



**EXCHANGE RATE VOLATILITY AND STOCK MARKET DEVELOPMENT:
AN EMPIRICAL EVIDENCE FROM NIGERIA**

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Abstract

Recent evidence suggests that stock markets experience shift in volatility which can affect development of such markets. This study re-examines exchange rate volatility and stock market development in Nigeria using annual data from 1985-2020. The study employed multivariate regression analysis as well as granger causality test to model the variables. Results show that exchange rate volatility has a significant negative impact on stock market capitalization and volume of transactions on the stock market. Essentially, exchange rate volatility has significant weak negative correlation with stock market capitalization and stock market volume of transactions. It is observed that there is no causality between exchange rate volatility and the four stock market indicators investigated. The study concludes that the effect of exchange rate volatility on stock market development in Nigeria is negative. Hence, the study recommends that dollarization of stock market transactions and operations in the Nigerian stock market should be discouraged.

INTRODUCTION

Foreign exchange market is often associated with speculative demand which has the means of destabilizing stock market operations in the real economy as the accompanying unadorned volatility generates an aggregate consciousness of uncertainty for market investors (Obstfeld & Rogoff, 1998). Exchange rate instability may cause dynamic effects across the real sector and financial markets especially the depreciation of assets in the balance sheet as well as rapidly deterioration of portfolio assets across the globe. Volatility is caused by a strong dynamic element of frequent changes in the stock and exchange market that is normally influenced by the speculative activities of traders (Berganza & Broto, 2012; Caporin & Malik, 2020; Ganguly & Breuer, 2010; Giannellis & Papadopoulos, 2011; Grossman, Love, & Orlov, 2014; Gumus & Taspinar, 2015; Tule, Dogo & Uzonwanne, 2018).

The relevance of exchange rate volatility and stock market development for an emerging or developing economy like Nigeria's cannot be overemphasized, in view of the trade dependence of the Nigerian economy and the need for efficient and massive mobilization of capital required to accelerate the nation's growth and development process. Volatility



which can be taken to mean "the quality or state of being erratic or unpredictable" is a phenomenon associated with the exchange rate as a key macroeconomic variable of trans-border trade and international investments. In the stock market, as a key financial institution within an economy, stock prices are also known to have their own element of volatility.

Consequently, the impact of exchange rate movements on key macroeconomic variables and on the operations of key financial markets such as the stock market in Nigeria must remain under empirical scrutiny. Moreover, the link between exchange rate volatility and stock market development is becoming more and more prominent and gaining the attention of academics, policy actors, firms and investors, in view of the internationalization of capital markets and cross listing of equities (Subair & Salihu, 2010).

Malik (2021) unequivocally asserted that "volatility in the exchange rate can, therefore, affect the performance of the stock market as well as the financial sector". In a closely related perspective, Nkoro and Uko (2016) reported that the Nigerian economy has simultaneously witnessed stock market volatility as well as fluctuations in domestic prices and the exchange rate. Ajao and Igbekoyi (2013) reports that Nigeria has one of the most volatile real exchange rate regimes among developing countries.

One fundamentally resulting question is: is there a cause-effect and/or correlational relationship between exchange rate volatility and stock market volatility in Nigeria? Besides volatility in stock prices, one can extend intellectual curiosity further by asking: what is the impact of exchange rate volatility on other indices of stock market development? This is the basic question motivating this empirical enquiry. Furthermore, the study aims to identify the dynamic transmission between exchange rate and the stock market development indices by defining the existence, tenacity and path of volatility in Nigeria.

LITERATURE REVIEW

Hassan, et al (2017) explains that exchange rate volatility is associated with unpredictable movements in the relative price in the economy, involving swings or fluctuations in the exchange rate over a period of time or deviations from a benchmark or equilibrium exchange rate. It is the usual practice in extant literature for stock market development to be defined empirically in terms of several indicators employed in the study. As such, Ishioro (2013) defined stock market development in terms of market capitalization (market value), real value of shares traded ration (market liquidity), as well as the stock market



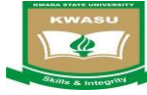
volatility. In this regard, stock market development entails an appreciation of both market value and liquidity as well as minimal levels of stock market volatility.

There exists a growing body of literature on the relationship between the Naira volatility and stock market indicators. Nkoro et al (2016) investigated the relationship between exchange rate and inflation volatility and stock prices volatility in Nigeria. The GARCH model and Johansen cointegration procedure were employed on quarterly data between 1986 Q1 to 2012 Q4 to investigate the impact of exchange rate and inflation rates on the all-share index as a measure of stock return. The cointegration procedure indicates at least 3 cointegrating equations, implying the long run relationship between exchange rate, inflation rate and stock market returns. The GARCH model showed a statistically significant negative relationship between exchange rate and inflation volatility, and Nigeria stock prices volatility.

