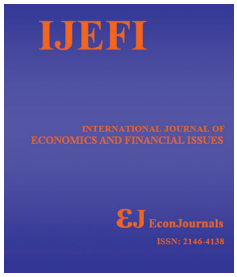


International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2024, 14(6), 273-282.

Monetary Policy Instruments and Stock Market Returns Volatility in Nigeria

Emmanuel Othuke Akpokerere[1]*, Caroline Azuoma Onojaife[2], Eloho Elizabeth Osevwe-Okoroyibo[3]

[1]Department of Banking and Finance, Faculty of Administration and Management, Delta State University of Science and Technology, Ozoro Delta State, Nigeria, [2]Department of Office and Information Technology, Faculty of Administration and Management, Delta State University of Science and Technology, Ozoro Delta State, Nigeria, [3]Department Accountancy, Faculty of Administration and Management, Delta State University of Science and Technology, Ozoro Delta State, Nigeria. *Email: akpokerereemma@gmail.com

Received: 01 August 2024 **Accepted:** 12 October 2024 **DOI:** https://doi.org/10.32479/ijefi.17087

ABSTRACT

The study examines monetary policies instruments impact on stock market volatility in Nigeria for the period of 1993-2022. The study identified the independent variables, namely; reserve requirement (RR), cash reserve ratio (CRR), discount rate (DR) and money supply (MS) which were analyzed in relation to stock market volatility proxied with all share index volatility (ASIV). The data was analyzed with descriptive statistics, correlation matrix several diagnostics tests (VIF, validity test, ADF and Johansen tests) and the multiple regression analysis. The findings revealed that RR, CRR and MS have significant effect on ASIV while DR has insignificant effect on ASIV in Nigeria. It was concluded that reserve requirement, discount rate and money supply exert significant effect on Nigerian economy. Thus, it thereby recommended that management of CBN should put modalities in place to aggressively control ASIV in Nigeria. CBN should put measures in place to increase CRR. This will provide banks opportunity to fund economic transaction in the Nigerian economy, thereby reducing ASIV.

Keywords: Reserve Requirement, Cash Reserve Ratio, Discount Rate, Money Supply and Stock Market Volatility
JEL Classifications: E1, E2, E3, E4, G1

1. INTRODUCTION

Stock price volatility can affect the financial sector and the economy due to the capital market's growing role in financial intermediation (Adamu and Zubairu, 2022). In this scenario, the monetary authorities alter monetary policy tools to meet the government's macroeconomic goal and eliminate any fundamental that could distort financial system stability, reliability, or the economy (Anaele and Umeora, 2019). Since monetary policy and market index are functionally related, the Central Bank must determine how monetary variables like reserve requirement, cash reserve ratio, discount rate, and money supply affect stock market volatility. Additionally, stock markets are not always upbeat. The Central Bank places great importance on the impact of reserve requirement, cash reserve ratio, discount rate, and money supply on stock market sustainability, but individual and corporate investors must be aware of the uncertainties that would be attached to share values if the Apex Bank changes its monetary policy tools. Understanding how reserve requirement, cash reserve ratio, discount rate, and money supply affect common stock intrinsic value would help investors. The principal value of a common stock compared to its market price assumes capital market securities over- and under-price (Tordee et al., 2020). Tchereni and Mpini (2020) acknowledged fundamentalist views but argued that stock trading profits depend on an investor's ability to accurately calculate stock's intrinsic value by examining the firm's economic, financial, and other qualitative and quantitative factors. After arguing that reserve requirement, cash reserve ratio,

discount rate, and money supply affect stock market volatility, the efficient market hypothesis postulation would hold because the capital market tends to assimilate and integrate all monetary policy information as a tool of stabilisation by the monetary authorities to realise.

The stock market mobilises domestic resources for productive investments worldwide. Most economies depend on the stock market because it indicates asset redistribution and reallocation (Pilinkus, 2018). Market performance depends on economy performance. The stock market has contributed to Nigeria's economic growth in the last two decades (Bertram, 2018). Therefore, economic growth is closely linked to stock market performance. Policymakers now discuss monetary policy and stock exchange market research. In light of this development, monetary policy tools (reserve requirement, cash reserve ratio, discount rate, and money supply) are adjusted to achieve macroeconomic goals of inflation and output targets and control financial system stability risk (Echekoba et al., 2018). The Central Bank of Nigeria (CBN) is interested in the stock market because of its role in monetary policy and financial risk management. The bank can affect stock market volatility through reserve requirement, cash reserve ratio, discount rate, and money supply. Central banks manipulate monetary policy instruments like reserve requirement, cash reserve ratio, discount rate, stock market credit, and exchange rate to affect money supply growth, interest rates, security prices, credit availability, and financial institution liquidity. These factors can cause monetary imbalances or shocks by affecting investment, consumption, imports, exports, government spending, total output, income, and prices (Ighoroje and Akpokerere, 2022). Only if stock earnings are rising can investors receive rewards. Thus, understanding how policy actions affect the macro-economy requires understanding how they will affect key financial markets and how asset prices and returns in these markets affect households, firms, and other stakeholders (Alugbuo and Ekwugha, 2020). According to Omodero et al. (2020), company fundamentals like a change in the board of directors, appointment of new management, creation of new assets, dividends, earnings, and external factors like government rules and regulations, inflation, and other economic conditions, investor behaviour, market conditions, money supply, competition, and unco Market volatility is meant to reflect the economy: falling stock prices indicate economic depression, while rising stock prices indicate economic prosperity (Echekoba et al., 2018). Given the increasingly complex global financial system, it is important to determine how monetary policies (reserve requirement, cash reserve ratio, discount rate, and money supply) affect Nigerian stock market volatility.

