How Fluctuations in Money Market Indicators (MMIs) affect Nigerian Exchange Limited (NGX) (2010 – 2023 Q2): Evidences from VAR and Granger Causality Wald Model

Emmanuel Obiora Nwakeze[*]
Head of Accountancy Department
School of Management Sciences
Grundtvig Polytechnic, Oba, Anambra State, Nigeria.

Samuel Oshiole
Accountancy Department
School of Management Sciences
Auchi Polytechnic, Auchi, Edo State, Nigeria.

Evelyn Nwamaka Ochi (Ph.D)
Business Administration Department
Faculty of Management Sciences
Madonna University, Okija, Anambra State, Nigeria.

Okechukwu Onwuliri (Ph.D)
Management & Social Sciences Division
Polytechnic Programmes Department
National Board for Technical Education (NBTE), Kaduna, Nigeria.
*Corresponding Author: moredayshopesngltd@gmail.com
moredayshopesngltd@gmail.com

A b s t r a c t

Since the Black Thursday (October 24) and Black Tuesday (October 29) experiences that scholars widely associated as triggers for the great crash of the U.S Wall street stock market of 1929, there have been constant debates on whether there were Money Market Indicators (MMIs) causal undertone to that crashed performance of the stock market. Instead prior researches dwelled majorly on the effect of macroeconomic indicators on the performance of the market, with a stale and narrowed datasets, and without specifically selecting multiple MMIs as control variables. This creates a gap in research, and explains why this study was aimed at using 5 selected MMIs - Inter-Bank Call Rate (IBCR), Monetary Policy Rate (MPR), Treasury Bill Rate (TBR), Savings Deposit Rate (SDR), and Maximum Lending Rate (MLR) – and with a better updated and expanded monthly datasets (January 2010 – July, 2023) to examine how these selected control variables, individually and collectively, affect the performance of a stock exchange market – using the Nigerian Exchange limited (NGX) market as a case. Expo-facto was the research design for the study since the datasets utilized are already available and retrieved from both the Central Bank of Nigeria (CBN), and NGX

historical data. These datasets as well as the formulated hypotheses were respectively analyzed and tested using Vector Auto-regression (VAR) model, and VAR diagnostics and tests' Granger Causality Wald test model in STATA 15.0. The study found that, out of the 5 MMIs (control variables), only MPR [since p-value (0.002) < 0.05] and SDR [since p-value (0.007) < 0.05] provided statistical evidence of their independent and significant prediction of adverse impact on performance of NGX (measured by % ∆ in ASI - and evident in its high volatility). However, it also found that when the control variables are considered collectively, it is capable of impacting the market significantly in the long-run [since p-value (0.009) < 0.05]. Thus, the study concludes that MMIs are true determinants of the performance of NGX market. The study then recommends that MMIs should be kept at favourable rates by CBN, other monetary regulators, and financial institutions, so as to foster the performance and stability of NGX market, and the economy at large

Keywords: *Money Market Indicators (MMIs), Nigerian Exchange Limited (NGX), Inter-Bank Call Rate, Monetary Policy Rate, Treasury Bill Rate, Savings Deposit Rate, Maximum Lending, All-Share Index.*

1. Introduction

Once upon a time in the history of U.S Wall Street stock market, there were days notable as *Black Thursday* (October 24, 1929) and *Black Tuesday* (October 29, 1929). Those days remind many of what was widely referred as the *Great Crash* – the Wall Street crash of 1929. The crash was the heavy and unprecedented New York Stock Exchange (NYSE) collapse in its history. *Black Thursday* is associated with the experience of the highest sell-off of shares in American history, forcing the market to lose about 11% of its value; while *Black Tuesday* was the day investors, out of speculation and panic, extra-ordinarily traded approximately sixteen million shares on NYSE, making the market to lose about 14 billion USD value of stock, and thousands of investor exiting its books (Wikipedia, 2023). And since then, there has been a constant ponder and debates by scholars on factors that precipitated that great and unprecedented crash.

Many scholars held divergent theories that suggested causal factors for the aforementioned crash. However, a chunk of them suggested that the swift decline in money supply, prompted by the decision of Federal Reserve, as at that time, seriously had a contractionary economic effect. And to cushion this, interest rate was make cheap, enticing many citizens to resort to bank borrowing. This paved way for financial excesses, to the point that the banks became caught with insufficient reserve. This borrowed money was largely invested in the stock market – that was then speculated to be ever-rising, thereby making the stock to grow exponentially. And just like the natural law of diminishing return, the market boomed to a peak, and started to dwindle – as earlier predicted by economist and financial expert Irving Fisher and Roger Babson, respectively. This dwindle drastically weakened the confidence reposed in the market, and subsequently and severely destabilized the financial system and the economy at large, to the extent of erupting a 'great crash'.

From the initial decline in money supply, to cheap interest rate, to cheap bank loans, to banks' keeping of insufficient reserves, and *et cetera,* the underlying ponder remained: are there truly money market indicators causal undertones to the crash? Thus, the nexus between money market and capital market have been a subject of interest by prior studies.

Over the years, prior studies on this subject are dominated by researches that examined principally the impact of macroeconomic variables [such as: money supply, interest rate, treasury bills, foreign exchange rate, inflation, total savings, hot money, money supply, income per capital, inflation (wholesale price index), government expenditures, real gross domestic production (RGDP), *et cetera*] on either stock prices or the performance of stock market (popularly measured by All-Share-Index) of their respective countries (Babarinde & Enoruwa, 2021; Majeed, 2022; Oskenbayev, Yilmaz & Chagirov, 2011; Ali, Rehman, Yilmaz, Khan & Afzal, 2010; Lee, Huang & Chen, 2017; Ayunku, 2019; Hassan & Ahmad, 2022; Udo, Odey & Jacob, 2022; Ezenduka & Joseph, 2020; Odey, Owan & Owan, 2023; Azimi, 2022; Qing & Kusairi, 2019; Hussainey & Ngoc, 2009; Rajapakse, C. & Garthika.S., 2018), with virtually no focus on using multiply selected MMIs as control variables. A grossly examination of the above empirical reviews, would also reveal that virtually the studies were with relatively stale datasets. Their literatures, data, and findings may have been overtaken by recent events - e.g. COVID 19 pandemic, Russia-Ukraine war, the various *coup d'état* and other political instability in Africa (and their attending economic sanctions by the international community) *et cetera*. Perhaps newer data and governments' economic/monetary policies may be capable of shaping today's research results and findings in a different dimension. Thus, the reason this study aimed to contribute coherently to body of knowledge by extending the range, and updating the datasets for the period 2010 – 2023:Q2, thereby updating the extant literatures. It would therefore prove a great accomplishment if this study can be able to fill this research gap, while using the Nigerian Exchange Limited (NGX) as a case.

2. Literature Review: Conceptual and Theoretical Framework

2.1 Money Market and Money Market Indicators (MMIs)

Over the years, money market has been found by prior researches to have played significant role in Nigeria's economy, by way of contributing immensely to her economic prosperity and development (Marshal & Solomon, 2015; Aminu, Bambur & Aliyu, 2017 – as cited in Hassan *et al*., 2022). Historically, money market has its origin from depository banking institutions – and still depends on these for credit enhancement and survival (Flandreau & Ugolini 2011). The Economic Times (2023) defined Money Market as the subset of the financial market where short-term and highly liquid financial instruments are traded. In Nigeria, these financial instruments consist of Government Securities (e.g. treasury certificates, treasury bills, Eligible development stocks, and CBN bills); Non-Government Securities (e.g. certificates of deposit, bankers' acceptances, commercial paper, and tenured deposits); the Foreign Exchange market; the Discount market; and the Inter-bank market (Olowe, 2011). More also, the forecasting of this market's fluctuations has mainly been done by certain Money Market Indicators (MMIs). MMIs are mainly quantitative data-points emanating from financial securities that aim to interpret stock and other financial index data. It deploys some statistical formula on time-series data in arriving at a ratio and conclusion – that can serve the forecasting need of investors and

other users. MMIs that are applicable in most economies and studies are: Inter-Bank Call Rate, Monetary Policy Rate, Treasury Bill Rate, Savings Deposit Rate, 12-Months Deposit Rate, 6-Months Deposit Rate, 3-Months Deposit Rate, 1-Months Deposit Rate, Prime Lending, Maximum Lending Rate, CRR – Private Sector Funds, CRR – Public Sector Funds, and Liquidity Ratio. In Nigeria, the present (as of June 2023) rates of MMIs are as disclosed in *figure 1* below, with its curves depicting the varying fluctuations and volatility over the relevant months. The outrageous nosedive in the Inter-Bank Call Rate, visible on the graph from the month October 2022, could be attributed to the effect of Naira Redesign Policy implementation of the Central Bank of Nigeria, which was announced on the 26th October of the same year, and characterized by naira scarcity and commercial banks' unwillingness to lend to each other.
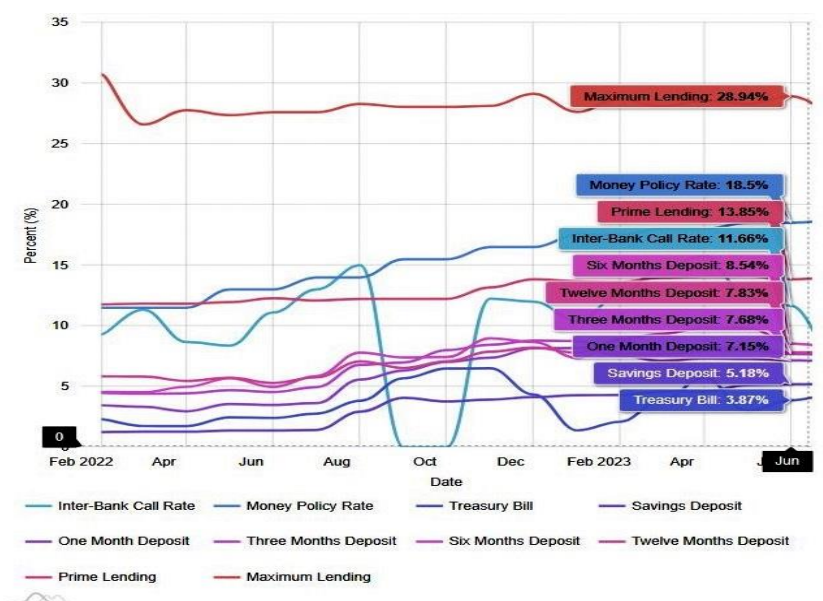
Source: Central Bank of Nigeria (2023)
Figure 1: Nigeria MMIs (in %) for the period February 2022 – June 2023.