Using the GARCH model and Granger causality test on a monthly dataset spanning 1985 (January) to 2012 (April), Oyinpreye and Karimo (2015) examined the impact of exchange rate volatility on share price fluctuations in Nigeria. The empirical results showed that the Naira exchange rate is highly volatile and responds significantly to information shock. Results from the variance equation of the GARCH model indicates that exchange rate volatility has a significant negative impact on the share price fluctuations, while the Granger causality test shows a unidirectional causality runs from share prices to exchange rate.

Evbayiro-Osagie and Emeni (2015) employed the ARCH and GARCH models to examine the relationship between inflation rate, financial openness, and exchange rate on stock market returns volatility, using quarterly data spanning 1985 - 2012. Three models were specified in the study. In the first model, the variance equation shows statistically significant negative impact of current values of inflation rate, financial openness, and exchange rate on stock market returns volatility. In the second model, the variance equation shows statistically significant negative impact of previous period values of inflation rate and exchange rate on stock market returns volatility, but not financial openness. The third model shows an insignificant negative impact of changing inflation rate and changing financial openness on stock market volatility, while changing exchange rate exerts an insignificant positive impact on stock market returns volatility.

Lawal and Ijirshar (2015) investigated the impact of exchange rate volatility on the Nigerian stock market performance. The GARCH model, Johansen Cointegration, Error Correction Mechanism (ECM) and Granger causality test was employed on a data set



spanning 1986 to 2013 to estimate the impact of exchange rate volatility, interest rate and inflation rate on market capitalization. The Johansen Cointegration procedure indicates that a long-run relationship exists between the variables of the study. The pairwise granger causality revealed a uni-directional relationship between exchange rate and stock market capitalization in Nigeria running from exchange rate to stock market capitalization in Nigeria. The ECM shows a significant negative impact of exchange rate and inflation rate on market capitalization, while interest rate has a significant positive impact of exchange rate and inflation rate on market capitalization.

Umoru and Asekome (2013) employed the cointegration technique and Granger-Sim causality test on daily data spanning 2000 to 2012, to test to examine the interaction between stock prices and the Naira-dollar rate. The cointegration results indicates one cointegrating equation between stock prices and the Naira-dollar exchange rate, indicating that a long-run relationship exists between Nigerian stock exchange price level and the Naira-dollar exchange rate. The result from the Granger-Sim causality test indicated that a significant *bi-directional* causal relationship between the Naira-dollar exchange rate movement and the reaction of stock prices, wherein the Naira-dollar exchange rate Granger causes stock prices, and the stock price movement also Granger causes the Naira-dollar exchange rate.

Olugbenga (2012) examined the impact of exchange rate volatility on stock market behaviour in Nigeria. As such the all share index (ASI) was regressed on the nominal exchange rate for the period of the 1st quarter of 1985 (1985: 1) to the fourth quarter of 2009 (2009: 4). The Johansen cointegration technique, Granger causality test, and the Error Correction Mechanism (ECM) were employed. The Johansen cointegration technique indicated at least 2 cointegrating equations, implying the existence of a long run equilibrium relationship between all share index (ASI) and nominal exchange rate. The Error correction model showed significant positive impact of current and previous levels of nominal exchange rate on all share index. The Granger causality test shows a unidirectional relationship running from exchange rate to stock market performance in Nigeria.

Najafzadeh, Monjazeб and Mamipour (2016) adopted a Panel-GARCH approach to investigate the effect of exchange rate volatility on the stock exchange returns of D8 countries including Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey. Monthly data for the period 2008 (January) to 2015 (June) was employed. The empirical results indicated a significant positive impact of exchange rate volatility on stock exchange return in four countries, namely Iran, Pakistan, Indonesia and Bangladesh.



Furthermore, real exchange rate and inflation rate were found to have significant negative effects on stock returns, oil price was found to have significant negative effects on stock returns, while interest rate and gold price were found not to have significant negative effects on stock returns.

Kennedy and Nourizad (2016) empirically investigated the impact of the US dollar- Euro on US stock market volatility. Using both OLS and GARCH model on weekly data covering from the first week of January 1999, through the week of January 25, 2010, stock market was regressed on 10 explanatory variables. Results from the OLS estimation showed that exchange rate volatility, growth of broad money (M2) and the one period lagged stock market volatility exerts significant positive impact stock market volatility. The GARCH estimation showed that increased exchange rate volatility exerts a positive and statistically significant effect on the volatility of stock returns. The GARCH estimation also showed that the 9/11 terrorist attack, bear markets, fluctuations in jobless claims, and negative equity market returns all exert significant positive impact on volatility of stock returns.

