# Macroeconomics Dynamics and Its Implication on Stock Market Return Volatility in Nigeria

# MBAGWU, Onyinyechi Nneka

Banking and Finance Department, Faculty of Management Sciences, Delta State University, Abraka. Email:sylviambagwu@gmail.com

Abstract: The study examined the effect of macroeconomics dynamics (MD) on SM return volatility in Nigeria. In a bid to achieved this objective, MD was proxied with; Money Supply (MS), Interest Rate (INTR), Exchange Rate (EXCHR), Inflation Rate (INFLR) and Real Gross Domestic Product Growth Rate (RGDPGR) while SM return was proxied All Share Index (ASI). The data was collected from the CBN Statistical Bulletin from 1985-2021. It was then examined using the, Descriptive Statistics, Unit Root Test, GARCH Model and Autoregressive Distributive Lag (ARDL) analysis. MS has a positive inconsequential impact on ASI in the short run but a positive consequential impact on ASI in both the short and long runs. EXCHR had a negative, insignificant influence on ASI over the medium and long term, with p-values of 0.4590 and 0.0473. INFLR negatively affects ASI short- and long-term, and its p-values (0.3071 and 0.3046) are above 5%. RGDPGR positively affects ASI in the short and long term, with p-values are 0.5314 and 0.5293, respectively, indicating no statistical significance. Hence, it was concluded that MD has no considerable effects on SMR in Nigeria. Thereby recommends that regulatory authorities and policy makers should ensure that there is general stability in money supply and exchange rates, while trying to put the inflationary trends under control and at the same time maintain a stable interest rate regime in the economy in order to achieve improvements in SM performance to bring about desired EG and national development.

Keywords: Macroeconomics, SM, Returns, Volatility and Rate on Returns.

#### Introduction

Stock market (SM) with predictable stock returns (SR), sound and stable macroeconomic variables (MV) mobilise long-term capital for the private and public sectors of any economy (Pole and Cavusoglu, 2021). High SR, effective and stable MV affect capital formation, industrial production, and economic growth (EG) of any nation. SMR fluctuate globally. SR influences financial risk, which affects capital costs, investor involvement, and transaction volume. This may have long-term effects on portfolio allocation, asset pricing, market risk, and EG (Pole, et al, 2021).

The performance of any economy is determined by MV such as INFLR, EXCHR, INTR, fiscal position, debt position, RGDDGR and many more, these MV guide economic activity. They might be volatile and sensitive. Any macroeconomic shock can harm the economy. As such, its behaviour should be continuously observed; this novel pandemic is ravaging the world and Nigeria (Ejem and Ogbonna, 2020).

SM investing may be lucrative yet dangerous. Potential investors research and predict SM trends to maximise returns and reduce risk (Rossi & Gunardi, 2018; Rashid & Mehmood, 2018). Investors evaluate how INTR, INFLR, EXCHR, MS, etc. affect stock performance. Macroeconomic determinants affect SM performance, according to Rashid & Mehmood (2018). They can help investors forecast SM performance and provide extra information about market behaviour (Jamaludin et al., 2017; Ong & Ng, 2018).

SMs grow a country's industries and commerce, which affects the economy (Ali et al., 2018). Stocks provide organisations with long-term investment capital. The market mediates by combining funds from investors who want to make alternative investments. Investors observe the composite market index before investing funds. The market index gives past SM performance, a yardstick to measure portfolio performance, and a key to forecasting future market patterns (John, 2018).

SMs with predictable SR, sound and stable MV mobilise long-term capital for the private and public sectors of any economy. High SR, effective and stable MV affect capital formation, industrial production, and EG of any nation, thus, SMR fluctuate globally (Pole and Cavusoglu, 2021). SR influences financial risk, which affects capital costs, investor involvement, and transaction volume. This may have long-term effects on portfolio allocation, asset pricing, market risk, and EG (Pole et al, 2021). This study investigates the effect of MD on Nigerian SM volatility.

# Statement of Problem

In emerging SMs, especially African SMs, issues of stock return and shaky MD such as EXCHR and INFLR are common. Due to market information asymmetry and shaky macroeconomic policies, practically all African SMs' returns and MV were unclear,

# International Journal of Academic Accounting, Finance & Management Research(IJAAFMR) ISSN: 2643-976X

#### Vol. 7 Issue 4, April - 2023, Pages: 1-12

volatile, and far from expectations. Unsteady MV, especially in developing nations, cause stock price forecast errors, according to Okonkwo (2019). Unsteady SR in the Nigerian SM is caused by unstable EXCHR and INFLR, as well as unhealthy industrial production and MS policies.