However, the selected MMIs for the purpose of this study are: Inter-Bank Call Rate (IBCR), Monetary Policy Rate (MPR), Treasury Bill Rate (TBR), Savings Deposit Rate (SDR), and Maximum Lending Rate (MLR). These MMIs, as better reviewed below, represent the control variables for this study:

2.1.1 Inter-Bank Call Rate (%) (IBCR)

Inter-Bank Call Rate (IBCR) is the interest percentage charged on short term fund lending between banks, and other financial institutions in a Inter-Bank Call Money Market. This market is beneficial in supporting the financial survival and liquidity of banks and other financial institutions (Haryadi & Sidiq, 2013). IBCR can also be used to refer to foreign exchange rate paid when banks engage in wholesale foreign currency transactions with other banks (Hayes, 2021).

Olowe (2011) is one of the studies hat provide clear empirical evidence that IBCR affects Nigerian Exchange Limited (NGX) market. According to the study, IBCR volatility has serious

implications not only on NGX market, but also on derivative pricing, repurchase agreement, foreign exchange market's rate determination, lending rates, reverse repo, banks' cost of funds, open buy back, other money market rates, and government policy decisions. One particular example of how IBCR influence or affect the stock market in Nigeria is the boost in confidence and trading activities on stock market as a result of marginal lending by the banking industry to various investors at a relatively affordable marginal lending rate (closely intertwined to IBCR) during the recapitalization of banking sector and insurance sector in July 2004 and September 2005, respectively (Olowe 2011). Hence, it is on this basis that this research formulated its' first hypothesis as:

H$_{01}$: Lagged (4 lagges) IBCR does not granger cause NGX Market performance AS1 (Δ%).

2.1.2 Monetary Policy Rate (MPR)

Monetary Policy Rate (MPR) has been defined as a reference rate set in the short-term by the central bank of a country. It is popularly referred as the refinancing rate for commercial banks that would want to borrow from central bank; and the deposit rate of return that central bank pays on commercial banks' reserve with it (Central Charts, 2019). In Nigeria, it is a pertinent monetary control tool for determining the cost of credit, rate of inflation, and financial and economic activities within the country. An increase in MPR by CBN would influence an increase in the cost of credit and money supply in an economy, thereby having a contractionary effect on inflation and economic activities in the country; and vice versa.

However, Effiong, Benson & David (2023) provided empirical evidence from Nigeria of how MPR affects NGX market. The study deployed panels Non-Linear Autoregressive Distributed Lag (NARDL) to, among others, examine how stock prices react to fluctuation in the MPR of the CBN. It found that a positive change MPR resulted to a 0.26% decline in stock prices in the long-term, and a 0.35% increase in the stock prices on the NGX market. Hence, it is on this basis that this research formulates its' second hypothesis as:

H$_{O2}$: Lagged (4 lagges) MPR does not granger cause NGX Market performance ASI (Δ%).

2.1.3 Treasury Bill Rate (TBR)

Treasury Bill (TB) rate is commonly an investment yield rate on a short-term and secured government debt obligation issuable by CBN, and backed by the treasury department for a period not later than one year. Ideally, TBs are issued at a discount for the purpose of raising short-term fund for the government. And at maturity, the full face value (at par) is paid to investors. In Addo & Sunzuoye (2013), the impact of TB rate, in conjunction with other MMIs, on the stock market returns of Ghana's stock market was critically examined for the period: January 1995 – December 2011. The study utilized the Vector Error Correlation, and Johansen's Multivariate co-integration Model to establish, among others, that co-integration and long-run relationship exist between TB rate and stock market returns. Furthermore, using Multivariate Regression Analysis (OLS), Addo *et al*. (2013) found that TB rate, when considered independently, is one of the MMI that reports a negative (but not significant) relationship with stock market returns. However, it also opined and concluded that when TB

rate is applied jointly with interest rate, they are found to have an impact in the long-run on stock market returns. Hence, it is on this basis that this research formulated its' third hypothesis as:

H$_{O3}$: Lagged (4 lagges) TBR does not granger cause NGX Market performance ASI (Δ%).

2.1.4 Savings Deposit Rate (SDR)

According to Etuk, Aboko, Victor-Emeka & Dimkpa (2014), Savings Deposit Rate (SDR) is the percentage of interest paid by banks and other financial institutions for money deposited in customers' savings accounts. Kagan (2021) in a more elaborate fashion, define *Deposit Rate* as the interest paid by financial institutions to any of these deposit account holders: savings account. Certificate of deposit (CD), and self-directed deposit retirement accounts.

Empirical evidence on the impact of SDR on NGX market was found in the study - Eze & Johnny (2020). The study utilized a monthly dataset between SDR (and one other control variable) on stock market capitalization in Nigeria NGX market. With the use of ADF test of unit root, Johansen co-integration test, and regression procedure, the study, among others, found a significant impact – an inverse relationship between SDR and stock market capitalization in NGX market. This Eze *et al*. (2020)'s research establishment was further affirmed by the results from its' F-statistics and Durbin-Watson tests. However, Efuntade & Efuntade (2022) using a dataset between 1985 – 2021 found deposit interest rate having a significant impact on stock market capitalization of NGX. Hence, it is on this basis that this research formulated its' forth hypothesis as:

H$_{O4}$: Lagged (4 lagges) SDR does not granger cause NGX Market performance ASI (Δ%).

2.1.5 Maximum Lending Rate (MLR)

Maximum Lending Rate (MLR) in the banking sector has been the rate charged to bank customers and micro, small, medium size enterprises (MSME) that are lowly credit rated when they attempt borrowing from a commercial banks. Thus, *Maximum Lending* provides the funding requirement of the private sector of the economy (Efuntade *et al*., 2022). Studies have shown that MPR is one of the prime determinants of MLR. Over the years, the hike in MPR has also been found as an attributing factor to the widening gap experienced in the Nigeria banking sector between ML and deposit rate. For example, when the CBN hiked the MPR, MLR in commercial banks got impacted almost immediately by experiencing a 1.12% increase (i.e., MLR = 28.75% in February 2023) against 27.63% in January 2023 (Tokede, 2023). But the question remains: does this MLR impact the NGX market in anyway?

The study by Efuntade *et al*. (2022) impeccably answered the above question, and provided further empirical evidence when it utilized vector error correction approach and co-integration to establish the short and long-run impact of MLR and deposit interest rate on stock market capitalization of NGX for the period 1985 – 2021. The study's finding was consistent with financial liberation theory in Nigeria – that MLR and deposit interest rate both has significant

impact on stock market capitalization. Hence, it is on this basis that this research formulates its' fifth hypothesis as:

H$_{05}$: Lagged (4 lagges) MLR does not granger cause NGX Market performance ASI (Δ%).

2.2 All-Share Index (ASI %)

All Share Index (ASI), sometimes referred to as stock market index, represents arrays of percentage changes in the average value of all share prices of registered companies on the floor of a stock exchange. It is perfect pointer of stock market fluctuations and directions (Majeed, 2022). Majority of the studies on this subject adopt ASI as a benchmark and proxy for the measurement of the performance of stock exchange markets, and extent of returns on stock market (Damian-Effiom, Essi & Deebom, 2022; Ebere & Etuk, 2020; Amarasinghe & Peiris, 2017; Ratnayake & Wijekoon & Yapa, 2014; Igwebuike & Nwankwo, 2019; Qing *et al*., 2019; John & Ezeabasili (2020); Osakwe & Chukwunulu 2019; John, 2018; Odey & Oko, 2022; Odey *et al*., 2023; Abdullai, Twumasi, Addo & Tetty, 2023; Duruechi, Ojiegbe & Ekweozor, 2023; Khan, Haroon & Rauf, 2023; Hassan *et al*., 2022). Thus, for this study, extent of fluctuations in ASI (%) remains the dependent variable, and the measure or proxy for detecting the effect of selected MMIs on the NGX market. Hence, it is on this basis that this research formulated its' sixth hypothesis as:

H$_{06}$: Lagged (4 lagges) IBCR, MPR, TBR, SDR, and MLR do not combine to granger cause ASI (Δ%).