Having reviewed literature, the performance trend of Naira volatility as indicated by three (3) measures confirmed that the Naira is volatile and has witnessed more depreciation than appreciation over the period reviewed. Stock market development as indicated in the performance trend lacks sustained positive growth in several indicators as periods of appreciation in these indicators are often followed by a decline.

The theoretical perspectives proffer different ways in which exchange rate volatility and stock market activities can interact. This makes empirical analysis of the degree and direction of causality or impact between exchange rates and stock prices and particularly interesting, with the resulting body of empirical evidence on the interaction between exchange and rates stock prices being mixed showing positive, negative, non-causal, bidirectional or uni-directional.

METHODOLOGY

When explaining stock market development, Calderon-Rossell model of stock market development has been commonly employed (El-Wassal, 2013; Lazarov & Slaveski, 2016; Winful, Sarpong, & Agyei-Ntiamoah, 2016; Ho, 2017). The theoretical framework of this particular study discusses these theoretical approaches of stock market development, with the adoption of exchange rate volatility as a factor of stock market development.

The Calderon-Rossell model of stock market development have been identified as the most effective attempt to lay the foundations of a financial theory of stock market development



(El-Wassal, 2013; Sezgin & Atakan, 2015). Calderon-Rossell (1991) developed a partial equilibrium model of stock market development, wherein stock market liquidity and economic growth are identified as the main determinants of stock market development. In the classical Calderon-Rossell model, stock market capitalization is a function of the number of firms listed in the exchanges and the value of those companies. Furthermore, the prices of listed companies depend on number of listed companies and yearly output (measured by gross domestic product), and the number of listed companies are function of output and liquidity available for the financial transactions. A simple mathematical specification of the Calderon-Rossell is given below:

$$Y = f(PV) \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad (3.1)$$

$$PV = f(G, T) \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad (3.2)$$

Where,

$$V = f(G, P) \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad (3.3)$$

$$P = f(T, V) \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad (3.4)$$

From the above equations,

Y = stock market capitalization

P = number of firms listed on the stock market

V = share prices of the listed firms

T = turnover ratio as a measure of stock market liquidity

G = output measured by the gross domestic output or per capita GDP.

From the above specification, it is seen that other macroeconomic and institutional factors known to affect stock market development are not captured by the Calderon-Rossell model. As such, El-Wassal (2013) developed holistic theoretical framework of stock market development, wherein the institutional factors highlighted above, are augmented with demand factors, supply factors, as well as economic policies. El-Wassal (2013) proposed that stock market development depends on four broad factors namely: supply factors, demand factors, institutional factors, and economic policies. Under this framework, the supply and demand factors are the "building blocks" of stock market development involving the interaction between issuers (supply) and the investors (demand). The economic policies and institutional factors are the "supporting blocks" of stock market development, given that the mere presence of supply and demand does not guarantee that the market will function efficiently. If the supporting blocks are inadequate, the demand and supply conditions may exist, but most likely it will not function well and will not become a developed market.

The supply factors identified under the El-Wassal framework include: stage of economic development, size of the economy, structure of the economy, and prospects for economic



growth. The demand factors include: economic growth and a sufficient level of GDP per capita, investor base and institutional investors, portfolio capital flows. The economic policies entail monetary policy, fiscal policy, and foreign participation.

In view of the theoretical perspective presented so far, it can be seen that no single theory can capture the dynamics of stock market development. Hence, several postulations of these different theoretical perspectives are combined to form an ample theoretical framework for this study. In this regard, the theoretical framework of this study borders on the premise that stock market development is a function of exchange rate volatility and gross domestic product (GDP) as macroeconomic variables, foreign direct investment, domestic investment and banking sector development as contextually relevant factors. The above postulate is functionally presented thus:

$$SMDEV = f(EXRVOL, GDP, FDI, BSDEV, DOMINV) \quad \text{-----} \quad \text{-----} \quad \text{-----} \quad (3.5)$$

The specification in equation 3.5 forms the theoretical basis for the empirical model of this study. Specifically, equation 3.5 models is the functional dependence of stock market development (SMDEV) on exchange rate volatility (EXRVOL), gross domestic product (GDP), foreign direct investment (FDI), banking sector development (BSDEV) and domestic investment (DOMINV).