Many academics argue that macroeconomic conditions affect SR notwithstanding the efficient market hypothesis (EMH), which states that investors cannot achieve abnormal profits since all available information is reflected in stock prices. This belief tends to agree with Ross's (1976) arbitrage pricing theory (APT), which states that SR are subject to INFR, company size, dividend yield, EXCHR, GDP, consumer price index, industrial production index, unemployment rate, INTR, real income (GDP per capita income), domestic savings, SM liquidity, etc. Few recent studies in Nigeria examine the effect of MV on SM return, such as John (2019), Omodero and Mlanga (2019), Akwe, Garba and Dang (2018), Udi and Ohwofasa (2018), Harcourt (2017), and Adekunle, Alalade and Okulenu (2017). No study in Nigeria or elsewhere has explored the relationship between MD and SM volatility. This suggests there is plenty to learn. This study explores the impact of macroeconomics on Nigeria's SM volatility.

This study on MD and SM volatility in Nigeria covers 1985–2021. This study will evaluate MS, INTR, EXCHR, INFLR and GDP, while ASI will be used as a proxied for Nigerian SM return volatility. **Review of Related Literature** 

This section seeks to build a comprehensive literature study on MV and how they affect SR in the Nigeria SM in conceptual framework, while succeeding parts will disclose theoretical and empirical assessments of the topic.

#### **Conceptual Framework Concept of MV and Share Prices**

SM trades publicly traded and government-issued securities (Peter, 2020). The market determines and indicates an economy's performance. Government, investors, and other stakeholders are concerned about the SM's nature and state. The SM improves capital formation and allocation as an economic institution. Thus, EG depends on the SM. The creation of a capital market is vital for EG (Asaolu & Ogunmuyiwa, 2010) as referenced in Peter (2020).

In Nigeria, as in many other nations, various circles have varied answers to what influences stock price fluctuations (upward and downward) (Omodero, 2019). Nigeria Stock Exchange is not insulated from external shocks (MV) outside the capital market. External shocks are macroeconomic indicators that affect stock prices (Anigbogu and Nduka, 2014). Winful, Sarpong, and Sarfo (2016) suggested that stock prices, market index, and market liquidity reflect these changes. Inflation and interest rates have been highlighted as external factors that affect share values. As an economic institution, SMs play a vital role in boosting the efficiency of capital formation and allocation. Thus, EG depends on how well the SM performs.

Other hazards besides market risks include GDP, inflation, currency rates, money supply, and interest rates. As global financial markets grow increasingly liberalised, evidence suggests a close association between SR and MV such as INTR, currency rates, GDP, INFLR, MS, etc. These variables are considered the most important SM determinants because they describe the macro economy that investors must monitor and forecast to make investing decisions (Abdullahi, Fakunmoju, Abubarkar, and Giwa, 2017). MD influences affecting share prices are: Osigwe and Uzonwanne (2015) defined EXCHR as the cost per unit of exchanging foreign currency to domestic currency. Obi, Oniore, and Nnadi (2016) studied the EXCHR at a certain time. The EXCHR is the ratio between one currency unit and another currency unit. Abdullahi, et al (2017) defined exchange rate as a country's pricing advantage over another's. The price advantage of one currency over another reflects SM and economic performance.

Khan and Khan (2018) defined SM return as an investment's profits over time. SM investors might earn capital gains or dividends. Pole and Cavusoglu (2021) said SM return is the key investment incentive. It helps investors compare investment possibilities. A return includes two components: periodic cash inflows on investments or dividends and change in asset price, i.e. capital gain or loss.

# SM Volatility

Volatility is the frequency and severity of investment price fluctuations (Seegert, 2012). Volatility is the rate a security's price rises or falls for a given set of returns. Volatility is evaluated by the standard deviation of annualised returns. (Balding and Dauchy, 2013) referenced in Pole and Cavusoglu (2021) define it as the range in which a security's price can rise or fall.

Volatility measures the dispersion of a security's or market index's returns. Volatility is measured by the standard deviation or variance of a security's or index's returns. Higher revenue volatility increases corporate and individual security and investment risk. Volatility in the SM often means huge swings.

# **Theoretical Review**

The section will be focus on the theoretical review of the study where it discusses four theories including: EMH theory and CAPM. These theories are discussed below: Efficient Market Hypothesis (EMH)

Malkiel and Fama (1970) advanced Markowitz's Capital Market Theory (1952). EMH proposes that stock prices fully reflect information about a company's value. The idea shows that using available information to generate large returns is difficult. An efficient capital market requires that all available information be considered when pricing assets to minimise undue profits.

