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THE ASYMMETRIC EFFECTSOF MACROECONOMIC VARIABLES ON THE NIGERIAN STOCK MARKET

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ABSTRACT

The study examined asymmetric effects of macroeconomic variables on the Nigerian Stock Market using annual time series data from 1985 to 2022. The study uses data from the Central Bank of Nigeria and the Nigerian Bureau of Statistics. The study employed the Augmented Dickey Fuller (ADF) Test, Phillips-Perron (PP) Test, and KPSS (Kwiatkowski, Phillips-Schmidt-Shin (KPSS). It also employed the Non-Linear Autoregressive Distributed Lag (NARDL) model. The findings reveal that a decline in industrial production tends to increase market capitalization over the long term, possibly due to strategic shifts by investors. Conversely, a rise in inflation significantly reduces market capitalization, reflecting its negative impact on investor confidence. A decrease in interest rates also leads to a decline in market capitalization, highlighting the sensitivity of the stock market to monetary policy. Interestingly, both increases and decreases in the exchange rate positively influence market capitalization, suggesting complex investor responses to currency movements. Furthermore, a drop in foreign direct investment leads to a long-term decline in market capitalization. Nonetheless, the magnitude of asymmetric behavior of these macroeconomic variables will aid in portfolio diversification and risk management strategies. In essence, the findings offer insights that can support economic planning and informed investment decisions in Nigeria's stock market. Thus, the study recommends that the government should implement fiscal and monetary policies that are well-coordinated and consistent to stabilize interest rates, exchange rates, and inflation rates in the country.

Keywords: Market capitalization, Interest rate, Inflation rate, Exchange rate, NARDL, Macroeconomic variables, Stock market Performance

INTRODUCTION

Stock market investments in most African countries are often perceived as passive savings mechanisms. This perception has led to extended periods of low activity, limited liquidity, and weak development indicators in African stock exchanges compared to their developed and emerging counterparts. According to Mbengue et al. (2023), the relatively small size of these economies and limited experience in trading diverse financial assets contribute to the underperformance of African stock markets. Government economic strategies in these countries typically prioritize monetary policy tools, such as interest rates and inflation control,that directly impact the fixed-income market, often at the expense of the equities market (Chindengwike, 2022; Hoong et al., 2023; Imhanzenobe, 2023).

The Nigerian Exchange Group is similarly affected. Shares are infrequently traded, and turnover ratios remain well below international standards (Yartey&Adjasi, 2007). Additionally, Nigeria's macroeconomic environment continues to be volatile due to both domestic and global disruptions. Global oil price fluctuations and surging food prices, have exacerbated inflationary pressures. Jakada (2014) noted that rising inflation erodes purchasing power,particularly of nominal assets, and hampers Nigeria's global competitiveness by appreciating the local currency. Higher inflation rates also increase living costs, leading investors to redirect resources from stock investments to basic consumption, thereby reducing market activity.

The Nigerian manufacturing sector has long been considered the engine of economic growth, has suffered a continuous decline (Egbuche&Nzotta, 2020). Contributing factors include poor infrastructure, inconsistent power supply, and intense competition from imported goods. These issues have discouraged local production, leading to a reduction in the number of listed companies and weakening stock market performance. Furthermore, the adoption of multiple exchange rates by the monetary authorities has led to a consistent depreciation of the naira. The exchange rate deteriorated from NGN 165.15 per USD in 2014 to NGN 1,334.65 as of May 2024. This depreciation has made it increasingly expensive to trade stocks, discouraging local investor participation and further reducing stock market vibrancy (Okechukwu et al., 2019).