The literature on monetary policy (reserve requirement, cash reserve ratio, discount rate, and money supply) and stock market volatility is uncertain in direction and behaviour. Most literature on stock market volatility and monetary policy (reserve requirement, cash reserve ratio, discount rate, and money supply) assumed a linear relationship. Another study found that monetary policy (reserve requirement, cash reserve ratio, discount rate, and money supply) and stock market volatility are not linearly related (Altintas and Yacouba, 2018). Most research found nonlinearity between monetary policy (reserve requirement, cash reserve ratio, discount rate, and money supply) and stock market volatility. Central banks' different responses to stock market shocks and vice versa may make linearity a misleading and systematic bias. Thus, a nonlinear approach is appropriate to show the relationship between reserve needs, cash reserve ratio, discount rate, money supply, and stock market volatility. This shows that multiple theoretical and empirical studies support stock market volatility's nonlinear relationship with monetary policy instruments (reserve requirement, cash reserve ratio, discount rate, and money supply). Recent literature and the unresolved discussion on the impact of monetary policy (reserve requirement, cash reserve ratio, discount rate, and money supply) transmission to the stock market using linear models inspired this study. We examine whether a nonlinear model can explain the well-documented stock market volatility-monetary policy connection. This research examines how reserve requirement, cash reserve ratio, discount rate, and money supply affect Nigerian stock market volatility (ASIV).

2. REVIEW OF RELATED LITERATURE

2.1. Reserve Requirement

Reserve requirements can serve three purposes, depending on the situation: micro-prudential, monetary control (to affect market interest rates and monetary aggregates), and liquidity management (especially to sterilise excess reserves), according to Babangida and Khan (2021). Micro-prudential functions defend against liquidity and solvency concerns, and reserve requirements provide liquidity insurance in the case of financing withdrawals. This position is crucial in nations with underdeveloped financial markets and a shortage of liquid assets (Jamilu and Asad-Ul, 2021). Reserve requirements have been useful in middle-income countries during strong capital inflows caused by changes in world interest rates and risk perceptions for monetary control and liquidity management (Okoyan and Eze, 2021). Several studies have found that these episodes are often accompanied by credit expansion, aggregate demand growth, and high inflation. Interest rate hikes may reduce inflation but attract capital, which might boost credit growth. Conversely, higher reserve requirements would cut bank deposit rates. The mechanics are these. Central banks often buy foreign exchange to limit exchange rate appreciation after substantial capital inflows. They also increase reserve requirements and sell government bonds to avoid money supply growth and maintain price stability (Okoyan and Eze, 2021). In an open economy, the incentive to do so is particularly strong if sterilising capital flows with open market operations is costly due to large differentials between the interest rate on assets used for these operations and the interest rate on other assets. Reserve requirements tax bank intermediation, separating the depositor rate from the bank's financing cost (Tordee et al., 2020). If bank deposits provide specific transaction and liquidity services to consumers, additional reserve requirements would usually be passed on to depositors in the form of lower deposit rates (Tchereni and Mpini, 2020). If banks can only partially substitute reservable liabilities with other financing sources due to information frictions or a less-than-perfect central bank

liquidity supply, a similar situation would follow. The policy may enhance bank intermediation spreads by lowering deposit rates or raising lending rates (Alugbuo and Ekwugha, 2020).

2.2. Cash Reserve Ratio

As a monetary phenomenon that can only be cured by monetary interventions that led to the injection of N600billion into the economy as a bail out measure which lead to a reduction in liquidity ratio from 40% to 30%, Monetary Policy Rate from 10.25% to 9.75 and Cash Reserve Ratio from 4% to 2%. This is an expansionary monetary policy to leverage the negative effect of illiquidity in the capital market. The relationship between money supply and stock price is the function of the macroeconomic policies (Akani, 2018). Increase in money supply has the capacity of increasing inflation which will crowd out investment.

2.3. Discount Rate

CBN (2018) stated that the central bank will lend to commercial banks at the discount rate. Panel rates are typical for central bank lending as a last option. The central bank indirectly controls loan volume by changing rates. The goal is to affect commercial bank lending. Inflation may raise the central bank's rediscount rate, making funds more expensive. This tightens credit. In depression, the central bank lowers the rediscount rate to encourage commercial banks to make more credits (Alugbuo and Ekwugha, 2020). By connecting borrowers and lenders at affordable interest rates, a stock market facilitates financial availability (Issahaku et al., 2018). Banks and other lenders use stock markets to lend money to individuals and corporations, who invest in stocks. The stock market and interest rate are related by debt and equity financing. If banks give greater deposit interest rates, investors will use them more and invest less in stocks (Ighoroje and Akpokerere, 2022). This reduces stock market and economic output. However, a high interest rate raises borrowing costs and lowers business earnings and dividends, affecting share prices.

2.4. Money Supply

Money supply can be defined as cash outside banks, demand deposits at deposit money banks, domestic deposits at the CBN, less Federal and State government deposits. This mostly entails buying or selling government bonds to increase or decrease the money supply (Uju and Ugochukwu, 2021). When the Central Bank pays or receives these bonds, it changes the economy's money supply and short-term government bond prices. Interbank interest rates alter with economic money supply. Peter (2020) notes that raising the money supply lowers interest rates, which boosts investment and consumer spending. According to Umeora (2018), most economic activities depend on money, and an increase in the money supply is likely to increase producers' and consumers' capital bases, which increases investment and consumption, leading to growth. Omodero (2019) suggests portfolio replacement or inflation hypothesis impacts may link money supply to stock prices. The portfolio balancing model may reallocate idle money to financial assets like equities as money supply rises. According to Omodero (2019), increasing the money supply can cause unexpected inflation and scepticism. Money supply and stock values fall when interest rates rise. Stock price and money supply are linked (Akpokerere et al., 2024). The 2007/2008 global financial crisis decreased money supply. Evidence demonstrated that Nigerian Stock Exchange Market Capitalisation decreased from N10.18trillion in 2007 to N6.96trillion in 2008 and N4.69trillion in 2009 (Akani, 2018). All-Share Price index fell from N7, 990.12 in 2007 to N31, 450.78 and N20, 827.17 in 2008 and 2009, while aggregate stock price fell 10.8%, 9.02%, and 7.81%.