Data Scope and Source

The empirical model for this study is estimated using an annually aggregated dataset spanning a 35-year period from 1985 to 2020. The time frame was chosen due to the non-existence of data on the all-share index prior to 1985. Data on stock market indicators are obtained from the Central Bank Statistical Bulletin Financial Sector (2020) and author-computed where necessary.

Data on exchange rate volatility was computed from nominal exchange rate data obtained from the Central Bank Statistical Bulletin External Sector (2020). Data on banking credit to the private sector are obtained from the Central Bank Statistical Bulletin Financial Sector (2020). Data on foreign direct investment and domestic investment are obtained from the 2016 World Bank Development Indicators for Nigeria.

RESULTS AND DISCUSSION

The annually aggregated data on the variables of the study for the specified period was subjected to descriptive analysis, correlation analysis, the ordinary least squares (OLS) regression analysis and the Granger causality test.



Descriptive Statistics

Table 1 below presents the descriptive statistics on the dependent variables of the study. Stock market returns (SMRTN) for the review period averaged 2.34%, but with a larger standard deviation 3.11%, implying huge volatility in stock market returns in the Nigerian stock market. Also, the highest stock market return (SMRTN) for the period is 10.36%, with the lowest being -4.99%.

Table 1: Descriptive Analysis

	SMRTN	SMCAP	SMLIQ	SMVOL
Mean	2.335741	11.04899	0.865148	380.5840
Median	2.737926	7.209362	0.466196	42.91845
Maximum	10.35928	39.95010	4.288137	2350.876
Minimum	-4.991364	3.053461	0.040618	0.225400
Std. Dev.	3.106322	8.602578	1.018494	580.0970
Skewness	0.025967	1.351476	1.807858	1.763902
Kurtosis	3.334974	4.954539	5.998000	5.738499
Jarque-Bera	0.153207	14.83489	29.41521	26.59304
Probability	0.926257	0.000601	0.000000	0.000002
Sum	74.74371	353.5678	27.68472	12178.69
Sum Sq. Dev.	299.1262	2294.135	32.15721	10431889
Observations	32	32	32	32

Source: Author's Computation, 2022

The ratio of stock market capitalization to the GDP (SMCAP) averaged 11.05%, deviating as much as 8.6% from the mean. For the review period (1085 – 2016), the ratio of stock market capitalization to the GDP (SMCAP) rose as high as 39.95% and fell as low as 3.05%. This implies that the Nigerian capital market is small relative to the size of the Nigerian economy.

Stock market liquidity (SMLIQ) as measured by the total value of shares traded ratio averaged 0.86%, with a larger standard deviation of 1.02%. For the review period, the total value of shares traded ratio (SMLIQ) rose as high 4.29% and fell as low as 0.04%. As such, the degree of trading relative to the size of the Nigerian economy is low.

The volume of shares traded ratio (SMVOL) for the period aggregated at N12178.69 million, averaging N380.5840 million, and deviating by N580.0970 million. The volume of shares traded ratio (SMVOL) peaked at N2350.876 million and ebbed at N0.2254 million. This connotes small trading activity on the Nigerian stock market, when compared to the volume of shares traded on the stock market of emerging economies and the advanced economies.



The Jarque-Bera statistics show that only one of the dependent variables are normally distributed while three are not. In particular, stock market return (SMRTN) was found to be normally distributed. In contrast, stock market capitalization (SMCAP), stock market liquidity (SMLIQ) and the volume of shares traded ratio (SMVOL) were found not to be normally distributed.

Table 2: Descriptive Analysis on Independent Variables

	EXVOL	GDP	FDI	BSDEV	DOMINV
Mean	-3.007089	25172.77	2.99E+09	18.52906	4.49E+12
Median	-3.116152	7515.812	1.87E+09	17.96500	2.69E+12
Maximum	-1.744997	101489.5	8.84E+09	29.80000	1.06E+13
Minimum	-3.247921	192.2733	1.93E+08	9.250000	1.80E+12
Std. Dev.	0.314512	32147.19	2.66E+09	4.133560	3.04E+12
Skewness	2.503535	1.163072	0.910238	0.513043	0.980334
Kurtosis	9.571956	2.956595	2.497291	4.260029	2.289414
Jarque-Bera	91.01516	7.217110	4.755795	3.520700	5.798864
Probability	0.000000	0.027091	0.092745	0.171985	0.055054
Sum	-96.22685	805528.6	9.58E+10	592.9300	1.44E+14
Sum Sq. Dev.	3.066447	3.20E+10	2.19E+20	529.6759	2.87E+26
Observations	32	32	32	32	32