This study sets itself apart from previous research by addressing methodological and analytical limitations. Most earlier studies examined the influence of macroeconomic variables on stock market performance using linear models, thereby ignoring the possibility of non-linear or asymmetric effects. Scholars such as Sharma and Kautish (2019) and Sheikh et al. (2020), as cited in Okere et al. (2021), identified this oversight, emphasizing the restrictive nature of conventional cointegration methods that assume a linear relationship. Past research often relied on descriptive tools such as

Ordinary Least Squares (OLS), multivariate regressions, and Autoregressive Distributed Lag (ARDL) models (Agwu & Haydar, 2023; Majeed, 2022; Emmanuel, 2023). However, these methods struggle with overparameterization, lag instability, and the assumption that positive and negative shocks to macroeconomic variables have equal but opposite effects. This assumption may not hold in the real world. Inflation, interest rates, and exchange rate fluctuations may yield significantly different responses depending on their direction and intensity. To address these gaps, this study proposes the use of the Non-linear Autoregressive Distributed Lag (NARDL) model, which is better suited for capturing asymmetric relationships. As highlighted by Jakada et al. (2023), non-linear models offer a more nuanced, realistic, and practical approach to economic analysis.

Another point of distinction is the selection of macroeconomic variables. While previous studies, such as Okere et al. (2021), focused on indicators like the All-Share Index, market capitalization, inflation, money supply, exchange rate, and oil prices, this research incorporates industrial production, inflation rate, exchange rate, interest rate, and foreign direct investment. These variables were chosen due to their demonstrated impact on capital formation and investor behavior, which ultimately shape market capitalization trends.The study covers a comprehensive timeline from 1985 to 2022, capturing the pre-adjustment, post-adjustment, and reform periods in Nigeria. This extended scope ensures a more detailed analysis of macroeconomic trends and their implications for the stock market. By focusing on the asymmetric effects of selected macroeconomic variables using the NARDL model, this study aims to provide more robust and policy-relevant insights into the dynamics of Nigeria's stock market performance. In doing so, it not only contributes to academic literature but also serves as a reference for future research and a guide for policymakers and investors alike.

LITERATURE REVIEW

Theoretical Framework

This study is underpinned by two theories Dividend Discounted Model (DDM),

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The Dividend Discounted Model (DDM) states that a stock's intrinsic value is derived from the sum of its discounted future dividend payments. The model focuses on internal company performance, its valuation is influenced by broader macroeconomic variables, which directly or indirectly impact dividends, discount rates, and ultimately stock prices.Themodel hypothesized that when interest rates rise, the discount rate also increases, leading to lower present values of future dividends and, consequently, a lower intrinsic value for the stock (Market capitalization). Chen et al. (1986) explain that there is

an intuitive appeal to understand how the value of a company may be affected by external forces. Any systematic factors that affect the economy's pricing operator or those that influence dividends would also influence the stock market. Chen et al. (1986) hypothesize that the negative inflation-stock market relationship is generated because average inflation rates impact the expected cash flows and asset valuation. The growth in economic activity depends on the accumulation of assets, which contributes to firms' ability to generate cash flows. Chen et al. (1986) use industrial production to measure this and find that future growth in industrial production was a significant factor in explaining stock returns, indicating a positive relationship between economic activities and stock prices. They also hypothesized the relationship for the interest rate to be an inverse relationship, meaning that increasing interest rates will increase the discount rate due to their effect on the nominal risk-free rate, which causes lower asset valuations. It proves that interest rates have a negative relationship with the stock market empirically. An increase in interest would force investors to require a high rate of return due to the rise in the opportunity cost of investing in shares.