2.5. Stock Market Return Volatility

Akpokerere and Okoroyibo (2020) define stock market return as investment earnings over time. Stock market investors may receive dividends or capital gains. They believe that stock market return drives and rewards investing. It helps investors compare alternative investments. They explained that a return has two parts: Periodic cash receipts on investments or dividends and capital gain or loss. Volatility is the frequency and intensity of investment price movements (Seegert, 2018). The rate at which a security's price rises or falls in response to a set of returns is called volatility. Volatility is calculated using the standard deviation of annualised returns across time. It is the range of a security's price. Volatility measures an investment or market index's return dispersion statistically. The standard deviation or variance in returns from the same securities or market index can be used to calculate volatility. The higher the corporate revenue volatility, the riskier company and individual security and investment. Asymmetric stock market volatility is often linked to big swings in either direction. Stock market values for financial assets are variable and probabilistic. The concept of volatility is straightforward. Divergence and spread around a central tendency are measured. More importantly, it estimates how far the present asset price is from its past average (Rashid et al., 2022). In any market, there will be some volatility, which can be valued and used to make resource allocation easier. However, increased volatility and stock market gaps frequently cause unease and depreciation in most involved parties. Due to stock market volatility, the capital market becomes unstable, destabilising the currency and hindering international trade and finance (Rashid et al., 2022). High volatility means a security's price can change quickly, either positively or negatively. However, lesser volatility means a security's value fluctuates more slowly over time. Extreme volatility disrupts stock market efficiency (Izunobi et al., 2019). Rashid et al. (2022) also noted that economic and political issues affect stock market volatility, regardless of their magnitude. The index difference from the share prices of all stock exchange-listed companies usually represents stock market volatility. Standard deviation is a common volatility measure. Investors worry about skewness, kurtosis, and heteroskedasticity. Histograms and GARCH models can depict volatility shocks without over-persistence in the conditional variance (Salisu and Oloko, 2018). Calculate stock market return volatility using all share index (ASI): $\ln(ASI_{t-1}-ASI_{t-1})/ASI_{t-1}.*100$.

2.6. Theoretical Framework

2.6.1. Random walk theory

The random walk theory is a component of efficient market hypothesis. It states that current price of any security, fully reflects the information content of its historical sequences of price, Afego (2018). It is built on the premises that investors react instantaneously to information advantage, they have thereby

eliminating profit opportunities. Stock price always reflect the information based available and no profit can be made from information based trading (Lo and MacKinlay, 1989) cited in Evbayiro-Osagies and Kehinde (2018). A random walk is known by the fact that prices changes independent of each other Lo and MacKinlay (1999) cited in Evbayiro-Osagies and Kehinde (2018), opined that stock price short-run serial correlations are not zero. They also proposed that in the short-run, prices can gain momentum due to investors jumping on the bandwagon as they see several consecutives periods of some direction price movements with particular stock.

2.6.2. Empirical reviews

Adamu and Zubairu (2022) used an annual dataset from 1985 to 2021 to analyse how money market variables affect Nigerian stock market volatility. Certificates of deposit, commercial papers, bankers' acceptance, and government notes were studied as money market indicators. The GARCH-in mean model generated stock market index volatility and cross-variable nexus. Nigerian stock market volatility is affected by certificates of deposit and bankers' acceptance, but not commercial paper or treasury bills. This study recommends investing in money market indicators such certificates of deposit and bankers' acceptance to reduce stock market index risk and volatility.

Okoyan and Eze (2021) modelled 1981-2018 Nigerian time series datasets using Johansen cointegration and vector error correction. Their findings showed that bankers' approval positively affects capital market expansion while treasury bills and commercial paper negatively affect it.

Tchereni and Mpini (2020) evaluated how monetary policy affected emerging economy stock markets, particularly South Africa, from 2000Q1 to 2016Q4. This helps monetary authorities understand how their decisions affect the stock market. Monetary policy affects money supply, repo rate, GDP, inflation, and other macroeconomic factors. We test the hypothesis that stock markets do not respond to monetary policy by first using the vector error correction model to determine the long-run relationship of the variables and then the GARCH (1, 2) model to determine volatility. The results imply that monetary policy shocks explain 5.2% of JSE volatility. Stock market volatility is negatively correlated with M2. There is a positive correlation between repo rate and JSE volatility, which is not economically advantageous because repo rates affect securities investment demand. The study suggests that the Monetary Policy Committee cut the repo rate to increase borrowing and give the public money to trade securities on the financial market.

Omodero et al. (2020) investigate Nigeria's stock market reaction to monetary policy changes. This analysis analyses 1998-2018 data to determine the current empirical situation. All share index, money supply, interest rate, and exchange rate statistics are collected. The multiple regression results show that money supply positively affects the all-share index. In contrast, interest rates barely hurt stock market output. The finding shows that the exchange rate negatively impacts stock market performance, but not significantly. Following these findings, the report recommends that the country's monetary authority pilot test all monetary policy modifications before adoption. The government should push the CBN to lower interest rates and avert stock market collapse measures.

Anaele and Umeora (2019) examined monetary policy and Nigerian capital market performance from 1986 to 2017. The study used economic policy rate, cash reserve ratio, liquidity ratio, and loan to deposit balance as monetary policy tools and all share index as a capital market proxy. The ARDL regression method showed that capital market production was negatively and significantly associated to the monetary policy rate, cash reserve ratio, and loan to deposit ratio. The liquidity ratio also correlated with capital market productivity.

In addition, Etale and Eze (2019) examined macroeconomic variables and stock market performance using an annual time series dataset from 1985 to 2017. The study found using Johansen cointegration test and Error Correction Model (ECM) that broad money supply and the exchange rate boost stock market growth, but interest rate and inflation rate hurt it.

Celebi and Honig (2019) used a quarterly time series dataset from 1991 to 2018 to explore how macroeconomic issues affected the German stock market. An Ordinary Least Square (OLS) model shows that exchange rate and interest rate positively affect stock market return, whereas GDP, gross investment, and money supply negatively affect it.

Das and Megaravalli (2018) examined the Indian stock market and macroeconomic data quarterly from April 2005 to March 2015. They include currency rate, foreign institutional investment, call money rate, and CPI as macroeconomic factors. The study also used Pearson's correlation, Johansen co-integration, and Granger causality. They found a positive correlation between macroeconomic parameters and stock market indices and long-term equilibrium. The Granger causality test indicated that exchange rates, call money rates, and the stock market index are causally related.