Brealey and Myers (2011) said a market is efficient when excessive rewards are impossible. It indicates returns would equal market return. The fair value of shares reflects a company's worth by discounting future cash-flows at a cost of capital. Mishkin and Eakins (2006) continued the EMH hypothesis and said that for a market to be efficient, the traded shares and stocks must reflect all available information. In the 1980s, EMH gained popularity, according to Shiller (2003).

The EMH has three forms: weak, semi-strong, and powerful. In this market, stock prices reflect all publicly available information, hence the semi-strong form is preferred. All macroeconomic elements affecting a firm's stock must be examined to determine its share price in a semi-strong efficient market. World Bank, IMF, and central banks publish macroeconomic data in the public domain. Since industry information is public, companies can be easily monitored and share prices cannot be manipulated to make a profit. Investors make prudent, well-informed financial decisions to prevent informational losses (Lyndon and Gbalam, 2019).

In today's SM, the EMH hypothesis describes trading conditions and provides a basis for the study. The flow of macroeconomic data will affect SM index trading execution. Capital Asset Pricing Model (CAPM)

# Sharpe (1964), Linter (1965), and Mossin (1966) established the CAPM to examine how risk affected investment returns relative to the market portfolio. A risk-free security is considered since its return is constant. Over and above risk-free investments, investors are categorised by their risk tolerance. The capital asset pricing model relates an asset's expected return to its riskiness by comparing its historic rate of return to its asset class.

CAPM relies on the mean variance paradigm for investment decision making. It ties an asset's predicted return to its riskiness, assessed by its historical return variance relative to its asset class. The model separates systemic and specific portfolio risks. Systemic risk is market portfolio risk. Any asset that participates in market fluctuations has systematic risk. Specific risk is asset-specific. It's the asset's return that's unrelated to market changes. CAPM believes investors are compensated for systematic risk but not specific risk. Diversification reduces specific risk. Each asset in a market portfolio carries distinct risk, but diversification reduces the investor's net exposure to systematic risk (Ouma & Muriu, 2014).

CAPM relates risk and return. Risks are divided by return impact. Systematic risks influence the entire economy, while specialised risks harm only one industry. The model attempts to describe an investor's expected return based on the risk he/she is willing to assume.

# **Empirical review**

The empirical review of this study was done in two dimensions, which will comprises of foreign and Nigeria studies. The will be done below;

# **Empirical Review of Foreign Studies**

Ndlovu, Faisal, Resatoglu, and Turgut (2018) examined the relationship between INFLR, MS growth (M3), INTR, and the USD ZAR EXCHR using quarterly data from 1981Q1 to 2016Q4 on Johannesburg Stock Exchange stock prices. A vector error correction model, variance decomposition, impulse response function, and co-integration tests were employed in the investigation. INTR, MS, and INFLR boost share values, but the EXCHR hurts them. Share prices and MS are unidirectionally affected by EXCHE and INTR. Shocks to the share price account for most of the variations in itself for all periods in the short-run and long-run, according to variance decompositions. The impulse response function validated the variables' causal links with the stock price.

Epaphra and Salema (2018) examined the impact of MV on stock prices using monthly panel data from 2012-2016. MS and EXCHR influenced stock prices positively, while Treasury bill rate did not. The study found that INFLR didn't affect stock prices.

Khan and Khan (2018) used Karachi Stock Exchange to analyse the impact of MV on Pakistani stock prices. The study covered 2000 to 2016 and concluded that Karachi Stock Exchange stock prices were influenced by MS, EXCHR and INTR in the long run, but in the short term, only the EXCHR had an impact.

# International Journal of Academic Accounting, Finance & Management Research(IJAAFMR) ISSN: 2643-976X

#### Vol. 7 Issue 4, April - 2023, Pages: 1-12

Megaravalli and Sampagnaro (2018) evaluated the long- and short-term influence of MV on SMs in China, India, and Japan from 2008 to 2016. Using the Vector Error Correction Model, the study indicated that EXCHR have a long-term positive impact on SMs while INFLR has a little negative impact. Short-term, the variables didn't affect the SM.