2.3 Theoretical Framework

This study tends to align with the proposition of *Arbitrage Pricing Theory (APT) -* serves as the theoretical framework that anchors this research. The theory was propounded by Stephen Ross in 1976. In relation to this study, it is a multi-causal stock pricing model that states that: returns on stock market can be forecasted by employing linear function between the expected stock's return and various monetary/macroeconomic variables (such as interest rate, money supply, treasury bill rate, foreign exchange rate, inflation rate, savings deposit rate, stock market liquidity, income per capital, government expenditures, GDP growth rate, unemployment rate, consumer price index, *et cetera*) that influence the systematic risk of stocks (Ross, 1976). It is centered on the assumption that the stochastic medium for creating stock returns could be expressed as a '*k*' factor, as represented below (Ross 1976):

$$R_i = E(R_i) + b_{i1}\delta_1 + b_{i2}\delta_2 + \cdots + b_{ik}\delta_k + \varepsilon_i \quad \text{..} \quad (1)$$

Where: $i = 1, 2, 3, \cdots n$

Hence, underpinned by this theory, the selected MMIs/control variables for this study will be utilized hereafter in the examination of how they affect the NGX market. Babarinde *et al*. (2021), Hassan *et al*. (2022), and John (2018) are few of the avalanche studies on similar subject that are anchored on APT.

2.4 Empirical Review

Over the years, prior studies on this subject are dominated by researches that examined principally the impact of macroeconomic variables (such as: money supply, interest tare, treasury bills, foreign exchange rate, inflation, total savings, hot money, income per capital, government expenditures, *et cetera*) on either stock prices or the performance of stock markets of their respective countries, with only a few employing multiple MMIs as control variables instead. The following empirical reviews are research evidences corroborating the above assertion:

Table 1: Study's Empirical Reviews

Study	Case	Dataset	Research Model & Design	Variables in the study	Finding(s)
Babarinde & Enoruwa (2021)	Capital Market (Nigeria)	1981 - 2019	Vector Error Correction Model (VECM), and Granger Causality Test Model.	Exchange rate, total savings, money supply, government expenditure, and capital market development	Macroeconomic variables exert a long-run, unidirectional, and significant effect on capital market development in Nigeria.
Majeed (2022)	Stock Exchange Market (SEM) (Iraq)	Jan. 2005 – Oct. 2021	Auto-regression Distributed Lag (ARDL) test.	Interest rate, inflation rate, money supply, exchange rate; and stock exchange performance.	Exchange rate (r = 0.62), interest rate (r = 0.53), and money supply (r = 0.50) have the most significant, positive, and long-term effect on the performance of SEM in Iraq.
Oskenbayev et al. (2011)	Stock Exchange Market (Kazakhstan) – KSE	2001 - 2009	ARDL model, Johansen Co-integration test, Engel-Granger two-step approach, Granger Causality test.	Income per capital, Inflation, Exchange Rate, Oil Price volatility; and stock market performance.	Found that the chief determinants of KASE are exchange rate, inflation, income per capita, and any possible impact of global crisis.
Ali et al. (2010)	Stock Exchange Market (Pakistan)	June 1990 – Dec. 2008	Unit-root Augmented Dickey Fuller test, Granger Causality Test, Johansen's Co-integration.	Exchange Rate, Inflation, Balance of Trade, and General price Index	No causal relationship exist between selected macroeconomic indicators and the prices of stocks in Pakistan; and that stock prices does not in its entirety reflect the macroeconomic health of a country.
Lee et al. (2017)	Shanghai and Shenzhen	July 2005 - June 2013	Quantile approach, VECMBEKK	Hot money, stock market prices, exchange rate	Stock and exchange rate market both demonstrated an equilibrium and long-term relationship; and that hot

	stock market (China)			model, Quantile regression.		money significantly impact stock market, and not exchange market.
Ayunku (2019)	NGX Market (Nigeria)	1985 2015	-	Unit-root Augmented Dickey Fuller test, Johansen's Co-integration, VECM.	Money Supply, Treasury Bill Rate, stock market prices, Exchange Rate	Although money supply and treasury bill rate reported an inverse effect, they however statistically and significant affect the NGX market's prices; while market capitalization was found to significantly and positively affect stock prices.
Hassan et al. (2022)	NGX Market (Nigeria)	1985 2021	-	Generalized Autoregressive Condition Heteroskedasticity (GARCH-in mean) model.	Certificate of deposit, bankers' acceptance, commercial papers, treasury bills, and stock market index	Some of the selected money market indicators (treasury bills and commercial papers) recorded no effect on the volatility of stock market in Nigeria; whereas bankers' acceptance and certificate of deposit do.
Udo et al. (2022)	NGX Market (Nigeria)	1985 2018	-	ARDL.	GDP growth, exchange rate, broad money supply, inflation rate savings interest rate , and all-share index	Found that the selected macroeconomic variables, save for inflation rate, showed a positive effect on the stock market performance in Nigeria.
Ezenduka et al. (2020)	NGX Market, and the Nigerian Economy.	1985 2018	-	Ordinary least squares regression; and Co-integration, normality and descriptive statistics tests.	Money Supply (M2R), Economic Growth rate (GDPr), Credit to Private Sector (CPSR), Number of Securities Listed (NSL), Market Capitalization Ratio (MCR), Turnover ratio (TOR), Monetary Policy Rate (MPR), and All Share Index (ASI)	Long term, significant and equilibrium relationship was found to exist between M2R, GDPr, CPSR, MCR, NSL and TOR, except ASI and MPR. Among others, it found a significant relationship between stock market performance and economic growth in Nigeria.
Odey et al. (2023)	NGX Market (Nigeria)	1985 2021	-	ARDL model estimation techniques,	stock market liquidity, profitability, and	Found that positive impact exists between the selected financial indicators (liquidity, profitability, and efficiency)

			and bound testing.	efficiency; and all-share index	and stock market performance in Nigeria, in the following co-efficiencies: 879.58, 58.98, and 5152.51, respectively.
Azimi, M. N. (2022)	China Economy	2003Q1 - 2019Q1	Non-linear ARDL and Dynamic Multiplier Methods.	money market rate, economic growth, real interest rate, total liquidity, market capitalization, stock market turnover, and No. of stock traded.	Chiefly found that a positive/negative shock in money market rate, total liquidity, real interest rate, stock market turnover, and market capitalization cause both a short-run and long-run increase/decrease in economic growth.
Qing et al. (2019)	Stock Market (Malaysia)	Jan. 1997 – Aug. 2018	ARDL and GARCH model.	Money supply, interest spread, exchange rate, and Stock market.	Money supply, interest spread, and exchange rate demonstrated a long-run effect on stock market performance. However, in the short-run, real effective exchange rate and Money supply were found to have a positive effect; while interest spread showed a negative effect.
Hussainey et al. (2009)	Stock Market (Viet Nam)	Jan. 2001 – Apr. 2008	Multivariate regression analysis, and monthly time series data.	Industrial production, interest rate, and stock prices.	Empirically found a statistically significant relationship between money market, domestic production sector, and stock prices of Viet Nam. And that U.S's macroeconomic indicators were found to significantly influence Viet Nam's stock prices.
Ratnayake et al. (2014)	Stock Market (Sri Lanka)	2002 - 2011:Q4	Unit root tests, Johansen Co-integration, Error Correction Model, and Granger Causality test	Inflation rates, real economy, money supply, exchange rates, interest rates, and All –Share-Price Index (ASPI).	Found that real economy and money supply have a positive and significant with ASPI; while nominate rate (of service and industrial sectors) has a negative relationship with ASPI; and that only money supply & real economic variables revealed a co-movement with prices of shares.

Igwebuike et al. (2019)	NGX Market (Nigeria)	Jan. 1997 – Dec. 2016	EGARCH	Interest rates, exchange rates, and All-Share-Index (ASI)	Revealed that oil price fluctuations do have a significant negative effect on ASI. Thus, concluding that oil price fluctuation is a pertinent tool for determining the performance of stock market.
Eze, *et al.* (2020)	NGX Market (Nigeria)	Jan. 2016 – Dec. 2019.	Descriptive tools: ADF Unit root tests, Johansen Co-integration, and regression.	Saving Deposit Rates (SDR), Bank Lending Rates (BLR), and Stock Market Capitalization (MCAP).	Found that both SDR and BLR have significant inverse relationships with stock MCAP.
Efuntade *at al.* (2022)	NGX Market (Nigeria)	1985 - 2021	co-integration, unit root test, and error correction model.	Lending rates, deposit rates, and stock market capitalization.	Revealed that lending rates and deposit rates significantly impact stock market capitalization – thereby aligning with the liberation theory in Nigeria.
Addo *et al*. (2013)	Stock Market (Ghana)		Vector Error Correction Model, Johansen's Multivariate Co-integration Model, and Multiple Regression Analysis (OLS).	Treasury bill rates, interest rates, and stock market returns.	Showed that both interest rate and treasury bill rate have weak forecasting, and negative (but not significant) relationship on/with stock market returns.

Source: Authors' Compilations, 2023.

A grossly evaluation of the above empirical reviews, would reveal studies with relatively stale datasets. Their literatures, data, and findings may have been overtaken by recent events - e.g. COVID 19 pandemic, Russia-Ukraine war, the various *coup d'état* and other political instability in Africa (and their attending economic sanctions by the international community) *et cetera* -, and newer data and government's economic/monetary policies – that may shape today's research findings in a different way. Thus, the reason this study aimed to contribute coherently to body of knowledge by extending the range, and updating the datasets for the period 2010 – 2023:Q2, thereby updating the extant literatures.