Using OLS and other econometric models, Chukwuemeka (2018) examined the relationship between monetary policy and the Nigerian capital market from 1985 to 2016. Interest rate, exchange rate, monetary aggregate, and monetary policy rate positively correlated with market capitalisation. Treasury bill rates adversely correlated with market capitalisation. The study also found that market turnover was positively correlated with monetary policy, monetary aggregate, and exchange rate. Treasury bill and interest rates negatively affected market turnover.

Nwokoye and Otu (2018) examined how monetary policy affected Nigeria's stock market. The 1981-2015 study used co-integration test and vector error correction. The study indicated that money supply positively and considerably affected stock market development. In contrast, the interest rate hurt the stock market.

In 2018, Echekoba, Ananwude, and Lateef examined how the Central Bank of Nigeria's monetary policy rate, cash reserve

ratio, liquidity ratio, and loan-to-deposit ratio affected the Nigerian capital market. Various Nigerian Stock Exchange and Central Bank of Nigeria yearly reports provided data for analysis. ARDL was used to estimate the model and analyse co-integration, while granger causality analysis determined how monetary policy tools affected capital market performance. Nigerian capital market performance and monetary policy tools are not co-integrated, according to the report. The study also indicated that Nigerian capital market performance is more affected by monetary policy rate than Central Bank of Nigeria announcements. Based on the superior methodology of ARDL in data analysis, the Central Bank of Nigeria should be cautious and properly consider the macroeconomic condition in monetary policy decisions, especially regarding liquidity ratio because it can fuel or deter inflation, which affects capital market stock prices.

Atgur and Yigit (2018) used Johansen Co-integration and Granger Causality tests to examine how monetary policies affected the Borsa Istanbul (BIST) stock market in Turkey from 2006 to 2016. Johansen Co-integration test showed a long-term link. The Granger Causality test showed a substantial link between BIST stock market price and return indices and money supply (M2) and deposit interest rate. The data showed that Turkish monetary policy affected the stock market.

Vladimír (2018) used the portfolio equilibrium network to study the impact of money supply on the stock market as a monetary policy diffusion mechanism. The study sought statistical proof on money supply's impact on the US stock market. Johansen's co-integration technique and vector error correction model proved that money supply affected S&P 500 index valuation with a 6-month lag.

Pierre and Danillo (2018) examined how sectoral co-movement transmits monetary policy shocks to stocks. The study started factor-augmented vector autoregressive model with mixed regime-switching factor loadings, MS2-FAVAR, which allowed mutual evaluation of sector stock returns and monetary policy shocks on the stock market. The study indicated that monetary policy shocks had a greater impact on stock returns in industries with strong co-movement.

Finally, Evbayiro-Osagies and Kehinde (2018) examined Nigeria's inflation, financial openness, currency rates, and stock market returns volatility using the GARCH model using an annual time series dataset from 1985 to 2015. They found that the exchange rate positively affects stock market return volatility while inflation negatively affects it.

2.6.3. Research gaps

Few empirical studies done not only locally but also globally on monetary policy instruments and stock market return volatility; however, they are all faced methodology problem of some using multiple regression and GARCH analysis, with their findings mixed and inconclusive. From the foregoing, the results of previous studies in the Nigerian contest have considered stock market returns without addressing the volatility aspect and this was the gap the current study fill by examining the effect of monetary policy instruments on stock market returns volatility in Nigeria.

3. RESEARCH METHODOLOGY

This study used ex-post facto and quasi-experimental designs. Ex-post facto research examines the causal effect of reserve requirement discount rate and money supply on stock market volatility in Nigeria after the event or fact has occurred, while quasi experimental research examines the causal effect. Verifiable variables mean the study cannot manipulate the variable of interest. This study will use secondary data from CBN Statistical Bulletin and CBN Annual Report for 1993-2022, to meet its research goals. Quality and relevance for specific goals are more important than data source. Due to their credibility, these varied data and information sources were considered for the study. This study used Econometric Views 9.0. This study used unit root, Auto-regressive Distributed Lag (ARDL) Bound Co-integration, and ARDL Co-integrating and Long form estimation techniques. The unit root test determines whether a data series is stable (if its mean and variance are time invariant and the auto-covariance depends on the time lag between the variables), but the ARDL bound cointegration test models both I(0) and I(1) variables simultaneously. Next, test for ARDL Co-integrating and long run form if the ARDL bound cointegration test shows no cointegration between the study variables. ARDL Co-integrating experiment examined whether cointegrated variables are affected by long-run equilibrium deviations. A series robustness (diagnostic) check was performed on the model before running the analysis, along with descriptive statistical and trend analysis, correlation analysis, and Variance Inflation factor analysis. This study analyzes how Reserve Requirement (RR), Cash Reserve Ratio (CRR), Discount Rate (DR), and Money Supply (MS) (Independent Variables) affect stock market volatility [proxied by All Share index Volatility (ASIV)]. ARDL received the improved model to incorporate research variable stationarity. ARDL received the improved model to incorporate research variable stationarity. ARDL was defined:

$$\Delta ASIV = \partial_0 + \partial_1 ASIV + \partial_2 RR_{t-1} + \partial_3 CRR_{t-1} + \partial_4 DR_{t-1} + \partial_5 MS_{t-1} + \sum_{i=1}^{k} \gamma_1 i \Delta ASIV_{t-1} + \sum_{i=1}^{k} \gamma_2 i \Delta RR_{t-1} + \sum_{i=1}^{k} \gamma_3 i \Delta CRR_{t-1} + \sum_{i=1}^{k} \gamma_4 i \Delta DR_{t-1} + \sum_{i=1}^{k} \gamma_5 i \Delta MS_{t-1} + \varepsilon_t \quad (1)$$

K = lag length for the Unrestricted Error-Correction Model (UECM)
Δ = first differencing operator
ε = white noise or disturbance error term

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

$$\Delta ASIV = \partial_0 + \partial_1 ASIV_{t-1} + \partial_2 RR_{t-1} + \partial_3 CRR_{t-1} + \partial_4 DR_{t-1} + \partial_5 MS_{t-1} + \varepsilon_t \quad (2)$$

The short-run dynamic model is specify thus:

$$\Delta ASIV = \sum_{i=1}^{k} \gamma_1 i \Delta ASIV_{t-1} + \sum_{i=1}^{k} \gamma_2 i \Delta RR_{t-1} + \sum_{i=1}^{k} \gamma_3 i \Delta CRR_{t-1} + \sum_{i=1}^{k} \gamma_4 i \Delta INFLR_{t-1} + \sum_{i=1}^{k} \gamma_5 i \Delta MS_{t-1} + \varepsilon c_t \quad (3)$$

Where;
εc_{t-1}= the error correction term lagged for one period
^{y}= the coefficient for measuring speed of adjustment in equation (4)

4. RESULTS AND DISCUSSION

The descriptive statistics consists of mean, std. Dev., minimum and maximum values associated with the variables under consideration. The descriptive statistics are summarized on Table 1.

