatility clustering, suggests that once the market experiences heightened volatility, there is a tendency for such periods to be followed by additional episodes of increased market uncertainty. Recognizing this clustering behavior is essential for making informed decisions regarding risk management and portfolio optimization.

In essence, the significant coefficients for both the squared lagged residuals and the GARCH term underscore the importance of historical patterns in determining current volatility levels. The presence of volatility clustering signifies that the market's reaction to unexpected events or shocks is not transitory but rather has a lasting impact, influencing subsequent periods of market activity. This insight is particularly valuable for market participants seeking to navigate and anticipate changes in volatility, allowing for more effective risk assessment and strategic decision-making. The model explains a modest proportion of the variation in volatility, as indicated by the R-squared value, and the Durbin-Watson statistic suggests mild positive autocorrelation in the residuals. This implies some degree of pattern persistence in the model's residuals. An asymmetric GARCH model is further applied to examine asymmetric relationship between exchange rate volatility and volatility in returns of market capitalization reported in Table 4.4.

Notably, the coefficient for lagged market capitalization returns is both positive and statistically significant at 0.227668, indicating a substantial impact of past market capitalization returns on the current level of volatility. This emphasizes the persistent influence of historical market capitalization trends on present volatility. On the other hand, the coefficients for lagged returns of the Consumer Price Index (RCPI) and

exchange rate returns (REXCHRATE) are not statistically significant at conventional levels. This suggests that the lagged returns of these variables may not robustly influence the current volatility of market capitalization returns. The constant term (C) in the model has a significant coefficient of 0.013074, representing the baseline volatility when all other variables are zero. Moving to the variance equation components, the significant constant term implies a baseline level of volatility not explained by other components. The specific component denoted by RESID(-1)^2*(RESID(-1)<0) captures the asymmetric impact of squared lagged residuals on the current volatility in the context of positive and negative exchange rate volatility.

The positive and statistically significant coefficient of 0.341853 associated with this term is of paramount importance. It signifies that when the lagged squared residuals are negative, reflecting periods of negative volatility or unexpected market downturns, the subsequent increase in the current volatility of market capitalization returns is more pronounced. In other words, negative market shocks, or instances of decreased market value, have a stronger influence on the contemporaneous volatility compared to an equivalent magnitude of positive market shocks. This finding underscores a distinct asymmetry in the market's response to different directions of exchange rate movements, revealing a heightened sensitivity to negative developments.

Furthermore, the persistence of past squared residuals, as indicated by the coefficient of 0.102421, emphasizes the enduring influence of historical shocks or unexpected events on the current level of volatility. This suggests that periods of heightened volatility, whether positive or negative, have a lasting impact and tend to persist over time. Investors and market participants should be cognizant of this persistence, as it implies that the market's memory of past shocks contributes significantly to the current state of volatility.

The GARCH term, with a substantial coefficient of 0.592788, further highlights the sustained influence of past conditional volatility on the present level of volatility. This term represents the autoregressive component of the conditional volatility, indicating that periods of high or low volatility tend to cluster over time. In the context of the model, the GARCH term signifies that past market conditions, as captured by conditional volatility, play a crucial role in shaping the ongoing volatility, and this influence endures.

In essence, the asymmetry in response to exchange rate movements, coupled with the persistence of past squared residuals and the GARCH term, underscores the complex interplay of historical patterns in determining the current volatility of market capitalization returns. Acknowledging these dynamics is pivotal for market participants seeking to understand and navigate the nuanced behavior of financial markets, particularly in response to asymmetric information or varying directions of economic indicators.

In terms of model fit, the R-squared value of 0.039360 suggests that the model explains approximately

3.94% of the variation in volatility. The adjusted R-squared, accounting for the number of predictors, is 0.029140. The Durbin-Watson statistic of 2.188545 suggests a mild positive autocorrelation in the residuals, indicating some level of pattern persistence.