Ntshangase, Mingiri, and Palesa (2016) examine the SM and South African MV from 1994 to 2012. INFR, INTR, MS, EXCHR and government spending are independent variables. The paper analyses the variables using the restricted VAR model and Johansen cointegration test. The study demonstrates a long-run association between MV and South Africa's SM. The study fails to assess each independent variable's impact on South Africa's SM. Also, critical fiscal policy factors are missing. This would have helped users uncover more exogenous variables affecting South African stock performance.

#### **Empirical Review of Nigeria Studies**

Pole and Cavusoglu (2021) studied MV impact on Nigerian SR. The study used secondary data from NSE fact book and CBN statistical bulletin between 1998 and 2019. ARDL was used to analyse monthly data. MS and aggregate industrial production favourably effect SR in the Nigerian stock exchange market (=0.466098, P0.05; =0.213141, P0.05), while EXCHR and INFLR negatively affect stock return (=-0.009285, P0.05; =-0.028260, P0.05). The study finds that MV affect short- and long-term SR in Nigeria. The report advises the CBN use deflationary fiscal policy and Adaptive Stabilization Method of EXCHR policy to reduce variance between actual and predicted SR in the Nigerian SM. The study identifies the dynamic effect of long and short-run MV on SR. To the author's knowledge, this is the first attempt to model Nigerian SR using MS and industrial production.

Lyndon and Gbalam (2019) studied the impact of MV on Nigerian Stock Exchange performance (NSE). ASI was employed as a proxy for SM performance as the dependent variable, while MS, INTR, INFLR, and EXCHR were independent variables. The variables' secondary data came from CBN Statistical Bulletins from 1985 to 2017. The study used multiple regression, Augmented Dickey-Fuller unit root test, Johansen co-integration test, and E-views 9.0 software to analyse data. Data research indicated longrun equilibrium and short-run dynamic correlations between MV and Nigerian Stock Exchange performance. All independent variables affected SM performance empirically. MS and EXCHR had a positive impact on ASI, whereas INTR and INFLR had an adverse association. The study advised that monetary authorities implement good monetary policies to boost the SM.

John (2019) used 1981-2016 annual time series data to analyse the effect of MV on Nigerian SM performance. CBN Statistical Bulletin provided the statistics. MS, INTR, EXCHR and INFLR were independent variables, while market capitalization (SM performance) was the dependent variable. All variables were steady at first difference except MS, which was stationary at second difference. MS has a significant positive effect on SM performance; INTR has a significant negative effect; EXCHR has a positive but not significant effect; and INFLR has a positive but not statistically significant effect. Cointegration tests revealed a long-run relationship between MV and SM performance. MS, EXCHR, and SM performance have unidirectional connection, according to the Granger Causality test. MS and INTR are the fundamental elements driving SM performance in Nigeria. EXCHR and INFLR had little impact on SM performance. Therefore, monetary policies that favour the availability of money in the economy should be adopted to assure a stronger SM performance. High interest rates have a considerable negative influence on the Nigerian SM.

Omodero and Mlanga (2019) examined the role of MV in determining Nigerian SM performance from 2009 to 2018. World Bank Development Indicators, IMF, and CBN Statistical Bulletin provided these statistics. EXCHR and INTR have no substantial impact on share price index, but INFLR does. Contrary to popular belief, GDP positively affects share price index. The study proposes that the economy should grow to keep the SM thriving, and those MV such as INFLR, INTR, and currency rate should be regulated to reduce negative SM performance.

Udi and Ohwofasa (2018) studied Nigeria's SM during 1986-2016. Market capitalization, per capita income, INTR, EXCHR, INFLR, and openness were used. The research uses an error correction model and indicates that INTR,I NFLR and market capitalization were key determinants in Nigerian Stock Exchange trade. SM performance is negatively correlated with inflation, interest rate, and per capita income, according to the report. The study advises that the monetary authorities ensure reasonable interest rates that encourage investment while checking double-digit inflation.

Kolapo, Oke, and Olaniyan (2018) used ARDL limits to analyse Nigeria's SM from 1986 to 2015. The study concluded that GDP and money supply affected Nigeria's SM. Long-term relationships between macroeconomic fundamentals and SM performance were also found.

Research Gaps: Several studies have been conducted on MD and SM return volatility in Nigeria and other countries, but no study has captured the effect of MD on SM return volatility in Nigeria before, making this study unique and first-of-its-kind. Some studies on MD and SM return volatility in Nigeria and other countries have found positive significant effects and others have found negative insignificant effects. This study explores the effect of MD on SM return volatility in Nigeria. **Research Methodology** 

The research design that will be adopted in this study is the Ex-post facto and Quasi Experimental design. The ex-post facto research design will be use because this type of research is one that takes place after the event or the fact had taken place while Quasi Experimental design will be adopted because it seeks to explore the causal effect of MD on SM return volatility in Nigeria.