The result in Table 1 provided some insight into the nature of the independent variables and the dependent variable used in this study. RR had a mean of 2.6969 within 1993-2022, with a maximum and minimum of 5.1200 and 0.8289 respectively while the std. dev. is 1.2162. This shows that RR volatility is about 121.62%. CRR had a mean of 34.6605, with a maximum and minimum of 79.9500 and 1.0000 respectively while the std. dev. is 23.2171. DR had a mean of 13.3000 with a maximum and minimum of 26.0000 and 6.0000 respectively while the std. dev. is 3.7574; this implies that the volatility of DR is about 375.74. MS had a mean of 22.3647 with a maximum and minimum of 57.7800 and 1.2900 respectively while the std. dev. is 15.0516. ASIV had a mean of 0.1975 with a maximum and minimum of 0.9941 and −0.5421 respectively while the std. dev. is 0.3478. This shows that ASIV volatility is about 34.78%, this implies steady increase in ASIV in Nigeria during the duration of 1993-2022.

In order to ensure that the results of this study are valid, the variance inflation factor (VIF) computed as shown in Table 2. Furthermore, the Centered Variance Inflation Factor (CVIF) statistics for all the independent variables consistently lies between 1.3466, 1.9595, 1.8904 and 1.2860 for RR, CRR, DR and MS respectively. This indicates the absence of multicollinearity problems among the variables under investigation because the cut off value of VIF is 10. Values of VIF that exceed 10 are often regarded as indicating multicollinearity.

This was done using the serial correlation LM test. The serial correlation LM test in Table 3 details that there is no element of serial correlation in the models owing to the fact that the P-values of the f-statistics are insignificant at 5% level of significance. To ensure that there is homoscedasticity in the model estimation, the heteroskedasticity test via the Breusch-Pagan-Godfrey was performed. With the result there is no problem of heteroskedasticity in the models as the P-values of the f-statistics are insignificant at 5% significance level. From the Table 3, it confirms that the model is homoskendastic since the probability values of three parameters are >0.05 level of significance. Ramsey test result reveals that our model is correctly specified and is stable for regression analysis.

The test of residuals for normality was conducted to assess the distribution normality of the model residuals. When residuals are not normally distributed, it denotes the presence of significant outliers in the data which affects the standard errors and then the significance levels of the coefficients. From the test result, it indicates that the residuals are normally distributed as the histogram assumes a bell-shape and the J-B statistic probability value is 0.7725 which is greater that 0.05 (5%), this form the premise to reject the null hypotheses that the residuals are not normally distributed (Table 4).

The correlation matrix in Table 5, showed the coefficients of the type of relationship that exist between the independent (RR, CRR, DR and MS) and the dependent variable; ASIV. It evident from the correlation coefficients that RR, CRR, DR and MS has the coefficients (r) of 0.2649, 0.3414, −0.2572 and 0.1047 respectively, which is below the threshold of 0.7, which further confirms the absent of multicolinearity in the data sets.

The summary of the ADF unit root test output in Table 6, above revealed that all the variables under investigation i.e. ASI, RR, CRR, DR and MS contain unit root test at their first difference 1(1). Evidence of this could be seen from the value of their respective ADF statistics which is more than the critical value at 5%. Moreover, additional evidence of stationary series could also be seen from the P-value for all variables which is <5% level of significance >95% confidence level. They all attained

Table 1: Descriptive Statistics of variables of the study

Results	ASIV	LOGRR	CRR	DR	MS
Mean	0.197506	2.696915	34.66046	13.30000	22.36467
Median	0.156245	2.266615	22.50000	13.50000	17.83500
Maximum	0.994076	5.120000	79.95000	26.00000	57.78000
Minimum	−0.542059	0.828943	1.000000	6.000000	1.290000
SD	0.347787	1.216220	23.21710	3.757406	15.05163
Skewness	0.182925	0.308168	0.553829	1.103346	0.781935
Kurtosis	2.587072	2.125400	2.023978	6.291816	2.884278
Jarque-Bera	0.367762	1.430992	2.724406	19.63193	3.073854
Probability	0.832035	0.488949	0.256096	0.000055	0.215041
Sum	5.727677	80.90744	1039.814	399.0000	670.9400
Sum square deviation	3.386768	42.89657	15631.97	409.4250	6569.996
Observations	29	30	30	30	30

Source: E-VIEW 9.0 output, 2024. ASIV: All share index volatility, CRR: Cash reserve ratio, DR: Discount rate, MS: Money supply, SD: Standard deviation

Table 2: Variance inflation factors multicollinearity test

Variance inflation factors			
Sample: 1 30			
Included observations: 29			
Variable	Coefficient variance	Uncentere VIF	Centered VIF
C	0.304455	74.19376	NA
LOGRR	0.004079	8.925687	1.346581
CRR	1.61E-05	6.993765	1.959525
DR	0.000927	39.27739	1.890359
MS	2.76E-05	4.329366	1.286015

ASIV: All share index volatility, CRR: Cash reserve ratio, DR: Discount rate, MS: Money supply, NA: Not available