Arbitrage Pricing Theory (APT),

Arbitrage Pricing Theory (APT), developed by Stephen Ross in 1976. The APT provides a flexible and realistic framework for understanding how multiple macroeconomic factors influence the returns of financial assets, particularly stocks. Unlike the Capital Asset Pricing Model (CAPM), which assumes that market returns are driven solely by a single market factor, APT proposes that asset returns are affected by several systematic factors. According to the theory, the expected return of an asset is a linear function of various macroeconomic variables, each associated with its sensitivity coefficient (beta). If actual asset prices diverge from the prices implied by the model, arbitrage opportunities will arise, and market participants will exploit them until equilibrium is restored.Studies by Chen et al. (1986), Antoniou et al. (1998), and Azeez and Yonezawa (2003) demonstrate that macroeconomic variables such as industrial production, inflation rates, interest rates, exchange rates, and oil prices significantly influence stock returns. Arbitrage Pricing Theory (APT) offers a comprehensive explanation of how macroeconomic variables impact stock market performance by emphasizing the role of multiple risk factors. According to APT, the returns of financial assets, including stocks, are not solely determined by a single factor such as market risk, but are instead influenced by a variety of economic forces. These forces can include industrial production, inflation rates, interest rates, exchange rates, and foreign direct investment, each with its sensitivity coefficient (beta). The theory suggests that any change in these macroeconomic variables, whether positive or negative, can lead to shifts in stock market returns, as investors adjust their expectations based on these

factors. For instance, an increase in industrial production typically signals economic growth, which may result in higher stock returns due to increased corporate earnings. Conversely, rising inflation or interest rates may cause stock prices to fall as investors anticipate lower future returns or higher borrowing costs. APT's multi-factor approach thus helps explain the complex relationship between macroeconomic changes and stock market performance, highlighting how fluctuations in various economic indicators can directly and indirectly affect investor behavior, asset pricing, and market dynamics.Applying the APT to the Nigerian Stock Exchange enables a robust exploration of how macroeconomic variables,Industrial Production, Inflation, Interest Rate, Exchange Rate, and Foreign Direct Investment impact the stock market.

Empirical Literature

Previous researchhas investigated the effect of Macroeconomic variables on the stock market. For example,Yusuf et al. (2025) investigate the impact of key macroeconomic variables on stock development in Nigeria, using money supply, inflation, interest rate, exchange rate, trade openness, and the share index from 1986 to 2019. The Augmented Dickey Fullerand Phillips Perron, and Autoregressive Distributive Lag (ARD)model. Based on the findings, the long run relationship indicates that money supply has a positive and statisticallysignificant impact on all share index. Furthermore, the exchange rate has positive but statistically insignificant effects on all share indices. Theinterest rate indicates positive and statistically significant effects on all share indices. Trade openness indicates a positive but statistically insignificant effect on all share indicesin Nigeria. The inflation rate shows a negative and statistically insignificant effect on all share index in Nigeria.

Abusaba et al. (2025) assess the impact of selected macroeconomic variables on stock prices in Sub-Saharan Africa, focusing on inflation rate, interest rate, exchange rate, and money supply. The research adopted a causal design to explore the relationship between these variables and stock market performance. Monthly data spanning from 2005 to 2023 were collected from six countries—Tanzania, Kenya, Malawi, Botswana, Ghana, and Nigeria. The data were analyzed using descriptive statistics and multiple regression techniques.The findings revealed that both the inflation rate and exchange rate have statistically significant and positive effects on stock prices, with coefficients of 0.4222 ($p < 0.001$) and 1.3522 ($p < 0.001$), respectively. This indicates that increases in these variables are associated with a rise in stock market values. Conversely, the interest rate exhibited a positive but statistically insignificant relationship with stock prices, as shown by its coefficient of 0.0120 ($p = 0.133$). The results suggest that inflation and exchange rate movements are key drivers of stock price variations in the region, while interest rates may not exert a strong influence. Overall, the

study concluded that macroeconomic shocks, particularly in inflation and exchange rates, are positively associated with stock market performance across Sub-Saharan African countries.

Oladosu and Topbie (2024) examined how macroeconomic variables affect the performance of the Nigerian capital market. They used money supply (M2), exchange rate (EXR), consumer price index (CPI), and prime lending rate (PLR) as indicators of macroeconomic conditions (independent variables), while the All-Share Index (ASI) represented the capital market's performance (dependent variable). The study utilized monthly time-series data obtained from the Nigerian Stock Exchange, the Central Bank of Nigeria, and the National Bureau of Statistics. Employing the Autoregressive Distributed Lag (ARDL) model, the findings indicated that variations in the ASI were significantly influenced by changes in money supply and exchange rate. Additionally, the ASI responded both significantly and insignificantly to CPI and PLR depending on the period. The study recommended that regulatory bodies should intensify efforts to create a more supportive environment to strengthen and deepen the capital market.