Source: Author's Computation, 2022

Table 2 presents the descriptive analysis of the independent variables. From the above table, exchange rate volatility (EXVOL) for the period averaged -3.007089, falling as low as -3.247921 and rising as high -1.744997. Nominal GDP for the period averaged N25172.77 billion, rising as high as N101489.5 billion, with the lowest figure being N192.2733 billion. Foreign direct investment for the period averaged \$2990000000, peaking at \$8840000000 and ebbing at \$1930000000. Banking sector development (BSDEV) proxied by bank lending rate averaged 18.53% for the review period, rising as high as 29.80% and as falling as low as 9.25%. Domestic investment (DOMINV) proxied by the gross fixed capital formation averaged N4990.00 billion, peaking at N10600.00 billion, with the lowest figure being N1800.00 billion,

The Jarque-Bera statistics show that three of the explanatory variables are normally distributed while two are not. In particular, foreign direct investment (FDI), banking sector development (BSDEV) and domestic investment (DOMINV) were found to be normally distributed. Exchange rate volatility (EXVOL) and nominal GDP were found not to be normally distributed



Correlation Analysis

The correlation matrix presented in table 3 below reports only the results of the correlations between the dependent variables and the independent variables of the model as the focus of the study. Correlations between the explanatory variables are neither presented nor discussed, though the results are presented in the appendix. From table 4.3 below, the first column indicates significant positive and negative correlations between the dependent variables. From the first column, it is reported that stock market return (SMRTN) has a significant moderate negative correlation ($r = -0.481$; $p < 0.01$) with stock market capitalization (SMCAP), significant strong negative correlations ($r = -0.616$; $p < 0.01$) with stock market liquidity (SMLIQ) and ($r = -0.597$; $p < 0.01$) with volume of stock market transactions (SMVOL). Stock market capitalization (SMCAP) was found to have significant and very strong positive correlations ($r = 0.893$; $p < 0.01$) with stock market liquidity (SMLIQ) and ($r = 0.963$; $p < 0.01$) with volume of stock market transactions (SMVOL). Stock market liquidity was found to have a significant and very strong positive correlation ($r = 0.928$; $p < 0.01$) with volume of stock market transactions (SMVOL).

From table 3 below, stock market return (SMRTN) has an insignificant strong positive correlation ($r = 0.789$; $p > 0.01$) with exchange rate volatility (EXVOL), significant moderate negative correlations ($r = -0.520$; $p < 0.01$) with nominal GDP, ($r = -0.487$; $p < 0.001$) with foreign direct investment (FDI), and ($r = -0.453$; $p < 0.01$) with domestic investment (DOMINV). An insignificant weak positive correlation ($r = 0.079$; $p > 0.05$) was found between stock market return (SMRTN) and banking sector development (BSDEV).

Table 3: Correlation Matrix

		SMRTN (1)	LNSMCAP (2)	LNSMLIQ (3)	LNSMVO L (4)
SMRTN (1)	Pearson Correlation	1	-.481**	-.616**	-.597**
	Sig. (2-tailed)		.005	.000	.000
	N	32	32	32	32
LNSMCAP (2)	Pearson Correlation	-.481**	1	.893**	.963**
	Sig. (2-tailed)	.005		.000	.000
	N	32	32	32	32
LNSMLIQ (3)	Pearson Correlation	-.616**	.893**	1	.928**
	Sig. (2-tailed)	.000	.000		.000



	N	32	32	32	32
LN SMVOL (4)	Pearson Correlation	-.597**	.963**	.928**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	32	32	32	32
EXVOL (5)	Pearson Correlation	.049	-.433*	-.317	-.382*
	Sig. (2-tailed)	.789	.013	.077	.031
	N	32	32	32	32
LN GDP (6)	Pearson Correlation	-.520**	.923**	.781**	.957**
	Sig. (2-tailed)	.002	.000	.000	.000
	N	32	32	32	32
LN FDI (7)	Pearson Correlation	-.487**	.875**	.735**	.869**
	Sig. (2-tailed)	.005	.000	.000	.000
	N	32	32	32	32
LN BSDEV (8)	Pearson Correlation	.316	-.174	-.296	-.132
	Sig. (2-tailed)	.079	.340	.100	.472
	N	32	32	32	32
LN DOMINV (9)	Pearson Correlation	-.453**	.816**	.672**	.802**
	Sig. (2-tailed)	.009	.000	.000	.000
	N	32	32	32	32

SOURCE: Author's Computation, 2022.