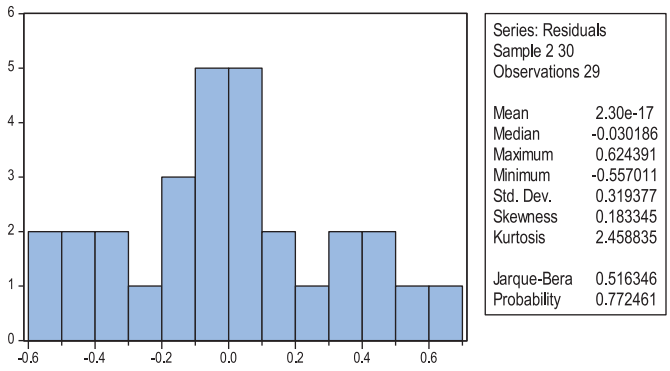
Table 3: Data validity test

Breusch-Godfrey serial correlation LM test			
F-statistic	4.175927	Prob. F (2,22)	0.1290
Obs×R^2	7.979868	Prob. Chi-square (2)	0.1185
Heteroskedasticity test: Breusch-Pagan-Godfrey			
F-statistic	0.270008	Prob. F (4,24)	0.8944
Obs×R^2	1.248838	Prob. Chi-square (4)	0.8700
Scaled explained SS	0.623891	Prob. Chi-square (4)	0.9604

Ramsey RESET Test for appropriateness of variables of the study			
Equation: Untitled			
Specification: ASIV C LOGRR CRR DR MS			
Omitted variables: Squares of fitted values			
Results	Value	Df	P
t-statistic	0.108802	23	0.9143
F-statistic	0.011838	(1, 23)	0.9143
Likelihood ratio	0.014922	1	0.9028

Source: E-VIEW, 9.0 outputs, 2024. ASIV: All share index volatility, CRR: Cash reserve ratio, DR: Discount rate, MS: Money supply

Table 4: Normality histogram test



Source: E-VIEW 9.0 Output, 2024

stationarity at first difference i.e. at order one. Since the variables are all integrated at order one, we may proceed with Johansen cointegration test.

Table 7 revealed that the result of the multivariate cointegration test by Johansen and Juselius cointegration technique reveal that both the trace statistic and the Maximum Eigenvalue statistic shows evidence of two cointegration relationship (at None and at most 1), where the values of the trace statistic and the Maximum

Table 5: Correlation output

Variables	ASIV	LOGRR	CRR	DR	MS
ASIV	1.000000				
LOGRR	0.264852	1.000000			
CRR	0.341366	0.224538	1.000000		
DR	−0.257198	−0.218667	−0.682337	1.000000	
MS	0.104672	−0.429980	0.088836	−0.003059	1.000000

Source: E-VIEW 9.0 output, 2024. ASIV: All share index volatility, CRR: Cash reserve ratio, DR: Discount rate, MS: Money supply, NA: Not available

Eigenvalue statistic is greater than their respective critical values at 5% level of significance level. This result conforms to the existence of a stable long-run relationship between ASIV and RR, CRR, DR and MS.

Table 8 shows the regression coefficients and the significance of the t-statistics for the independent variables; RR, CRR, DR and MS individual impact on the dependent variable: ASIV.

The P-value of RR is 0.0439 which is lesser than the significant value of 0.05 and the t-ratio value of 2.3443 is >2 which indicate the extent of significance to which RR affects ASIV. The coefficient of RR is 0.0439 which imply that RR has a positive trend with ASIV. One percent movement in RR would lead to 4.39% increases in ASIV in Nigeria. RR has a significant influence on ASIV in Nigeria. Thus, putting modalities in place to increase RR by the CBN, has would contribute immensely to the ASIV control in the country; hence, RR is paramount in maintaining stable share prices in the country. This is in line with the findings of Vladimír (2018) but contrary to the finding of Echekoba et al. (2018).

The P-value of CRR is 0.0015 which is lesser than the significant value of 0.05 and the t-ratio value is 3.6200 is >2 which indicates the extent of significance to which CRR affects ASIV. The coefficient of CRR is 0.0145 which imply that CRR has a positive trend with ASIV. One percent movement in CRR would lead to 1.45% increases in ASIV. CRR has a significant influence on ASIV in Nigeria. This implies that the CRR is the most control instruments of the banks, by increasing CRR has enhances stable share prices in the Nigeria economy. This is contrast with findings of Anaele and Umeora (2019) and Echekoba et al. (2018) but in line with the findings of Chukwuemeka (2018).

The P-value of DR is 0.9437 which is greater than the significance value of 0.05 and the t-ratio value of −0.0714 lesser than 2, which indicates the extent of insignificant to which DR affects ASIV. The coefficient of DR of −0.0022, imply that DR has a negative effect on ASIV. The implication is that a 1% increase in DR would lead to 0.22% decreases in ASIV. Though the relationship is insignificant, it paramount to note DR play a major in stimulating investment in the country, thus, modalities should be put in place to increase DR of the banks in the bids to control ASIV in the Nigeria economy. This is in contrast with the findings of Babangida and Khan (2021) and Jamilu and Asad-Ul (2021) but in line with Alugbuo and Ekwugha (2020).

The P-value of MS is 0.0466 which is lesser than the significant value of 0.05 and the t-ratio value of 2.1783 is greater than indicates

Table 6: ADF unit root test

Test variables	ADF test statistic value	Mackinnon critical value at 5%	Order of integration	P	Decision
At level					
ASIV	−5.010665	−5.976263	1 (0)	0.5310	Non-stationary
RR	0.123449	−2.967767	1 (0)	0.9621	Non-stationary
CRR	−1.931336	−2.967767	1 (0)	0.3140	Non-stationary
DR	−4.744818	−5.967767	1 (0)	0.0623	Non-stationary
MS	−3.325620	−4.967767	1 (0)	0.0628	Non-stationary
At 1st difference					
ASIV	−6.836393	−2.981038	1 (1)	0.0000	Stationary
RR	−6.158465	−2.971853	1 (1)	0.0000	Stationary
CRR	−6.225405	−2.971853	1 (1)	0.0000	Stationary
DR	−8.688096	−2.971853	1 (1)	0.0000	Stationary
MS	−5.816865	−2.971853	1 (1)	0.0000	Stationary

Source: E-VIEW, 9.0 outputs, 2024. ASIV: All share index volatility, CRR: Cash reserve ratio, DR: Discount rate, MS: Money supply, RR: Reserve requirement