The method of data collection used in this study were the secondary source of data (time series data), from the CBN Statistical Bulletin and Annual Report from 1985-2021. It was then examined using the, Descriptive Statistics, Unit Root Test, GARCH Model for the volatile ASI in the bids to capture the SM return volatility in Nigeria. In the bids to test the hypotheses formulated for this study, the MD (MS, INTR, EXCHR, INFLR and RGDPGR) and ASI, were subjected to Autoregressive Distributive Lag (ARDL) analysis in bids to capture the short and long run relationship between the independent and dependent variables.

In order to capture the stock return volatility, the GARCH Model was adopted for the study. The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Model, assuming a log return series  $r_t = \mu + \epsilon_t$ , where  $\epsilon_t$  is the error term at time t. The  $\epsilon_t$  follows a GARCH (1,1) model if:

with constraints  $\omega > 0, \alpha 1 \ge 0$  and  $\beta_1 \ge 0$ ,  $j = 1; \alpha 1 + \beta_1 < 1$  to ensure conditional variance to be positive as well as stationary. The basic GARCH (1,1) model is adequate in capturing all volatility in any financial time series. The GARCH (1,1) model with dummy variable in the conditional variance is specified as:

where  $D_1,..,D_n$  are dummy variables added to the conditional variance equation which takes value 1 as the sudden break appears in conditional volatility onwards and otherwise it takes value 0.

The modified model will be subjected to Autoregressive Distributive Lag (ARDL) in order to suit the feature of stationarity of the study variables. The ARDL was specified as:

K = lag length for the Unrestricted Error-Correction Model (UECM) $<math>\Delta = first differencing operator$  $\varepsilon = white noise or disturbance error term$ 

The co-integrating long-run relationship will estimated using the specification below:

The short-run dynamic model is specify thus:

Where;

 $\epsilon_{t-1}$  = the error correction term lagged for one period y = the coefficient for measuring speed of adjustment in equation (5) ASI= Volatile All Share Index MS= Change Money Supply INTR= Change Interest Rate EXCHR = Change Exchange Rate INFLR= Change Inflation Rate RGDPGR= Change Real Gross Domestic Product Growth Rate.

# **Result Discussions**

The first step in this investigation was to look at the distribution of annual data for the variables of the study using the descriptive statistics below;

		100				
Observations	36	37	37	37	37	37
Std. Dev.	0.615532	16.54101	4.150759	71.57819	16.20378	3.848183
Minimum	-0.561020	-42.38000	9.250000	-74.68118	-51.50000	-1.910000
Maximum	2.319551	40.57000	29.80000	401.9847	41.10000	14.60000
Mean	0.003706	0.336216	18.08662	3.059459	0.027027	4.654595
	ASI	MS	INTR	EXCHR	INFLR	RGDPGR

#### **Table 4.1: Descriptive Statistics**

Source: E-VIEW, 9.0 Outputs, 2022.

The evidence provided in Table 4.2 show significant variations in the variables given the large differences between the maximum and minimum values of the series. The summary statistics evidenced that the study variables covered a study period of 37 years (1985 to 2021). Again, ASI reported an average and Std. Dev. value of 0.0037 and 0.6155 suggesting that ASI deviate much away from the mean value. Meanwhile, ASI reported had a minimum and maximum value of -0.5610 and 2.3196 respectively throughout the study periods. Further, MS reported an average and Std. Dev. value of 0.3362 and 16.5410 suggesting that MS deviate much away from the mean value. Meanwhile, MS reported had a minimum and maximum value of -42.3800 and 40.5700 respectively throughout the study periods. INTR reported an average and Std. Dev. value of 18.0866 and 4.1508 suggesting that INTR did not deviate much away from the mean value. Meanwhile, EXCHR reported had a minimum and maximum value of -74.6812 and 401.9847, coupled with an average and Std. Dev. values of 3.0595 and 71.5782 respectively. INFLR ranged from -51.5000 to 41.1000 during the research. Lastly, evidenced that RGDPGR reported an average and Std. Dev. value of 4.6546 and 3.8482 suggesting that Std. Dev. is lower the mean value, which implies that RGDPGR has witness a steady growth over the years. Meanwhile, RGDPGR reported had a minimum and maximum value of -1.9100 and 14.6000 respectively throughout the study periods.