Stock market capitalization (SMCAP) was found to have a significant moderate negative correlation ($r = -0.433$; $p < 0.05$) with exchange rate volatility (EXVOL). Significant and very strong positive correlations were found between stock market capitalization (SMCAP), and nominal GDP ($r = 0.923$; $p < 0.01$), foreign direct investment (FDI – $r = 0.875$; $p < 0.01$), and domestic investment (DOMINV – $r = 0.816$; $p < 0.01$). An insignificant weak negative correlation ($r = -0.174$; $p > 0.05$) was found between stock market capitalization (SMCAP) and banking sector development (BSDEV).

Stock market liquidity (SMLIQ) was found to have an insignificant weak negative correlation ($r = -0.317$; $p > 0.05$) with exchange rate volatility (EXVOL). Significant and strong positive correlations were found between stock market liquidity (SMLIQ), and



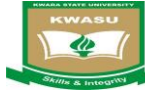
nominal GDP ($r = 0.781$; $p < 0.01$) and foreign direct investment (FDI – $r = 0.672$; $p < 0.01$) and domestic investment (DOMINV – $r = 0.816$; $p < 0.01$). An insignificant weak negative correlation ($r = -0.296$; $p > 0.05$) was found between stock market liquidity (SMLIQ) and banking sector development (BSDEV).

Volume of stock market transactions (SMVOL) was found to have a significant weak negative correlation ($r = -0.382$; $p < 0.05$) with exchange rate volatility (EXVOL). Significant and very strong positive correlations were found between volume of stock market transactions (SMVOL), and nominal GDP ($r = 0.957$; $p < 0.01$), foreign direct investment (FDI – $r = 0.869$; $p < 0.01$), and domestic investment (DOMINV – $r = 0.802$; $p < 0.01$). An insignificant weak negative correlation ($r = -0.132$; $p > 0.05$) was found between volume of stock market transactions (SMVOL) and banking sector development (BSDEV).

Ordinary Least Squares (OLS) Regression Analysis

Table 4: Ordinary Least Squares Modelling

INDEPENDENT VARIABLES	COEFFICIENTS			
	MODEL 1: Stock Market Returns LNSMRTN	MODEL 2: Stock Market Capitalization LNSMCAP	MODEL 3: Stock Market Liquidity LNSMLIQ	MODEL 4: Volume of Transactions LNSMVOL
Constant	-75.93039**	-3.398842	1.933415	7.416590
EXVOL	-3.922865*	-0.045004	0.021144	-0.020031
LNGDP	-0.723946	0.238314**	0.420525	0.567663
LNFDI	-2.054387	0.241002*	0.014070	0.022765
LNBSDEV	10.29546*	-0.658239**	-0.876437	-0.866479
LNDOMINV	3.042408*	-0.012092	-0.173256	-0.180555
AR	AR (3) -0.416706*	----	AR (1) 0.139927**	AR (1) 0.949781**
R ²	0.538723	0.906859	0.872550	0.974726
F-statistic	4.282288**	50.62956**	27.38478**	154.2662**
D-W Statistic	2.211102	1.374776	1.630787	1.688100
* <i>p</i> -value of <i>t</i> -value of coefficient and <i>F</i> -statistic < 0.05				
** <i>p</i> -value of <i>t</i> -value of coefficient and <i>F</i> -statistic < 0.01				
Breusch-Godfrey Serial Correlation LM Test				
	MODEL 1: Stock	MODEL 2:	MODEL 3:	MODEL 4:



	Market Returns	Stock Market Capitalization	Stock Market Liquidity	Volume of Transactions
Obs*R-squared	4.972458	4.299519	1.126690	1.187274
Prob. Chi-Square	0.0832	0.1165	0.5693	0.5523
Heteroskedasticity Test: Breusch-Pagan-Godfrey				
Obs*R-squared	3.359669	3.427341	7.649604	8.02863334
Prob. Chi-Square	0.6447	0.6344	0.1766	0.1528

SOURCE: Author's Computation from Eviews 7.0.

It must be emphasized that the initial OLS estimations for all the models, except the model for stock market capitalization (SMVOL) were all adjusted with several orders of autoregressive schemes to correct for autocorrelation and improve the estimation results. As such, the initial OLS estimations for the models for stock market return (SMRTN), stock market liquidity (SMLIQ), stock market volume of transactions (SMVOL) were all adjusted to avoid spurious regression results. These adjusted models are adopted and reported in Table 4 above. The initial OLS estimation for the model for stock market capitalization (SMVOL) is adopted and reported.