3.0 Research Methodology.

The research design deployed for this study is *Expo-facto*, because the quantitative data reliably utilized in the study are already available, and credibly published in Central Bank of Nigeria (CBN)'s Macroeconomic Data on Money Market Indicators, and Nigeria Exchange Group Limited (NGX)'s All-Share Indices Historical Data. *Multivariate time series* was opted for - using Vector auto-regression (VAR), and VAR Diagnostics and Tests' Granger Causality Wald Test models. The proposed general model by Granger (1969) for Granger causality test, defined that *'y'* could cause '*x*' if (Shojaie & Fox, 2022):

$$\text{Var } [\chi_t - P(\chi_t \mid H_{<t})] < \text{var } [\chi_t - P(\chi_t \mid H_{<t} \backslash y_{<t}]$$
……………..………..……………………..…………….. (2)

Where $H_{<t} \backslash y_{<t}$ signifies neglecting the values of $y_{<t}$ from $H_{<t}$

In examining if L1, L2, L3, and L4 (as in *table 4*) jointly cause ASI ($\Delta\%$) for each of the control variables in the study, the Granger Causality Wald Test model would be utilized - with the aid of STATA 15.0, because the variables in the study are stationary, and does not possess any unit root.

3.1 Results of Data Analysis
The results of data analysis from STATA 15.0, at lag 4, are as presented and interpreted below:

Table 2: Outcome of Vector Auto-regression (VAR)

Sample: 2.0e+05 - 2.0e+05, but with gaps	**Number of obs** = 107
Log likelihood = -974.8171	**AIC** = 21.02462
FPE = 57.40403	
Det (Sigma_ml) = 3.298997	**HQIC** = 22.54359
	SBIC = 24.77158

Source: Authors' analysis based on STATA 15.0

Table 2 is the preliminary output of Vector Auto-regression (VAR) Model, reporting, among others, the number of observations, sample, log of likelihood, and *et cetera.*

Table 3: Outcome of Vector Auto-regression (VAR)

Equation	Parms	RMSE	R-sq	chi2	P>chi2
IBCR	25	6.39042	0.5010	107.4374	0.0000
MPR	25	487292	0.9701	3466.166	0.0000
TBR	25	1.99319	0.8427	573.3416	0.0000
SDR	25	.31678	0.9389	1643.022	0.0000
MLR	25	.446667	0.9822	5905.278	0.0000
ASI ($\Delta\%$)	25	5.33899	0.3460	56.60023	0.0002

Source: Authors' analysis based on STATA 15.0

Table 3 is also the preliminary output of Vector Auto-regression (VAR) Model, summarizing the test details: the equation (study's variables), Parms, and chi2, probability (P>chi2), RMSE, and R-sq values for the respective variables in the study.

Table 4: Outcome of VAR

		Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
IBCR	IBCR						
	L1.	.1850604	.0699924	2.64	0.008	.0478778	.322243
	L2.	.0016375	.0709293	0.02	0.982	-.1373814	.1406564
	L3.	.0611564	.0773049	-1.24	0.214	-.2475538	.0554759
	L4.	-.0960389	.0810873	0.75	0.451	-.0977718	.2200846
	MPR						
	L1.	.8875893	1.557786	0.57	0.569	-2.165614	3.940793
	L2.	-3.296509	2.103741	-1.57	0.117	-7.419765	.8267464
	L3.	5.06813	2.269204	2.23	0.026	.6205724	9.515687
	L4.	-2.833019	2.016112	-1.41	0.160	-6.784527	1.118488
	TBR						
	L1.	.8846377	.6614256	1.34	0.181		
	L2.	.8203235	.948428	0.86	0.387	-.4117326	2.181008
	L3.	.348509	1.073075	0.32	0.745	-1.038561	2.679208
	L4.	-1.547996	.7570177	-2.04	0.041	-1.754679	2.451697
						-3.031723	-.0642683
	SDR						
	L1.	-3.444055	2.077422	-1.66	0.097		
	L2.	4.549631	2.907229	1.56	0.118		
	L3.	1.096824	3.091749	0.35	0.723	-7.515728	.6276167
	L4.	-2.97277	2.356528	-1.26	0.207	-1.148434	10.2477
						-4.962893	7.15654
	MLR					-7.59148	1.645939
	L1.	1.59479	1.590516	1.00	0.316		
	L2.	1.043174	1.593605	0.65	0.513		
	L3.	-.878494	1.163223	-0.76	0.450	-1.522564	4.712145
	L4.	-1.203185	1.17964	-1.02	0.308	-2.080234	4.166582
						-3.158369	1.401381
	ASI					-3.515236	1.108867
	L1.	-.0081368	.1107668	-0.07	0.941		
	L2.	.1253762	.1132831	4.49	0.268		
	L3.	.1629338	.1162679	1.40	0.000	.2408725	.6138244
	L4.	.4273484	.0951425	1.11	0.161	-.0966546	.3474069
						-.064947	.3908146
	_cons	-6.327221	6.792274	-0.93	0.352	-.2252358	.2089622
						-19.63983	6.985392

		Coef	Std. Err	z	P>|z|	[95% Conf.	Interval]
MPR	IBCR						
	L1.	.0106607	.0053372	2.00	0.046	.0002	.0211213
	L2.	-.0032401	.0054086	-0.60	0.549	-.0138407	.0073606
	L3.	-.0113198	.0058948	-1.92	0.055	-.0228734	.0002337
	L4.	.0053042	.0061832	0.86	0.391	-.0068146	.017423
	MPR						
	L1.	.8637003	.1187866	7.27	0.000	.6308828	1.096518
	L2.	.3381476	.1604176	2.11	0.035	.0237349	.6525602
	L3.	-.0409472	.1730347	-0.24	0.813	-.3800889	.2981946
	L4.	-.1511966	.1537356	-0.98	0.325	-.4525128	.1501197
	TBR						
	L1.	.0686087	.050436	1.36	0.174	-.0302441	.1674614
	L2.	-.1128165	.0723209	-1.56	0.119	-.2545629	.02893
	L3.	-.0010561	.0818257	-0.01	0.990	-.1614315	.1593194
	L4.	.0367063	.0577252	0.64	0.525	-.0764331	.1498457
	SDR						
	L1.	.1515592	.1584107	0.96	0.339	-.15892	.4620384
	L2.	-.1390421	.2216864	-0.63	0.531	-.5735394	.2954552
	L3.	.029614	.2357566	0.13	0.900	-.4324606	.4916885
	L4.	-.1328811	.1796935	-0.74	0.460	-.4850739	.2193116
	ML						
	L1.	-.0797505	.1212824	-0.66	0.511	-.3174597	.1579586
	L2.	-.005469	.1215179	-0.05	0.964	-.2436398	.2327018
	L3.	.1803022	.0886998	2.03	0.042	.0064538	.3541507
	L4.	-.0986151	.0899517	-1.10	0.273	-.2749171	.077687
	ASI						
	L1.	-.0038043	.0084464	-0.45	0.652	-.0203588	.0127503
	L2.	.0064454	.0086382	0.75	0.456	-.0104852	.0233761
	L3.	-.004194	.0088658	-0.47	0.636	-.0215708	.0131827
	L4.	.0033641	.007255	0.46	0.643	-.0108553	.0175836
	_cons	.366481	.5179346	0.71	0.479	-.6486522	1.381614
TBR	IBCR						
	L1.	.0438151	.0218308	2.01	0.045	.0010275	.0866026
	L2.	-.0562505	.022123	-2.54	0.011	-.0996108	
	L3.	-.0056799	.0252913	-0.24	0.814	-.0128902	
	L4.	.0317132	.0241116	1.25	0.210	-.0529377	.0415779
						-.0178569	.0812832
	MPR						
	L1.	.1146427	.4858767	0.24	0.813		
	L2.	-.3428098	.6561613	-0.52	0.601	-.8376582	1.066944
	L3.	.3404935	.7077696	0.48	0.630	-1.628862	.9432428

		Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
	L4.	-.1829686	.6288299	-0.29	0.771	-1.04671	1.727696
						-1.415453	1.049515
	TBR						
	L1.	1.051453	.2063001	5.10	0.000		
	L2.	-.1946207	.2958168	-0.66	0.511	.647112	1.455794
	L3.	-.1560381	.3346944	-0.47	0.641	-.774411	.3851695
	L4.	.1564775	.2361155	0.66	0.508	-.8120272	.4999509
						-.3063003	.6192553
	SDR						
	L1.	.3171544	.6479525	0.49	0.625		
	L2.	.477772	.9067712	0.53	0.598	-.9528092	1.587118
	L3.	-1.037521	.9643233	-1.08	0.282	-1.299467	
	L4.	.3242016	.7350062	0.44	0.659	2.255011	
						-2.92756	.8525183
	MLR					-1.116384	1.764787
	L1.	.6267478	.4960855	1.26		0.496		
	L2.	-.2502834	.4970489	-0.23	0.257		
	L3.	-.4109552	.3628118	-1.13	0.819	-.3455619	1.599057
	L4.	-.1140544	.3679323	-0.68	0.206	-1.088252	.8601435
						-1.122053	.3001428
	ASI					-.9714175	.4708507
	L1.	.0153207	.0345484	0.44	0.657		
	L2.	-.0269393	.0353332	-0.76	0.446		
	L3.	.0220045	.0362642	0.61	0.322	-.052393	.0830344
	L4.	.0293945	.0296752	0.99	0.544	-.0961912	.0423126
						-.0287678	.0875568
	_cons	5.452809	2.118525	2.57	0.010	-.049072	.093081
						1.300575	9.605042
SDR	IBCR						
	L1.	-3.62e-06	.0034696	-0.00	0.999	-.0068039	.0067967
	L2.	-.0008833	.003516	-0.25	0.802	-.0077746	.006008
	L3.	-.0029467	.0038321	-0.77	0.442	-.0106713	.0050852
	L4.	-.0027931	.0040196	-0.69	0.487	-.0104575	.004564
	MPR						
	L1.	.0962994	.0772212	1.25	0.212	-.0550514	.2476501
	L2.	.0082718	.1042848	0.08	0.937	-.1961226	.2126662
	L3.	.0581371	.112487	0.52	0.605	-.1623333	.2786075
	L4.	-.0892657	.099941	-0.89	0.372	-.2851463	.106615
	TBR						
	L1.	-.0056425	.0327876	-0.17	0.863	-.0699051	.05862
	L2.	-.0178159	.0470146	-0.38	0.705	-.1099629	.0743311
	L3.	.0748408	.0531935	1.41	0.159	-.0294166	.1790982
	L4.	-.0536232	.0375262	-1.43	0.153	-.1271733	.0199268