Table 7: Summary of Johansen cointegration test output

Date: June 09, 24, time: 23:30				
Sample (adjusted): 4 30				
Included observations: 27 after adjustments				
Trend assumption: Linear deterministic trend				
Series: ASIV LOGRR CRR DR MS				
Lags interval (in first differences): 1-1				
Unrestricted Cointegration Rank test (trace)				
Hypothesized		Trace	0.05	
Number of CE (s)	Eigenvalue	Statistic	Critical value	P**
None*	0.821520	89.91459	69.81889	0.0006
At most 1	0.545794	53.38603	47.85613	0.0234
At most 2	0.476841	32.07749	29.79707	0.0242
At most 3	0.113828	24.584986	15.49471	0.0112
At most 4	0.047791	4.322206	3.841466	0.0502

Trace test indicates 1 cointegrating eqn (s) at the 0.05 level. Source: E-views 9.0 Output, 2024. *Rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) P values

Table 8: Regression results

Dependent variable: ASIV				
Method: Least squares				
Sample (adjusted): 2 30				
Included observations: 29 after adjustments				
Variable	Coefficient	SE	T-statistic	P
C	0.438343	0.551774	0.794426	0.4347
LOGRR	0.149722	0.063866	2.344315	0.0439
CRR	0.014527	0.004013	3.619985	0.0015
DR	−0.002175	0.030453	−0.071417	0.9437
MS	0.011438	0.005251	2.178252	0.0466
R^2	0.856706	Mean dependent variance		0.197506
Adjusted R^2	0.816158	SD dependent variance		0.347787
SE of regression	0.344966	Akaike info criterion		0.864845
Sum squared resid	2.856040	Schwarz criterion		1.100586
Log likelihood	−7.540250	Hannan-Quinn criterion		0.938676
F-statistic	2.114960	Durbin-Watson statistic		2.008142
Prob (F-statistic)	0.002572			

Source: E-VIEW 9.0 Output, 2024. SD: Standard deviation, SE: Standard error

the extent of significance to which MS affects ASIV. The coefficient of MS is 0.0114, which imply that MS have a positive effect on ASIV. This shows that 1% increase in MS would lead to 1.14% increases in ASIV in Nigeria. It implies that the increase in the money in circulation, in bids to decrease ASIV in Nigeria economy. This is line with findings of Babangida and Khan (2021) and Jamilu and Asad-Ul (2021) but in contrast to Alugbuo and Ekwugha (2020).

R^2 value of 86% showed that the strong positive relationship is further confirmed. The adjusted R^2 measures the goodness or fit of the model. This shows the goodness of fit of the model and also explains the ASIV in relation to the RR, CRR, DR and MS in 82ways. The 18% left is known as the error term and other variables outside the model. From the above, there is conclusive evidence of absence serial or autocorrelation since the Durbin Watson value is 2.0081, which is lesser than "4". The F-Statistics has a value of 2.114960 and a P = 0.002572, this showed that all the independent variables; RR, CRR, DR and MS jointly have effect on the ASIV of Nigeria within the period investigated in. Therefore this section exposes the relationship that exists between the independent variables and the dependent variable.

5. CONCLUSION AND RECOMMENDATIONS

The study examined the impact of monetary policies on stock market volatility in Nigeria between for the period of 30 years (1993-2022). The study made used of secondary data (Time Series) sourced from CBN Statistical Bulletin. The study identified the independent variables, namely; Reserve Requirement (RR), Cash Reserve Ratio (CRR), Discount Rate (DR) and Money Supply (MS) which were analyzed in relation to stock market volatility proxied with All Share index Volatility (ASIV). The data was analyzed with descriptive statistics, correlation matrix several diagnostics tests (VIF, validity test, ADF and Johannsen tests) and the multiple regression analysis with E-VIEW 9.0. The findings revealed that RR, CRR and MS have significant effect on ASIV in Nigeria while DR has insignificant effect on ASIV in Nigeria. It was concluded that reserve requirement discount rate and money supply exert significant effect on Nigerian economy.

The following recommendations are made:

1. RR had a significant effect on ASIV in Nigeria. Thus, it thereby recommended that management of CBN in Nigeria should put modalities in place in order to aggressively control ASIV in Nigeria.
2. CRR has significant effect on ASIV in Nigeria; as a result CBN should put various measures in place to increase CRR. This will obviously provided banks opportunity to fund economic transaction in the Nigerian economy, thereby reducing ASIV.
3. Since DR has insignificant negative effect on ASIV in Nigeria, thus, it is recommended that banks should involve various strategies to induce more savings deposits in order to have enough funds to grant loans to customers in need of loans, hence help in controlling ASIV in Nigeria.
4. MS has a significant impact on ASIV in Nigeria. Thus, to reduce the ASIV in Nigeria, CBN should design more attractive policies in controlling money in circulation; this will go a long way to reduce ASIV in Nigeria.

REFERENCES

Adamu, H., Zubairu, A. (2022), Money market indicators and stock market volatility in Nigeria: Evidence from GARCH-in-mean model. East African Scholars Journal of Economics, Business and Management, 5(9), 263-268.

Afego, P. (2018), Weak form efficiency of Nigerian stock market: An empirical analysis. International Journal of Economics and Financial Issues, 2(3), 340-347.

Akani, W.H. (2018), Analysis of macroeconomic aggregates on stock price in Nigeria: An application of co-integration and causality test. International Journal of Academic Research, 1(3), 56-79.

Akpokerere, O.E., Osevwe-Okoroyibo, E.E. (2020), Capital market performance as a panacea for economic growth in Nigeria. International Business Research Journal, 13(2), 1-12.

Akpokerere, O.E., Osevwe-Okoroyibo, E.E., Alexander, O.D., Eyesan, L.D., Meshack, A. (2024), Tax revenue, capital market performance and foreign direct investment in an emerging economy. International Journal of Economics and Financial Issues, 14(4), 290-298.

Altintas, H., Yacouba, K. (2018), Asymmetric responses of stock prices to money supply and oil prices shocks in Turkey: New evidence from a nonlinear ARDL approach. International Journal of Economics and Financial Issues, 8, 45-53.

Alugbuo, C.J., Ekwugha, J.C. (2020), Monetary policy and stock market performance: Evidence from Nigeria stock exchange market. International Journal of Research and Innovation in Social Science, 4(6), 556-566.