Table 4.2:

#### **Correlation Matrix**

	ASI	MS	INTR	EXCHR	INFLR	RGDPGR
ASI	1.000000					
MS	0.239350	1.000000				
INTR	-0.195254	-0.174752	1.000000			
EXCHR	-0.108475	-0.125009	-0.204195	1.000000		
INFLR	-0.247818	0.038506	0.084451	-0.027394	1.000000	
RGDPGR	-0.040444	0.095383	0.205773	0.189794	0.052716	1.000000

Source: E-VIEW, 9.0 Outputs, 2022.

INTR, EXCHR, INFLR, and RGDPGR had negative correlations with ASI in Nigeria, but MS had a positive correlation. MS revealed a coefficient value of 0.2394, indicating a substantial, positive connection between MS and ASI. The remaining variables have poor correlation. The table illustrates that multi-collinearity is unlikely. Nonetheless, another test confirmed this problem.

# Table 4.3: Multi-collinearity Test

Variables	Variance Inflation Factor (VIF)	Tolerance Value
ASI(-1)	1.123092	0.028234

MS	1.262311	4.27E-05
INTR	1.457593	0.000954
EXCHR	1.147991	1.81E-05
INFLR	1.027554	3.66E-05
RGDPGR	1.220704	0.000762

Source: E-VIEW, 9.0 Outputs, 2022.

From the above table, the VIF of ASI is 1.1231; MS is 1.2623; INTR is 1.4576; EXCHR is 1.1480, INFLR is 1.0276 and RGDPGR are less than 10. This shows the absence of multi-collinearity problem.

#### Table 4.5.1: Normality/Data Validity Test

#### Table 4.5.1a: Normality Histogram Test



Source: E-VIEW, 9.0 Outputs, 2022.

The residuals for normality test assessed model residual distribution normality. The presence of substantial outliers impacts standard errors and coefficient significance when residuals are not normally distributed. The test result in Table 4.4.1 ashows that the residuals are normally distributed because the histogram is bell-shaped and the Jarque-Bera statistic probability value is 0.2044, which is greater than 0.05 (5%), rejecting the null hypothesis that they are not.

Table 4.5.1b:	Heteroskedasticity	Test: Breusch	-Pagan-Godfrey

E-statistic	1 258680	Prob $F(7, 27)$	0 3072
Obs*P squared	8 611285	$\frac{1100.1(7,27)}{\text{Drob} Chi Savara(7)}$	0.2818
Scaled explained SS	5 200806	Prob Chi Square(7)	0.2010
Scaled explained 55	5.299890	FIOD. CIII-Square(7)	0.0234

# Source: E-VIEW, 9.0 Outputs, 2022.

Heteroskedasticity occurs when a variable's variability is unequal across a second variable's values that predict it. The Breusch-Pagan-Godfrey heteroskedasticity test ensured model estimation homoscedasticity. The models have no heteroskedasticity because the f-statistics p-values are insignificant at 5% significance level. The chi-square P-value was 0.2818, as seen above. Since it is not significant at 5%, this proves the study lacks heteroskedasticity. Hence, the residuals have no constant variance and zero me an null hypothesis is rejected. The model is Homoskedastic (i.e. it has equal variance). We can confidently say the model is reliable and predictive. Macroeconomic analysis uses the unit root test to test time series data stationarity because most economic variables are dependent. The study used ADF unit root;

# Table 4.6:Summary of ADF Test

Parameter	ADF test statistic	Test critical value @ 5%	Prob.*	Decision
ASI	-2.267465	-2.954021	0.1880	Non-stationary
MS	-8.007439	-2.945842	0.0000	Stationary
INTR	-3.842370	-2.945842	0.0057	Stationary
EXCHR	-3.118018	-3.948404	0.0743	Non-stationary
INFLR	-5.400614	-2.954021	0.0001	Stationary
RGDPGR	-3.411707	-2.945842	0.0170	Stationary
	ADF test a	t I <sup>st</sup> Difference		
ASI	-13.93279	-2.954021	0.0000	Stationary
MS	-12.00109	-2.948404	0.0000	Stationary
INTR	-5.744227	-2.951125	0.0000	Stationary
EXCHR	-3.195746	-2.951125	0.0290	Stationary
INFLR	-8.526554	-2.951125	0.0000	Stationary
RGDPGR	-8.025349	-2.948404	0.0000	Stationary
		000		

#### Source: E-VIEW, 9.0 Outputs, 2022.

The research series' stationarity is shown in the table above. All series except ASI and EXCHR were stationary in the ADF test. ASI, MS, INTR, EXCHR, INFLR, and RGDPGR reached stationarity at first difference when subjected further. All series reached stationarity at level and first differencing. As our series were stationary at levels (1(0) and first differencing (1(1)), we should study the long-term link between macroeconomic dynamism and SM volatility in Nigeria.