Only the coefficients of the explanatory variables from the results of the OLS regression estimations are presented in table 4 above. The statistical significance of the explanatory variables are indicated with asterisks (*). As such coefficients with one asterisk superscript (*) are significant at the 5% level of significance, while coefficients with twos asterisk superscripts (**) asterisk are significant at the 1% level of significance. Coefficients with no asterisks are not significant at neither the 5% nor 1% significance levels. The diagnostic tests for autocorrelation and heteroscedasticity are also considered.

The OLS estimations presented in Table 4 above are interpreted and analyzed in light of the economic, statistical and econometric criteria involving the apriori sign expectations, t-test of individual significance, F-test of the overall significance of the model, R squared, the Durbin-Watson statistic, as well as the diagnostic tests.

Granger Causality Test

The pairwise Granger causality test was employed to ascertain if bidirectional relationships exist between the dependent variables and exchange rate volatility. The results obtained are presented in table 5 below.

Table 5 Pairwise Granger Causality Tests



Pairwise Granger Causality Tests			
Date: 08/14/17 Time: 18:57			
Sample: 1985 2016			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LNSMCAP does not Granger Cause SMRTN	30	11.4118	0.0003
SMRTN does not Granger Cause LNSMCAP		2.67773	0.0884
LNSMLIQ does not Granger Cause SMRTN	30	9.73339	0.0007
SMRTN does not Granger Cause LNSMLIQ		2.34107	0.1170
LNSMVOL does not Granger Cause SMRTN	30	8.77414	0.0013
SMRTN does not Granger Cause LNSMVOL		2.64665	0.0907
EXVOL does not Granger Cause SMRTN	30	1.65353	0.2116
SMRTN does not Granger Cause EXVOL		0.19661	0.8228
LNSMLIQ does not Granger Cause LNSMCAP	30	1.33951	0.2801
LNSMCAP does not Granger Cause LNSMLIQ		4.53760	0.0208
LNSMVOL does not Granger Cause LNSMCAP	30	4.11829	0.0284
LNSMCAP does not Granger Cause LNSMVOL		3.55487	0.0438
EXVOL does not Granger Cause LNSMCAP	30	0.09275	0.9117
LNSMCAP does not Granger Cause EXVOL		2.86187	0.0760
LNSMVOL does not Granger Cause LNSMLIQ	30	2.96475	0.0699
LNSMLIQ does not Granger Cause LNSMVOL		3.86474	0.0345
EXVOL does not Granger Cause LNSMLIQ	30	0.06189	0.9401
LNSMLIQ does not Granger Cause EXVOL		0.55859	0.5790
EXVOL does not Granger Cause LNSMVOL	30	0.02093	0.9793
LNSMVOL does not Granger Cause EXVOL		1.24242	0.3059

Source: Author's Computation, 2022



An overview of the Granger causality tests indicates only one case of bidirectional causality, as well as unidirectional causality between the dependent variables as well as between the dependent variables and exchange rate volatility.

From the above table 5 there is unidirectional causality among the dependent variables. Specifically, the p-values of the F-statistic associated with stock market capitalization, stock market liquidity, and stock market volume of transactions were all lower than the 0.05 level of significance. As such, there is unidirectional causality running from stock market capitalization, stock market liquidity, and stock market volume of transactions to stock market return. There was no causality between exchange rate volatility and stock market return.

Unidirectional causality was found to run from stock market capitalization to stock market liquidity. Bidirectional causality was found between stock market capitalization and stock market volume of transactions. Unidirectional causality was found to run from stock market liquidity to stock market volume of transactions.

No causality was found to run from exchange rate volatility to neither of stock market capitalization, stock market liquidity and stock market volume of transactions. The pairwise Granger causality test thereby indicates that there is no causality between exchange rate volatility and any of the dimensions of stock market development dealt with in this study.

The empirical evidence presented so far, strongly suggest mixed results on the impact of exchange rate volatility on stock market development. The correlation analysis showed that exchange rate volatility has significant but weak negative correlations with stock market capitalization and stock market volume of transactions. However, there was neither unidirectional nor bidirectional causality between exchange rate volatility and four indicators of stock market development used in the study. These findings will be rationalized in terms of what practically obtains in the Nigerian society, as well as in light of relevant empirical evidence, and what the policy focus should be as regards altering the explanatory variables to drive stock market growth and development in Nigeria.