SDR							
	L1.	.7841932	.1029801	7.61	0.000	.5823559	.9860306
	L2.	.035618	.1441146	0.25	0.805		
	L3.	-.0821711	.1532615	-0.54	0.592	-.2468415	.3180774
	L4.	.1242142	.1168157	1.06	0.288	-.382558	.2182158
						-.1047404	.3531688
MLR							
	L1.	.0459335	.0788437	0.58	0.560		
	L2.	.1113098	.0789968	1.41	0.159	-.1085973	.2004642
	L3.	-.0184816	.0576623	-0.32	0.749	-.043521	.2661407
	L4.	-.1344285	.0584761	-2.30	0.022	-.1314976	.0945344
						-.2490395	
ASI						-.0198175	
	L1.	-.0033529	. .0054908	-0.61	0.541		
	L2.	-.0021865	.0056156	-0.39	0.697		
	L3.	.0021534	.0057635	0.37	0.709	-.0141147	.007409
	L4.	.0057504	.0047163	1.22	0.223	-.0131928	.0088199
						-.0091429	.0134497
	_cons	-.5224201	.3367006	-1.55	0.121	-.0034935	.0149942
						-1.182341	.1375011
MLR	**IBCR**						
	L1.	.0052937	.0048922	1.08	0.279	-.0042948	.0148823
	L2.	.0018151	.0049577	0.37	0.714		
	L3.	.0000777	.0054033	0.01	0.989	-.0079018	.0115321
	L4.	.0059607	.0056677	1.05	0.293	-.0105127	.010668
						-.0051478	.0170692
	MPR						
	L1.	. .1999419	. .140919	1.84	0.066		
	L2.	-.0531002	.1470439	-0.36	0.718	. -.013466	.4133498
	L3.	.0444681	.1586092	0.28	0.343	-.3413009	.2351005
	L4.	-.1336113	.1088836	-0.95	0.779	-.2664002	.3553363
						-.4098074	.1425848
	TBR						
	L1.	.0084602	.0462313	-1.16	0.855		
	L2.	-.0260142	.0529128	-0.39	0.695	-.0821514	.0990718
	L3.	.1128655	.0750041	1.50	0.132	-.1559435	.1039151
	L4.	-.0615932	.0662917	0.18	0.244	-.0341398	.2598707
						-.1653004	.042114
	SDR						
	L1.	-.1883729	.1647128	0.09	0.195		
	L2.	-.0011258	.2032048	-0.01	0.996	-.4729681	.0962223
	L3.	.015096	.2161021	0.51	0.610	-.3994	.3971484
	L4.	.1103434	.1452043	-1.30	0.927	-.3077351	.3379272
						-.3132089	.5338957

		Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
	MLR	.					
	L1.	.4495346	.1111713	4.04	0.000	.	
	L2.	.3466859	.1113872	3.11	0.002	.2316428	.6674265
	L3.	.073545	.0813051	0.90	0.366	.128371	.5650009
	L4.	.0841288	.0824526	1.02	0.308	-.08581	.2329001
						-.0774753	.2457329
	ASI						
	L1.	.0059263	.0066501	0.77	0.059		
	L2.	-.0133898	.0079181	-1.69	0.091	-.0092482	.0211007
	L3.	.01258	.0081267	1.89	0.522	-.0289089	.0021294
	L4.	-.0052071	.0077422	-0.64	0.444	-.0211351	.010721
						-.000454	.025614
	_cons	.2589487	.4747555	0.55	0.585		
						-.6715549	1.189452
ASI (Δ%)	IBCR						
	L1.	.0607309	.0584764	1.04	0.299	-.0538808	.1753426
	L2.	.0158895	.0592592	0.27	0.789	-.1002563	.1320354
	L3.	-.0317649	.0677459	-0.49	0.201	-.1583507	.0948209
	L4.	-.0866553	.0645858	-1.28	0.623	-.2194348	.0461241
	MPR						
	L1.	-2.285112	1.30148	-1.76	0.079	-4.835966	.2657422
	L2.	3.201872	1.684398	1.82	0.068	-.2429762	6.646721
	L3.	-.2886886	1.895847	-0.15	0.879	-4.004481	3.427104
	L4.	.7199855	1.757608	0.43	0.669	-2.581373	4.021344
	.						
	TBR						
	L1.	.6576465	.5526	1.19	0.234	-.4254296	1.740723
	L2.	-.6494687	.7923813	-0.82	0.412	-2.202508	.9035701
	L3.	-.1258866	.8965198	-0.16	0.842	-1.901083	1.61321
	L4.	-.1439367	.6324641	-0.20	0.872	-1.365493	1.11372
	SDR						
	L1.	-5.763379	1.73562	-3.32	0.001	-9.165132	-
	L2.	2.100975	2.428897	0.86	0.387	2.361627	
	L3.	2.650584	2.583058	. 0.01	0.305	-2.659576	6.861526
	L4.	0114122	1.968804	1.03	0.995	-2.412116	7.713284
						-3.847372	3.870197
	MLR						
	L1.	-.2412231	1.328825	-0.18	0.856		
	L2.	1.400921	1.331406	1.05	0.293	-2.845673	2.363227
	L3.	-2.107649	.9718357	0.61	0.539	-1.208587	4.010429
	L4.	.5969864	.9855516	-2.14	0.032	-1.307777	2.501749
						-4.039294	
	ASI					-.1760033	
	L1.	.2614529	.0925422	2.83	0.005		

L2.	-.0965052	.0946444	-1.02	0.308		
L3.	.1710601	.0971381	1.76	0.078	.0800737	.4428322
L4.	-.0092291	.0794886	-0.12	0.908	-.2820048	.0889944
					-.0193271	.3614472
_cons	-.3015897	5.674728	-0.05	0.958	-.1650238	.1465656
					-11.42385	10.82067

Source: Authors' analysis based on STATA 15.0

Table 4 above is the VAR model's results. It displayed the coefficient value, standard error, z-statistics, p-value, and 95% confidence interval for each of the selected variables' L1, L2, L3, L4 and _cons. However, to examine if L1, L2, L3, and L4 jointly cause ASI ($\Delta\%$) for each of the control variables in the study, Granger Causality Wald model's test has to be run – the outcome are as presented in *table 5* below:

Table 5: Outcome of VAR diagnostics and tests via Granger Causality Wald Test (vargranger)

Equation	Excluded	chi2	df	Prob > chi2
IBCR	MPR	7.8805	4	0.096
IBCR	TBR	17.238	4	0.002
IBCR	SDR	5.2747	4	0.260
IBCR	MLR	3.6705	4	0.452
IBCR	ASI	59.974	4	0.000
IBCR	ALL	25.352	20	0.000
MPR	IBCR	7.1262	4	0.129
MPR	TBR	3.8138	4	0.432
MPR	SDR	4.3537	4	0.360
MPR	MLR	4.73	4	0.316
MPR	ASI	.78071	4	0.941
MPR	ALL	25.363	20	0.188
TBR	IBCR	9.5288	4	0.049
TBR	MPR	.78987	4	0.940
TBR	SDR	1.7503	4	0.782
TBR	MLR	5.5938	4	0.139
TBR	ASI	2.3068	4	0.680
TBR	ALL	26.867	20	0.232
SDR	IBCR	1.4401	4	0.837
SDR	MPR	12.886	4	0.012
SDR	TBR	30.331	4	0.651
SDR	MLR	5.8178	4	0.065
SDR	ASI	2.5384	4	0.638
SDR	ALL	2.466	20	0.213
MLR	IBCR	2.6299	4	0.622
MLR	MPR	8.4285	4	0.077
MLR	TBR	8.2911	4	0.081
MLR	SDR	3.182	4	0.528

MLR	ASI	9.1649	4	0.057
MLR	ALL	50.866	20	0.000
ASI (Δ%)	IBCR	3.3525	4	0.501
ASI (Δ%)	**MPR**	16.654	4	0.002
ASI (Δ%)	TBR	5.8615	4	0.210
ASI (Δ%)	**SDR**	13.966	4	0.007
ASI (Δ%)	MLR	6.2382	4	0.182
ASI (Δ%)	**ALL**	37.844	20	0.009

Source: Authors' analysis based on STATA 15.0

Table 5 gave the VAR diagnostics and tests results. And because the study only wished to examine the effect of the control/independent variables (both individually and collectively), the interpretation would be restricted to the last row of the table (row 6). In the last row, and at 5% significant level, it is evident that IBCR does not granger cause ASI (Δ%), because [p-value (0.501) > 0.05]; MPR does granger cause ASI (Δ%), because [p-value (0.002) < 0.05]; TBR does not granger cause ASI (Δ%), because [p-value (0.210) > 0.05]; SDR does granger cause ASI (Δ%), because [p-value (0.007) < 0.05]; MLR does not granger cause ASI, because [p-value (0.182) > 0.05]; and that all the control variables when considered together (IBCR, MPR, TBR, SDR, and MLR) does granger cause ASI (Δ%), because [p-value (0.009) < 0.05].