The study concludes that the SM return movements on the Nigerian exchange group do not exhibit random walk phenomena since their level series are not stationary but can be differentia of order one to be stationary. Hence, the Nigerian SM is powerful. Ejem, Ogbonna, and Okpara (2020) warned that unit root tests may not discover departures from a random job. The researcher verified the conclusion using the GARCH Model and ARDL short and long run tests.

#### Table 4.7 GARCH Test

Dependent Variable: ASI

Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)

Date: 12/17/22 Time: 01:31

Sample (adjusted): 1985 2020

Included observations: 36 after adjustments

Failure to improve likelihood (non-zero gradients) after 34 iterations

Coefficient covariance computed using outer product of gradients

Presample variance: backcast (parameter = 0.7)

 $GARCH = C(7) + C(8) * RESID(-1)^2 + C(9) * GARCH(-1)$ 

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.404905	0.719614	0.562670	0.5737
MS	0.007385	0.007178	1.028849	0.3036
INTR	-0.027397	0.039547	-0.692772	0.4885
EXCHR	-0.003530	0.005165	-0.683451	0.4943
INFLR	-0.008085	0.008730	-0.926138	0.3544
RGDPGR	-0.003369	0.034174	-0.098585	0.9215
	Variance	Equation		
C	0.148928	0.139704	1.066025	0.2864
RESID(-1)^2	-0.089595	0.033949	-2.639119	0.0083
GARCH(-1)	0.594562	0.446041	1.332976	0.1825
R-squared	0.133380	Mean dependent var		0.003706
Adjusted R-squared	-0.011057	S.D. dependent var		0.615532
S.E. of regression	0.618925	Akaike info criterion		1.892855
Sum squared resid	11.49205	Schwarz criterion		2.288735
Log likelihood	-25.07139	Hannan-Quinn criter.		2.031028

Durbin-watson stat 2.552043

#### Source: E-VIEW, 9.0, 2022.

According to the calculated standard GARCH (1,1) model in table 4.7, the mean equation's conditional means and lagged price parameter are important. GARCH models in Tables 4.7 show that the conditional means and lagged price parameters in both mean equations are not statistically different from zero. The Nigerian SM is inefficient because the mean equation error terms are not independently and identically distributed (iid). The ARCH and GARCH parameters' total, +, is far from 1 (+ = 1.332976) all-share index, showing excessive volatility clustering relative to MD. The researcher concluded that the Nigerian SM is inefficient because the lagged value of the annual ASI is positively and insignificantly different from zero and the error terms (by the rule of thumb, DW2) are not, implying that MD variables have greatly contributed to SM return volatility in Nigeria.

 Table 4.8: ARDL Bounds Test

Date: 12/16/22 Time: 17:29 Sample: 1986 2020 Included observations: 35 Null Hypothesis: No long-run relationships exist

Test Statistic	Value	К	
F-statistic	9.984235	5	

Critical Value Bounds

Significance	I0 Bound	I1 Bound	
10%	2.26	3.35	
5%	2.62	3.79	
2.5%	2.96	4.18	
1%	3.41	4.68	

#### Source: E-VIEW 9.0 Output 2022.

From Table 4.8, the F-statistic 9.98423 exceeds the 5% critical values at I(0) and I(1) boundaries, rejecting the null hypothesis and indicating a long-term association between variables. MD and SM volatility in Nigeria have a long-term association.

Table 4.9: ARDL Cointegra					
Dependent Variable: ASI					
Selected Model: ARDL(1,0	(0, 1, 0, 0, 0)				
Date: 12/16/22 Time: 17:2	26				
Sample: 1985 2021					
Included observations: 35					
	Cointegra	ating Form			
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
D(MS)	0.012893	0.006535	1.972972	0.0588	
D(INTR)	-0.023202	0.030884	-0.751257	0.4590	
D(EXCHR)	-0.004433	0.004258	-1.041014	0.3071	
D(INFLR)	-0.009559	0.006052	-1.579583	0.1258	
D(RGDPGR)	0.017503	0.027609	0.633965	0.5314	
CointEq(-1)	-8.368259	0.0000			
Cointeq = ASI - (0.0092*MS -0.0480*INTR -0.0032*EXCHR -0.0					
+ 0.0124*RGDPGR +	0.8049)				