4.4 Discussion of Findings

The objective premised on the effect of exchange rate volatility on stock market capitalization by examining the relationship between exchange rate volatility and volatility in returns of market capitalization. The results revealed several key findings. Firstly, the coefficient for lagged market capitalization returns (RMARKETCAP(-1)) was found to be positive and statistically significant, indicating that past market capitalization returns have a substantial impact on the current level of volatility. This suggests a persistence in market reactions to changes in market capitalization, influencing subsequent volatility levels. However, the coefficients for lagged returns of the Consumer Price Index (RCPI) and exchange rate returns (REXCHRATE) were not statistically significant at conventional levels. This implies that past returns of these variables do not robustly affect the current volatility within the specified statistical threshold. Despite their lack of significance, these variables may still play a role in influencing market dynamics, albeit to a lesser extent than market capitalization returns.

The variance equation components in the GARCH(1,1) model, particularly the squared lagged residuals and the GARCH term, were found to be paramount in understanding the temporal patterns of volatility within the financial context. The significant coefficients associated with both these components highlight their substantial impact on the determination of conditional variance. The squared lagged residuals, representing historical shocks or unexpected events in the market, contribute significantly to current volatility, suggesting a lasting influence of past instances of market turbulence. Similarly, the GARCH term captures the persistence of past conditional volatility in shaping present volatility levels, indicating a tendency for volatility clustering over time. Recognizing these patterns is crucial for effective risk management and strategic decision-making in financial markets.

In summary, the study underscores the importance of historical patterns in determining current volatility levels and highlights the phenomenon of volatility clustering, wherein periods of heightened volatility tend to be followed by additional episodes of increased market uncertainty. While the model explains a modest proportion of the variation in volatility, there is evidence of mild positive autocorrelation in the residuals, suggesting some degree of pattern persistence. These insights provide valuable guidance for market participants seeking to navigate and anticipate changes in volatility, enhancing risk assessment and decision-making processes.

The findings of the study regarding the impact of exchange rate volatility on stock market capitalization align with some of the empirical evidence presented in the literature, while diverging from others. Adedeji

(2023) supports the notion that exchange rate volatility negatively affects stock market development, including returns and capitalization. This consistency suggests a broader trend wherein fluctuations in exchange rates can have adverse effects on stock market indicators, echoing the negative impact observed in the study's results. Furthermore, Chan and Patricia (2023) provide additional support by demonstrating the influence of macroeconomic variables, including the real effective exchange rate, on stock market performance. Their findings complement the study's results by highlighting the significance of exchange rate dynamics in shaping stock market behavior, albeit in a different context.

Conversely, the study's findings contrast with those of Dennis, Evans, and Christopher (2022), who found a positive impact of the real effective exchange rate on market capitalization. While both studies investigate the relationship between exchange rate dynamics and stock market performance, their divergent conclusions underscore the complexity of these interactions and the importance of considering contextual factors. Similarly, Asiedu and Boahen (2022) explore the impact of various factors, including stock market capitalization, on CO2 emissions, offering a different perspective on the consequences of stock market development. Despite the differences in focus, their findings highlight the multifaceted nature of stock market dynamics and its implications for broader economic and environmental outcomes.

5. Conclusion and Recommendations

The study investigated the effect of exchange rate volatility on stock market capitalization in Nigeria from 1999 to 2022, employing both flow-oriented models and the monetary approach. An ex-post facto research design was utilized, with pre-estimation applied and estimation techniques using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model at a 5% significance level. Findings revealed that past market capitalization returns significantly influenced current volatility, indicating a persistence in market reactions to changes in market capitalization. However, lagged returns of the Consumer Price Index (CPI) and exchange rate returns were not statistically significant, suggesting a lesser influence on current volatility compared to market capitalization returns. The study emphasizes the importance of considering exchange rate dynamics in investment decisions and market behavior.

In view of the result the following recommendations were made:

1. Policymakers should prioritize implementing measures to stabilize the exchange rate. This can be achieved through prudent monetary and fiscal policies to manage fluctuations effectively. Enhancing transparency and predictability in exchange rate management is also crucial to instill investor confidence and promote market stability.

2. Regulatory authorities should strengthen risk management frameworks within the stock market to mitigate the impact of exchange rate volatility on investor portfolios. This includes implementing robust risk assessment mechanisms, diversifying investment portfolios, and encouraging the use of hedging instruments to manage exchange rate risks effectively.

COMPETING INTERESTS

The authors have no competing interest to declare.

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