Therefore, the above Granger Causality Wald Test, established (at lagges 4) that only MPR and SDR are individually and independently significant enough to impact the performance of NGX (%Δ ASI) in both short and long-run. *Figure 2* and *figure 3* below visually demonstrated such respective impact of MPR and SDR on ASI (Δ%) – the back-and-forth volatility of the market, represented by the scattered dots across the graphs:
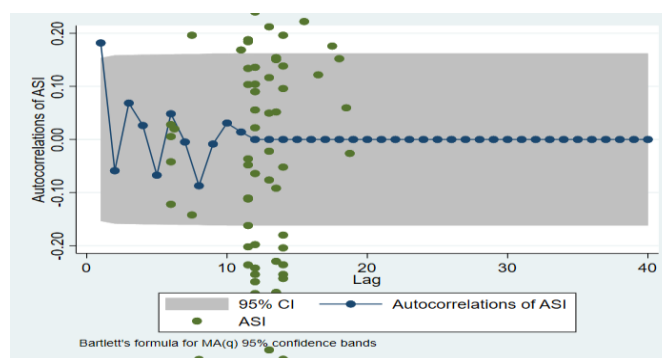
Source: Authors' analysis based on STATA 15.0
Figure 2: Time series' Correlogram (ac) basic and connected plot visually depicting the autocorrelation of ASI (Δ%) - i.e, the high volatility of All-Share Indices for the year under review: 2010 – 2023, caused by MPR alone.
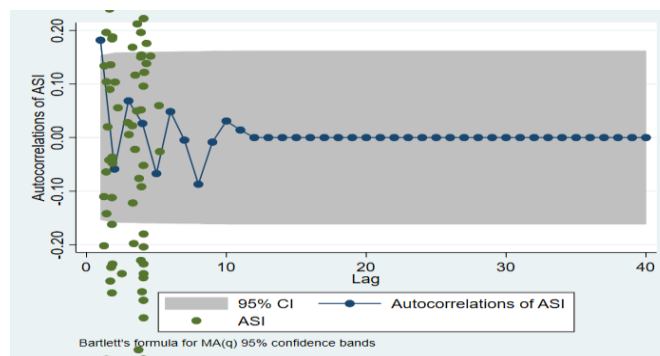
Source: Authors' analysis based on STATA 15.0

Figure 3: Time series' Correlogram (ac) basic and connected plot visually depicting the autocorrelation of ASI ($\Delta\%$) - i.e, the high volatility of All-Share Indices for the year under review: 2010 – 2023, caused by SDR alone.

However, the test also revealed that the combine effect of IBCR, MPR, TBR, SDR, and MLR are significant enough [since p-value $(0.009) < 0.05$] to cause ASI ($\Delta\%$) in the long-run. Hassan *et al*. (2022) corroborates this research's finding when they opined that: although stock market and money market are independent, they however interrelate – in that, a slight fluctuation in the later, could have an effect on the former, just as how the moon and the sun are said to be spatially and inexenorably tied to each other in a give-and-take relationship (Nwakeze 2021).

5.0 Conclusion and Recommendation.

The findings of this study were the premise it would accept the null hypothesis in hypothesis 1 - that states that Inter-Bank Call Rate (IBCR) does not cause fluctuation in All-Share Index(ASI), while it reject the alternative hypothesis; rejects the null hypothesis in hypothesis 2, while it accepts the alternative hypothesis - that states that Monetary Policy Rate (MPR) does cause fluctuation in All-Share Index (ASI); accepts the null hypothesis in hypothesis 3 - that states that Treasury Bill Rate (TBR) does not cause fluctuation in All-Share Index (ASI), while it rejects the alternative hypothesis; rejects the null hypothesis in hypothesis 4, while it accepts the alternative hypothesis - that states that Saving Deposit Rate (SDR) does cause fluctuation in All-Share Index (ASI); accepts the null hypothesis in hypothesis 5 - that states that Maximum Lending Rate (MLR) does not cause fluctuation in All-Share Index (ASI), while it rejects the alternative hypothesis; and reject the null hypothesis in hypothesis 6, while it accepts the alternative hypothesis - that states that Inter-Bank Call Rate (IBCR), Monetary Policy Rate (MPR), Treasury Bill Rate (TBR), Saving Deposit Rate (SDR), and Maximum Lending Rate (MLR) do combine to cause fluctuation in All-Share Index (ASI). Sequel to this, the study concludes that MMIs are true determinants of the performance of NGX market, more because short-term fund demands are only obtained via MMIs. And these short-term borrowings as evident in this research, directly or indirectly, impact the volatility of ASI. This conclusion is in consonance to that made by Hassan *et al*. (2022). Therefore, this study recommends that MMIs should be kept at favourable rates by the CBN, other monetary regulators, and banking institutions, so as to foster the performance and stability of NGX market; and halt the increasing tide of Multi-national Enterprises (MNEs) exiting the shores of the country (which is tantamount to lost in Foreign Direct Investments, FDIs), owing to hostile

monetary and economic policies – as opined by Nwakeze, Orajekwe, Sylvanus, Onyebiuwanso, & Oshiole (2023).

Declaration of Competing Interest

The authors declare that there are no known and potential competing interests or threats that could have, in any way, appeared to influence the findings or reporting of this research.

Acknowledgement

The authors earnestly wished to acknowledge the Chairman/Executive Director, Grundtvig Movement of Nigeria, Dr. Kachi A. Ozumba, for his counsels, support and encouragement towards our continual research development.

References

Abdullai, M., Twumasi, O., Addo, A., & Tettey, D. (2023). The Impact of Macroeconomic Variables on Stock Market Performance in Ghana. *Journal of Production, Operations Management and Economics, 3*(6), 1-14. DOI: https://doi.org/10.55529/jpome.36.1.14.

Addo, A., & Sunzuoye, F. (2013). The Impact of Treasury Bill Rate and Interest Rate on the Stock Market Returns: Case of Ghana Stock Exchange. *European Journal of Business and Economics. 8*(2), 15-24 DOI: https://doi.org/10.12955/ejbe.v8i2.378.

Ali, I., Rehman, K. U., Yilmaz, A., Khan, M. A., & Afzal, H. (2010). Causal relationship between macro-economic indicators and stock exchange prices in Pakistan. *African Journal of Business Management, 4* (3), 312-319. Retrieved from http://www.academicjournals.org/AJBM

Amarasinghe, A. A. M. D., & Peiris, T. S. G. (2017). Impact of the Macroeconomic Variables on All Share Price Index: GARCH-X Approach. Retrieved August 03, 2023, from https://www.researchgate.net/publication/368981140_IASSL_Articlepdf

Ayunku, P. E. (2019). Does Macroeconomic Indicators Influence Stock Price Behavior? Evidence from Nigerian Stock Market. *International Finance and Banking, 6*(2), 26-39. DOI: http://dx.doi.org/10.5296/ifb.v6i2.14928

Azimi, M. N. (2022). Assessing the asymmetric effects of capital and money markets on economic growth in China. *Heliyon 8 (2022) e08794*. DOI: https://doi.org/10.1016/j.heliyon.2022.e08794

Babarinde, G. F., & Enoruwa, K. O. (2021). Effects of Selected Macroeconomic Variables on Capital Market Development in Nigeria: An Application of Granger Causality Test and Vector Error Correlation Model. *International Journal of Auditing and Accounting Studies 3*(2), 145-160. Retrieved from www.arfjournals.com.

Central Bank of Nigeria. (2023). Money Market Indicators (In Percentage). Retrieved August 02, 2023 from https://www.cbn.gov.ng/rates/mnymktind.asp

Central Charts (2019). Definition of Policy Rate. Retrieved August 15, 2023, from https://www.centralcharts.com/en/gm/1-learn/9-economics/35-central-bank/989-definition-policy-rate.

Damian-Effiom, A. E., Essi, I. D., & Deebom, Z. D. (2022). Application of GARCH Models in Modelling the Returns on All Share Index from an Emerging Capital Market.

International Journal of Innovative Mathematics, Statistics & Energy Policies 10(4), *1-19.* Retrieved from www.seahipaj.org.

Duruechi, A., Ojiegbe, J., & Ekweozor, I. (2023). Foreign Exchange Rates Dynamics and Stock Market Performance in an Emerging Economy: Evidence from Nigeria. *Journal of Accounting and Financial Management. 8*(7), 127-150. DOI: https://doi.org/10.56201/jafm.v8.no7.2022.pg127.150.

Ebere, V. U., & Etuk, E. H. (2020). Modeling the Residuals of Linear Regression of All Share Index on Capitalizations of Nigerian Stock Exchange. *International Journal of Applied Science and Mathematical Theory, 6*(1), 34-47. Retrieved from www.iiardpub.org

Effiong, S., & Benson, O., & David, U. (2023). Reactions of Stock Prices to Changes in Exchange Rate and Monetary Policy Rate of Central Banking System: Symmetry or Asymmetry. *Asian Journal of Economics, Business and Accounting. 23*(18). 105-116. DOI: https://doi.org/10.9734/ajeba/2023/v23i181061.

Efuntade, A. O., & Efuntade, O. O. (2022). Stock Market Capitalisation, Banks' Lending and Deposit Interest Rate in Relation to Financial Liberalisation Theory in Nigeria (1985-2021). *IIARD International Journal of Banking and Finance Research, 8*(3), 10-27. DOI: https://doi.org/10.56201/ijbfr.v8.no3.2022.pg10.27.