	Long Run	Coefficients		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MS	0.009169	0.004538	2.020346	0.0534
INTR	-0.047973	0.023085	-2.078132	0.0473
EXCHR	-0.003153	0.003012	-1.046629	0.3046
INFLR	-0.006798	0.004441	-1.530930	0.1374
RGDPGR	0.012448	0.019531	0.637329	0.5293
С	0.804943	0.406338	1.980968	0.0579

#### Source: E-VIEW 9.0 Output 2022.

The Error Correction coefficient (cointEq-1) is estimated at -1.4061, meaning the model corrects its previous periods disequilibrium at 140.61% annually. Hence, increasing MD variables at a consistent 140.61% annually will improve them greatly over time. The coefficient of determination is 0.5334, which is 53%, and the modified R2 is 53%, implying that the independent variables in this model have been able to determine the variance of SM return to 53%. The F Probability statistic validates this model's significance. Again, Durbin Watson Statistics showed that the model is not serially linked because its value is within the accepted range.

Table 4.9 shows that a unit increase in MS increases ASI by 0.0129 and 0.0092 (1.29% and 0.92%) in the short and long term. Research showed that the more MS banks in Nigeria, the greater the ASI impact. MS failed short-term statistical significance but passed long-term significance. MS is a powerful long-term ASI factor, but not in the short term. Kolapo, Oke, and Olaniyan (2018) agree, however Akwe, Garba, Lyndon, and Gbalam (2019) and Dang (2018) and John (2018) disagree (2019).

The investigation showed that INTR had no short- or long-term effects. The negative result implies that 1% gain in INTR will only decrease ASI by -0.0232 and -0.0478 (2.32% and 4.78%) over time. In other words, as banks raise loan rates, ASI will suffer short- and long-term. INTR decreases ASI in the short and long term, statistically. Its short-term and long-term p-values are 0.4590 and 0.0473, respectively. This result supports Udi and Ohwofasa (2018), Akwe, Garba, and Dang (2018), and contradicts John (2018). (2019).

Table 4.9 shows that a unit increase in EXCHR reduces ASI by -0.0044 and -0.0032 (0.44% and 0.32%) in the short and long term. Research showed that as more stocks experience currency rate fluctuations owing to daily operations, the ASI in Nigeria may be affected. EXCHR failed the short- and long-term statistical significance tests. Omodero and Mlanga (2019), John (2019), and Pole and Cavusoglu (2021) agree with this finding, while Lyndon and Gbalam disagree (2019).

The regression result showed that INFLR negatively affected SM ASI in Nigeria both short-term and long-term. This study expected a poor result. The negative result implies that 1% INFLR will only decrease ASI in Nigeria by -0.0096 and -0.0068. p-values above 5%. Hence, INFLR will negatively impact Nigerian ASI in the short and long term. This result supports Udi and Ohwofasa (2018) and Pole and Cavusoglu (2021) but contradicts Omodero and Mlanga (2018). (2019).

Lastly, table 4.9 showed that RGDPGR increases ASI by 0.0175 and 0.0124 (1.75% and 1.24%) in the short and long run, respectively. RGDPGR's rise may effect Nigeria's ASI. Short- and long-term statistical significance tests failed RGDPGR. RGDPGR does not strongly determine ASI in the short or long term. Kolapo, Oke, and Olaniyan found the same (2018). **Conclusion and Recommendations** 

The Nigerian stock exchange is weak form efficient for the yearly ASI during the period of this study. However, the impact of the individual MV indicated that broad money supply and exchange rate had significant positive effect on all share-index (proxy for SM performance), while INTR and INFLR exhibited an inverse relationship with ASI. Hence, it was concluded that MD has no considerable effects on SMR in Nigeria. It is hoped that students and academics would find this study useful in future researches just as the findings of this study would be of immense benefit to investors, regulatory authority, policy makers, financial consultants, analysts and brokers. Based on the findings of this study the following recommendations are made:

i. Regulatory authorities and policy makers should ensure that there is general stability in MS and EXCHR, while trying to put the inflationary trends under control and at the same time maintain a stable INTR regime in the economy in order to achieve improvements in SM performance to bring about desired EG and national development.

ii. Besides, the monetary authorities should put in place sound monetary policies that would bring about positive developments in the SM.

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#### International Journal of Academic Accounting, Finance & Management Research(IJAAFMR) ISSN: 2643-976X

#### Vol. 7 Issue 4, April - 2023, Pages: 1-12

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