Anaele, S.C., Umeora, C.E. (2019), Monetary policy and the performance of the Nigerian capital market (1986-2017). International Journal of Research in Engineering Science and Management, 2(7), 59-72.

Atgur, M., Yigit, F. (2018), Causality analysis of the impact of monetary policy on stock markets: The case of Turkey. Journal of Knowledge Management, Economics and Information Technology, 7(4), 1-20.

Babangida, J.S., Khan, A.I. (2021), Effect of monetary policy on the Nigerian stock market: A smooth transition autoregressive approach. CBN Journal of Applied Statistics, 12(1), 1-21.

Bertram, O.A. (2018), Economic growth and capital market development in Nigeria; An appraisal. Journal of Business Management and Economic Research, 2, 27-38.

Celebi, K., Honig, M. (2019), The impact of macroeconomic factors on the German stock market: Evidence for the crises, pre-and post-crises periods. International Journal of Financial Studies, 7(18), 18.

Central Bank of Nigeria. (2018), Statistical Bulletin. Available from: https://www.cbn.gov.ng/out/2019/publications/statistical/bulletins/2019/tableA.4.2.1.xls [Last accessed on 2024 May 15].

Chukwuemeka, A. (2018), Monetary policy and the performance of Nigeria capital market: A time variant analysis. European Journal of Accounting, Auditing and Finance Research, 6(6), 22-43.

Das, A., Megaravalli, A.V. (2018), Macroeconomic indicators and stock market boogie: The case of National stock exchange, India. Indian Journal of Research in Capital Markets, 4(3), 20-32.

Echekoba, F.N., Ananwude, A.C., Lateef, O. (2018), Effect of monetary policy on the performance of the Nigerian capital market (1986-2016): Stylized facts from ARDL approach. Advances in Research, 14(6), 1-15.

Etale, L.M., Eze, G.P. (2019), Analyzing stock market reaction to macroeconomic variables: Evidence from Nigerian Stock Exchange (NSE). Global Journal of Arts, Humanities and Social Sciences, 7(3), 14-28.

Evbayiro-Osagies, E.I., Kehinde, E.F. (2018), Inflation rates, financial openness, exchange rates and stock market return volatility in Nigeria. ICAN Journal of Accounting and Finance, 4(1), 125-140.

Ighoroje, E.J., Akpokerere, O.E. (2022), An investigation of weak form efficiency in the Nigerian capital market. Account and Financial Management Journal, 7(6), 2787-2794.

Ighoroje, E.J., Akpokerere, O.E. (2022), Financial deepening and the Nigerian financial system. Peripex-Indian Journal of Research, 11(3), 121-126.

Issahaku, H., Ustarz, Y., Domanban, P.B. (2018), Macroeconomic variables and stock market returns in Ghana: Any causal link? Asian Economic and Financial Review, 3(8), 1044-1062.

Izunobi, A.O., Nzotta, S.M., Ugwuanyim, G., Ozurumba, A.B. (2019), Effects of exchange rate, interest rate, and inflation on stock market returns volatility in Nigeria. International Journal of Management Science and Business Administration, 5(6), 38-47.

Jamilu, S.B., Asad-Ul, I.K. (2021), Effect of monetary policy on the Nigerian stock market: A smooth transition autoregressive approach. CBN Journal of Applied Statistics, 12(1), 1-21.

Lo, A.W., Mackinlay, A.C. (2002), A Non Random Walk Down the Street. Princeton, Oxford: Princeton University Press.

Nwokoye, E.S., Otu, E. (2018), Impact of monetary policy on stock market development: Implication for the Nigerian economy. International Journal of Development and Economic Sustainability, 6(4), 29-50.

Okoyan, K., Eze, P.G. (2021), Effect of money market instruments on capital market performance in Nigeria. European Journal of Accounting, Auditing and Finance Research, 9(2), 67-80.

Omodero, C.O. (2019), Effect of money supply on economic growth: A comparative study of Nigeria and Ghana. International Journal of Social Science Studies, 7(3), 16-23.

Omodero, O.C., Adetula, T.D., Adeyemo, K. (2020), Stock market reaction to monetary policy modifications: Evidence from an emergent market. Academic Journal of Interdisciplinary Studies, 10(3), 59-66.

Peter W. (2020), Measurement of Money Supply. Available from: https://investopedia.com/terms/mon eysupply.asp [Last accessed on 2020 Oct 26].

Pierre, G., Danilo, L. (2018), Monetary Policy, Stock Market and Sectoral Co-movement. Documentos de Trabajo, No. 1731. Bancode Espana, Eurosistema. Available from: http://www.bde.es

Pilinkus, D. (2018), Macroeconomic indicators and their impact on stock market performance in the short and long run: The case of the Baltic States. Technological and Economic Development of Economy, 16(2), 291-304.

Rashid, A., Javed, A., Jehan, Z., Iqbal, U. (2022), Time-varying impacts of macroeconomic variables on stock market returns and volatility. Romanian Journal of Economic Forecasting, 25(3), 144-166.

Salisu, A.A., Oloko, T.F. (2018), Modelling spillovers between stock market and FX market: Evidence for Nigeria. Journal of African Business, 16(1-2), 84-108.

Seegert, N. (2018), Optimal Taxation with Volatility. A Theoretical and Empirical Decomposition. Job Market Paper, University of Michigan. p55.

Tchereni, B.H.M., Mpini, S. (2020), Monetary policy shocks and stock market volatility in emerging markets. Risk Governance and Control: Financial Markets and Institutions, 10(3), 50-61.

Tordee, B., Alobari, C., Zukbee, S., Abuba, S. (2020), Monetary variables in the determination of stock price movements in Nigeria. Contemporary Journal of Interdisciplinary Research, 1, 1-11.

Uju, E.A., Ugochukwu, P.O. (2021), Effect of monetary policy on industrial growth in Nigeria. International Journal of Entrepreneurship and Innovation, 4(1), 47-60.

Umeora, U.C. (2018), Effects of money supply and exchange rates on inflation in Nigeria. Journal of Management and Corporate Governance, 2, 73-87.

Vladimír, P. (2018), Effect of money supply on the stock market. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 65(2), 465-472.