Etuk, E. H., Aboko, I. S., Victor-Edema U., & Dimkpa, M. Y. (2014). An additive seasonal Box-Jenkins model for Nigerian monthly savings deposit rates. *Business Management and Economics 2*(3), 054-059. Retrieved from http://www.journalissues.org/IBME/

Eze, G. P., & Johnny, N. (2020). Effect of Savings Deposit Rate on Stock Market Capitalization in Nigeria: An Empirical Investigation. *International Journal of Business, Economics and Management. 7*(4), *239-247.* DOI: https://doi.org/10.18488/journal.62.2020.74.239.247.

Ezenduka, V. G., & Joseph, E. M. (2020). Stock Market Performance and Economic Growth in Nigeria (1985 – 2018). *International Journal of Accounting Research (IJAR), 5* (4), 143-168. DOI: http://dx.doi.org/10.12816/0059066

Flandreau, M., & Ugolini, S. (2011). Where it All Began: Lending of Last Resort and the Bank of England During the Overend-Gurney Panic of 1866. *SSRN Electronic Journal*. DOI: https://doi.org/10.2139/ssrn.1847593

Granger, C. W. J. (1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods. *Econometrica, 37*, 424–38.

Haryadi A., & Sidiq, S. (2013). Inter-Bank Call Money Transaction in Indonesia. *Economic Journal of Emerging Market, 5*(2), 92-98. DOI: http://dx.doi.org/10.20885/ejem.vol5.iss2.art2

Hassan, A. & Ahmad, Z. (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. DOI: https://doi.org/10.36349/easjebm.2022.v05i09.003

Hayes, A. (2021). What Is the Interbank Rate? Definition, How It Works, and Example. Retrieved August 12, 2023, from https://www.investopedia.com/terms/i/interbankrate.asp.

Hussainey, K., & Ngoc, L. K. (2009). The impact of macroeconomic indicators on Vietnamese stock prices. *The Journal of Risk Finance, 10*(4), 321-332. DOI https://doi.org/10.1108/15265940910980632

Igwebuike, A., & Nwankwo, S. (2019). Effect of Oil Price Volatility on the Volatility of The Nigerian All Share Index. *Journal of Accounting Information and Innovation, 5*(11), 10-25. Retrieved from www.cird.online/JAII.

Investing.com (2023). NSE All Share Historical Data. Retrieved August 02, 2023 from: https://ng.investing.com/indices/nse-all-share-historical-data.

John E. I. (2018). Macroeconomic Determinants of Stock Market Performance in Nigeria: An Econometric Approach. *Indonesian Journal of Applied Business and Economic Research, 1*(1), 47–58. Retrieved from http://econbiz.org/index.php/ijaber.

John, E. I., & Ezeabasili, V. N. (2020). Money Supply and Stock Market Performance in Nigeria, South Africa and Ghana. *African Journal of Accounting and Financial Research 3*(1), 101-114. Retrieved from www.abjournals.org

Kagan J. (2021). Deposit Interest Rate: Definition, Fixed Vs. Variable. Retrieved August 25, 2023, from https://www.investopedia.com/terms/d/deposit-interest-rate.asp.

Khan, H. U., Haroon, M. & Rauf, A. (2023). Nexus between Stabilization Policies and Stock Market Performance: Evidence from Pakistan Stock Exchange. *Xi'an Shiyou Daxue Xuebao (Ziran Kexue Ban)/Journal of Xi'an Shiyou University. 19*(6), 351-371.

Lee, Y. H., Huang, Y. L., & Chen, T. H. (2017). Does Hot Money Impact Stock And Exchange Rate Markets on China? *Asian Academy of Management Journal of Accounting and Finance, 13*(2), 95–108. DOI: https://doi.org/10.21315/Aamjaf2017.13.2.5

Majeed, B. N. (2022). The Effect of Macroeconomic Variables on Stock Exchange Market Performance: Iraq Stock Exchange Market as an Example. □□□□□□ 228-207 , □□□□□□□□□□□□ □□□□□□□□□□□□□ □□ □□□□□□□□□□. DOI: https://doi.org/10.54809/jkss.vi3.96

Nwakeze, E. O., Orajekwe, J. C., Sylvanus, A. N., Onyebiuwanso, R. A., & Oshiole, S. (2023). Nexus between Foreign Direct Investment (FDI) and Economic Growth (EG): A Study of 10 Countries of the World (2018 - 2022). *World Journal of Advanced Research and Reviews (WJARR), 19*(01), 1511-1522. DOI: https://doi.org/10.30574/wjarr.2023.19.1.1491

Nwakeze, E. O. (2021). Up with Hopes: A Memento of the Verisimilitude of Being Human. (1st ed., 1-86). Print Gate Digital Press.

Odey, F. I., & Oko, I. O. (2022). Macroeconomic Variables and the Returns on Stock Prices: Empirical Evidence from Nigeria. *IIARD International Journal of Banking and Finance Research, 8*(3), 104-115. DOI: https://doi.org/10.56201/ijbfr.v8.no3.2022.pg104.115

Odey, F. I., Owan, J. O., & Owan, J. N. (2023). Financial Indicators and Stock Market Performance in Nigeria. *Global Journal of Arts, Humanities and Social Sciences, 11*(5), 53-69. DOI: https://doi.org/10.37745/gjahss.2013/vol11n55369

Olowe, Rufus Ayodeji (2011). Inter-Bank Call Rate Volatility and the Global Financial Crisis: The Nigerian Case. *International Journal of Economics and Finance, 3*(1), 283-296. Retrieved from www.ccsenet.org/ijef

Osakwe, A. C., & Chukwunulu, J. I. (2019). Monetary Policy and Stock Market Performance in Nigeria. *EPRA International Journal of Research and Development (IJRD), 4*(5), 58-65. Retrieved from www.eprajournals.com.

Oskenbayev, Y., Yilmaz, M., & Chagirov, D. (2011). The impact of macroeconomic indicators on stock exchange performance in Kazakhstan. *African Journal of Business Management, 5*(7), 2985-2991. DOI: https://doi.org/10.5897/AJBM10.1480

Qing, Y. K., & Kusairi S. (2019). The Effect of Money Supply, Exchange Rate, and Interest Spread toward the Performance of Stock Market in Malaysia. *Widyakala Journal, 6* (2): 142-149. DOI: https://doi.org/10.36262/widyakala.v6i2.217

Rajapakse, C., & Garthika. S. (2018). Stock Market Performance and the Macroeconomic Factors: Evidence from Colombo Stock Exchange (CSE). *International Journal of Research, 5*(20), 752-779.

Ratnayake, R. M. I. P., Wijekoon, P., & Yapa. R. D. (2014). Relationship between All Share Price Index (ASPI) and Macroeconomic Variables. *International Journal of Development Research. 4*(9), 1923-1928.

Ross S. A. (1976). The Arbitrage theory of capital asset pricing. *Journal of Economic Theory, 13*(3), 341-360.

Shojaie, A., & Fox, E. B. (2022). Granger Causality: A Review and Recent Advances. *Annual Review of Statistics and its Application.* DOI: https://doi.org/10.1146/annurev-statistics-040120-010930

The Economic Times (2023, September 12). What is 'Money Market'. *The Economic Times.* Retrieved September 20, 2023, from https://economictimes.indiatimes.com/definition/money-market.

Tokede, K. (2023, September 13). Bank Customers Groan as Maximum Lending Rate Reached 28.75% in February. *This Day Newspaper.* Retrieved July 19, 2023, from https://www.thisdaylive.com/index.php/2023/03/29/bank-customers-groan-as-maximum-lending-rate-reached-28-75-in-february.

Udo, S. S., Odey, F. I., & Jacob, A. O. (2022). Effects of Selected Macroeconomic Variables on Stock Market Performance in Nigeria. *Malaysian E-Commerce Journal (MECJ), 6*(2), 54-58 DOI: http://doi.org/10.26480/mecj.02.2022.54.58

Wikipedia (Ed.) (2023, September 13). *Wall Street Crash of 1929.* Retrieved September 19, 2023, from Https://En.Wikipedia.Org/Wiki/Wall_Street_Crash_Of_1929#:~:Text=On%20October%2029%2C%201929%2C%20%22,No%20buyers%20at%20any%20price.

Appendix A

Table: Money CBN's Market Indicators (MMIs %), and NGX's All-Share Indices (ASI %Δ) Historical Data.

Periods	Money Market Indicators					NGX All-Share Index Historical Data (ASI %Δ)
	Inter-Bank Call Rate (IBCR)	Monetary Policy Rate (MPR)	Treasury Bill (TBR)	Savings Deposit (SDR)	Max. Lending (MLR)	
202301	10.35	17.5	1.39	4.29	27.63	3.88
202302	12.54	17.5	2.09	4.3	28.75	4.82
202303	14.75	18	3.81	4.58	28.08	-1.70
202304	15.8	18	5.73	4.59	28.59	-4.47
202305	12.31	18.5	2.98	5.13	28.31	6.42
202306	11.66	18.5	3.87	5.18	28.94	9.32
202307	6.73	18.75	4.45	5.24	27.38	5.53
202201	14.31	11.5	2.49	1.25	27.65	9.15
202202	9.30	11.5	2.3	1.25	30.73	1.65
202203	11.33	11.5	1.75	1.28	26.61	-0.91
202204	8.67	11.5	1.74	1.28	27.79	5.69
202205	8.38	13	2.47	1.37	27.37	8.05
202206	11.1	13	2.41	1.38	27.61	-3.39
202207	13	14	2.76	1.42	27.61	-2.79
202208	15	14	3.83	2.93	28.3	-1.06
202209	0	15.5	5.68	4.08	28.06	-1.63
202210	0	15.5	6.49	3.77	28.06	-10.58
202211	12.25	16.5	6.5	3.93	28.14	8.72
202212	12	16.5	4.35	4.13	29.13	7.53
202101	4.4	11.5	0.52	1.86	28.3	5.32
202102	11.43	11.5	1.49	1.79	28.54	-6.16
202103	10.1	11.5	2	1.86	28.74	-1.90
202104	30	11.5	2	1.86	28.64	2.04
202105	15.23	11.5	2.5	1.83	28.39	-3.52
202106	16.57	11.5	2.5	1.81	29.05	-1.38
202107	12.38	11.5	2.5	1.82	27.99	1.69
202108	13.45	11.5	2.5	1.82	28	1.74
202109	13.21	11.5	2.5	1.28	27.1	2.55
202110	13.33	11.5	2.5	1.28	27.1	4.52
202111	11.53	11.5	2.5	1.83	27.26	2.88
202112	0	11.5	2.49	1.25	27.58	-1.23
202001	5.74	13.5	3.45	3.89	30.77	7.46
202002	8.91	13.5	3	3.89	30.63	-9.11
202003	10.29	13.5	2.39	3.89	30.48	-18.75
202004	7.33	13.5	1.91	3.69	30.73	8.08