Exchange rate volatility was found to have a significant negative impact on stock market returns in Nigeria. This result is in tandem with the findings of Evbariyo-Osagie and Emeni (2015) of a significant negative impact of current and previous period values of exchange rate on stock market returns volatility in Nigeria. However, this result contradicts the findings of Kennedy and Nourizad (2016) where their OLS and GARCH estimations find significant positive impact of present and lagged values of exchange rate volatility on the volatility of stock market returns in the USA stock market. In similar vein, this study



contradicts the findings of Najafzadeh, Monjazebe and Mamipour (2016) of a significant positive impact of exchange rate volatility on stock exchange return in four countries, namely Iran, Pakistan, Indonesia and Bangladesh.

The finding of no causality between exchange rate volatility and stock market return contradicts the finding of Olugbenga (2012) of a unidirectional causality running from exchange rate to stock market returns in Nigeria. The main finding of a negative impact of exchange rate volatility on stock market returns is to be expected, given the high amount of capital importation Nigerian firms rely on for production. The uncertainties as well as cost implications of the vagaries of the naira-dollar rate would have a reductive impact on firm performance, and by extension their market value, leading to reduction on the returns of firm shares.

The study finds an insignificant negative impact of exchange rate volatility on stock market capitalization in the Nigerian capital market. This result conflicts with the findings of Mlambo, Maredza and Sibanda (2013) wherein the mean and variance estimations of the GARCH model showed a significant positive impact of the RAND volatility on capitalization of the South African capital market contradicts the findings. However, the study findings corroborate the findings of Lawal and Ijirshar (2015) of a significant negative impact of exchange rate volatility on market capitalization in Nigeria. It also reaffirms the findings of Sichoongwe (2016) that exchange rate volatility has a significant negative impact on stock market capitalization. The result of this study can be practically obtainable when one considers the high dollar demand on the part of Nigerian firms for domestic production as well as in their bids to internationalize their operations. The reduced profitability and international competitiveness on the part of Nigerian firms, resulting from the high import dependence will have a reductive effect on their market value, thereby lowering market capitalization.

The policy implications of these impacts are that the present policy mix has not been able to position the Nigerian stock market to benefit from the interactions between the naira and major currencies. Also, the positive impact of exchange rate volatility on stock market liquidity imply that several policy steps can be implemented to position the Nigerian capital market to gain from the volatility of the naira-dollar rate, while taking steps to curb the volatility overtime.

CONCLUSION AND RECOMMENDATION

This study concludes that impact of exchange rate volatility on stock market development in Nigeria is negative. In particular, stock market returns, stock market capitalization, stock market volume of transactions are all negatively affected by the volatility of the naira.



Consequently, policy action steps would be to a policy mix wherein exchange rate management strategies are augmented with import substitution and export promotion strategies. Also, growth-inducing infrastructural investments be put in place to make the Nigerian business environment more conducive, while also positioning the Nigerian capital market with several initiatives to increase trading activities.

On the basis of the empirical findings of the study, the following policy prescriptions are proffered:

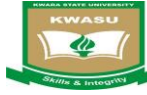
A mix of exchange rate management policies should be adopted alongside import substitution strategies on key production inputs known to drive Nigeria's capital importation. This will go a long way to reduce the pressure on the naira and improve its stability overtime. This can be followed up by export promotion strategies on non-oil products to reduce the oil dependence of the Nigerian economy and shield the economy from the inherent volatility of oil-based revenue.

Listed Nigerian firms should be provided incentives to look inward in their sourcing of raw materials, either in the form of tax cuts for research and development initiatives or public-private partnership in research and development initiatives into raw materials that can be locally sourced. Reduced importation on the part of listed Nigerian firms will reduce their exposure to the volatility of the naira.

Dollarization of stock market transactions and operations in the Nigerian capital market should be discouraged, even for foreign portfolio investment on the Nigerian capital market. This will increase the demand for the Naira and reduce the volatility of the Naira-dollar rate.

The Nigerian business environment should be made more conducive by providing critical infrastructure to minimize the cost of doing business. The enhanced profitability of the Nigerian firms will go a long way to affect their stock market value, as well as their share prices leading to higher stock market returns. Moreover, the enhanced growth of Nigerian firms increased the possibility of the formalization of more enterprises and their enlisting on the Nigerian Stock Exchange, either on the main exchange or on the second-tier or third-tier securities market.

Market capitalization can be boosted by removing trade impediments as well ensuring transparency and fair-trading transactions and dealings in the stock exchange. In this regard, investor confidence can be boosted encouraging domestic stock market investments, reducing the demand for dollar on the part of Nigerians who trade shares



abroad as well driving financial deepening. Moreover, the increased efficiency and transparency of the market will attract even more foreign direct and portfolio investments increasing the demand for the naira.

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