202005	4.35	12.5	2.47	3.83	30.69	9.76
202006	5.75	12.5	1.94	3.78	30.57	-3.12
202007	6.25	12.5	1.3	3.78	28.42	0.88
202008	7.38	12.5	1.17	3.78	29.51	2.57
202009	2	11.5	1.1	2.41	28.45	5.96
202010	0	11.5	0.86	1.87	28.36	13.76
202011	0	11.5	0.03	1.84	28.85	14.78
202012	1.25	11.5	0.03	2.04	28.31	14.92
201901	15	14	10.98	4.07	30.48	-2.78
201902	16.45	14	10.91	4.07	30.56	3.80
201903	11.5	13.5	10.42	3.97	30.83	-2.14
201904	13.98	13.5	10.24	3.91	30.89	-6.06
201905	5.14	13.5	10	3.9	31.07	6.55
201906	8.38	13.5	9.93	3.93	31.04	-3.55
201907	6.52	13.5	9.92	3.93	31.07	-7.50
201908	8	13.5	10.89	3.93	31.04	-0.69
201909	11.61	13.5	11.1	3.2	31.43	0.38
201910	6.37	13.5	10.03	3.93	30.56	-4.62
201911	0	13.5	6.73	3.31	29.4	2.45
201912	3.82	13.5	4.47	3.89	30.72	-0.59
201801	15.58	14	12.27	4.07	31.39	15.95
201802	26.19	14	11.88	4.07	31.4	-2.28
201803	15.16	14	11.84	4.07	31.55	-4.21
201804	3.1	14	11.43	4.07	31.56	-0.57
201805	25.43	14	10	4.07	31.29	-7.67
201806	5	14	10.11	4.07	31.17	0.46
201807	2.86	14	10	4.07	31.09	-3.29
201808	2.45	14	10.64	4.07	30.93	-5.86
201809	4.57	14	11	4.07	30.77	-5.97
201810	14.18	14	10.94	4.07	30.67	-0.92
201811	7.17	14	10.91	4.07	30.8	-4.90
201812	22.68	14	0	4.07	30.52	1.80
201701	8.15	14	13.95	4.22	28.88	-3.12
201702	27.46	14	13.75	4.22	29.26	-2.72
201703	13.11	14	13.6	4.23	30.18	0.74
201704	64.58	14	13.58	4.24	30.31	0.98
201705	21.29	14	13.5	4.08	30.75	14.48
201706	13.46	14	13.5	4.08	30.94	12.27
201707	12.28	14	13.46	4.08	30.94	8.24
201708	22.63	14	13.35	4.08	31.2	-0.96
201709	20.44	14	13.2	4.08	31.39	-0.18
201710	43.78	14	13.18	4.08	31.39	3.50
201711	18.78	14	13.01	4.08	30.95	3.45
201712	9.49	14	0	4.08	30.99	0.79
201601	2.04	11	4.12	3.29	26.77	-16.50
201602	2.67	11	4.91	3.29	26.73	2.74

201603	4.32	12	5.53	3.26	26.93	2.99
201604	3.75	12	7.27	3.54	26.88	-0.96
201605	7.67	12	8.04	3.57	26.73	10.41
201606	35.26	12	8.32	3.61	26.93	6.96
201607	31.51	14	12.34	3.89	27.06	-5.36
201608	24.25	14	14.93	3.93	27.21	-1.47
201609	14.5	14	14	4.05	27.49	2.67
201610	36.42	14	13.96	4.08	27.69	-3.94
201611	15.21	14	13.99	4.28	28.53	-7.27
201612	10.39	14	13.97	4.18	28.55	6.47
201501	10.21	13	11.2	3.48	25.97	-14.70
201502	23.5	13	10.88	3.47	26.33	1.83
201503	12.59	13	10.77	3.76	26.61	5.48
201504	24.24	13	10.23	3.6	26.41	9.31
201505	10.43	13	10.03	3.6	26.43	-1.15
201506	10.85	13	9.95	3.6	26.84	-2.49
201507	7.79	13	10	3.63	27.03	-9.79
201508	33.26	13	10	3.63	27.01	-1.64
201509	8.12	13	10.36	3.72	26.99	5.16
201510	3.22	13	9.11	3.71	27.01	-6.53
201511	0.84	11	5.62	3.47	27.02	-6.14
201512	0.77	11	4.57	3.33	26.84	4.59
201401	10	12	10.81	3.27	25.52	-1.83
201402	10.5	12	11.82	3.26	25.83	-2.50
201403	10.5	12	11.92	3.38	25.8	-2.05
201404	10.5	12	11.26	3.42	25.63	-0.68
201405	10.63	12	10.13	3.41	25.76	7.77
201406	10.5	12	9.98	3.42	26.07	2.43
201407	10.5	12	9.88	3.41	26.07	-0.91
201408	11.91	12	9.95	3.24	25.07	-1.34
201409	10.73	12	9.75	3.43	25.77	-0.78
201410	10.98	12	9.83	3.43	25.75	-8.88
201411	8.98	13	9.82	3.43	25.74	-8.01
201412	24.3	13	10.8	3.46	25.91	0.33
201301	11.67	12	11.17	1.69	24.54	13.44
201302	11.98	12	9.9	1.72	24.6	3.84
201303	10.39	12	10.17	1.77	24.49	1.39
201304	10.71	12	10.41	1.82	24.53	-0.29
201305	12.23	12	10.64	2.25	24.57	13.02
201306	11.59	12	11.6	2.04	24.58	-4.33
201307	10.63	12	11.56	2.42	24.62	4.85
201308	15.24	12	11.3	2.45	24.46	-4.39
201309	16.88	12	10.91	2.43	25.11	0.93
201310	11.08	12	10.8	2.39	24.9	2.84
201311	11.22	12	10.8	2.53	25	3.45
201312	10.75	12	10.97	2.53	24.9	6.19

201201	14.19	12	14.85	1.39	23.08	0.70
201202	14.35	12	14.76	1.43	23.13	-3.60
201203	14.13	12	14.49	1.61	23.21	2.63
201204	14.23	12	13.92	1.72	23.31	6.75
201205	13.8	12	13.34	1.66	23.44	0.09
201206	14.92	12	14.08	1.7	23.44	-2.12
201207	15.19	12	13.86	1.78	23.45	6.77
201208	17.81	12	14.26	1.77	23.76	2.99
201209	13.5	12	12.75	1.78	24.67	9.52
201210	11.42	12	12.94	1.76	24.65	1.61
201211	11.86	12	12.6	1.65	24.7	0.24
201212	11.88	12	11.77	1.66	24.61	5.98
201101	6.13	6.5	7.49	1.51	21.75	8.30
201102	8.38	6.5	7.09	1.48	21.88	-3.02
201103	9.33	7.5	8.27	1.41	22.02	-5.36
201104	10.8	7.5	9.52	1.43	22.19	1.71
201105	9.75	8	8.63	1.41	22.11	3.29
201106	11.15	8	8.2	1.4	22.02	-3.43
201107	8.85	8.75	7.08	1.42	22.42	-4.62
201108	8.59	8.75	7.41	1.46	22.27	-9.78
201109	9.37	9.25	8.92	1.46	22.09	-5.23
201110	13.07	12	15	1.41	23.32	2.76
201111	15.58	12	14.53	1.4	23.35	-4.45
201112	15.5	12	14.27	1.41	23.21	3.64
201001	2.61	6	3.72	3.34	22.76	8.49
201002	2.27	6	2.33	3.31	23.33	1.73
201003	1.5	6	1.04	3.03	23.62	12.97
201004	1.27	6	1.2	2.94	23.47	1.88
201005	4.94	6	1.63	2.92	22.56	-1.02
201006	2.73	6	2.29	1.95	22.03	-3.05
201007	3.59	6	2.94	1.62	22.27	1.81
201008	1.26	6	2.63	1.41	22.31	-6.10
201009	2.71	6.25	6.6	1.49	22.2	-5.02
201010	8.5	6.25	6.75	1.48	21.85	8.64
201011	8.79	6.25	7.58	1.48	21.84	-1.11
201012	8.03	6.25	7.47	1.51	21.86	0.02

Sources: Author's Compilation, based on Central Bank of Nigeria (CBN)'s 2023 Money Market Indicators (Retrieved from: https://www.cbn.gov.ng/rates/mnymktind.asp); and Nigeria Exchange Group Limited (NGX)'s All-Share Indices Historical Data (Retrieved from: https://ng.investing.com/indices/nse-all-share-historical-data).