Fapetu et al. (2024) analyzed the relationship between capital market performance and macroeconomic dynamics in Nigeria over the period 1993 to 2023. Using the Vector Error Correction Model (VECM), the study assessed the impact of exchange rate, inflation rate, money supply, and unemployment rate as independent variables, with the All-Share Index (ASI) serving as a proxy for capital market performance. The findings indicated a significant long-run relationship between the capital market and macroeconomic factors. Specifically, exchange rate, inflation, and money supply were found to have significant long-run causal effects on market performance, while the unemployment rate had an insignificant impact. The study recommended that the government should enhance the stability and effectiveness of key macroeconomic indicators to promote better performance of the Nigerian capital market.

Onyenwe and Eleodinmuo (2023) in their study examined macroeconomic indicators and capital market performance from 1997 to 2020. Data were collected from the Statistical Bulletin of the Central Bank of Nigeria and were used to analyze the effect of explanatory variables (gross domestic product, interest rate, index of industrial production, and employment rate) on the dependent variable (market capitalization). Error Correction Mechanisms were used to analyze the data, and the result of the analysis indicates that macroeconomic variables have a positive but insignificant effect on capital market performance within the period of the study.

Siang and Rayappan (2023) examine the effect of macroeconomic variables on stock market performance in Malaysia from January 2015 to December 2021. The macroeconomic variables included in their study are the inflation

rate, real effective exchange rate, money supply, and short-term interest rate. Johansen Cointegration Test has been utilized if the variables have a long-term impact on Malaysian stock market performance; whereas regression analysis will quantify the impact. The results show that the real effective exchange rate has a moderate positive effect on the KLCI index. Secondly, the inflation rate and overnight policy rate have a long-term positive effect on the KLCI index. M2 money supply has a long-term negative effect on the KLCI index. This study extends previous studies by examining the effect of macroeconomic variables on stock market performance in emerging markets.
Sajor et al.(2023) in their study investigate the short and long-run relationship between the Philippine Stock Exchange Index and macroeconomic variables, interest rate, foreign direct investment (FDI), and exchange rate from 1985 to 2019. The study adopted the Autoregressive Distributed Lag (ARDL) model to estimate the causality function, the F-Bounds Test to establish long-run causal significance, and the Error Correction Term (ECT) to determine how long until the adjustment of short-run errors to re-equilibrate to the long-run equilibrium. The results show that FDI has a positive cointegration in both the short and long run, the exchange rate has a positive cointegration in both the short and long run, and the lag of interest rate is positively significant in the short run and negatively significant in the long run. Also, Abdullai et al. (2023) examinedhow macroeconomic factors affected Ghana's stock market performance, concentrating oninflation, interestrates, exchangerates, and the uncertainty surrounding global economic policy. The results showed that while inflation and exchange rates have a slight effecton Ghanaian stock performance, interest rates and the uncertainty surrounding global economic policy have a major impact.
Idan (2022) reported that Oil prices (OP), inflation rate (INF), energy consumption (EC), and gross domestic product (GDP) have had a substantial impact on the performance of the stock market (SMP). Therefore, the primary purpose of his study is to investigate the effects of various macroeconomic factors on the SMP in Iraq. The all-share price index (ASPI) is a proxy for the stock market's performance. In contrast, GDP, INF, EC, and OP are macroeconomic indicators. All companies traded on the Iraq StockExchange comprised the population for examination in this study. The information was acquired from secondary sources, and annual time series data for 2000 through 2021 were utilized. Correlation and multiple regression were employed as statistical methods to analyze the data. Also, the Augmeted Dicky–Fuller (ADF) test, the Breusch-Pagan-Godfrey test, and the Variance inflation factor (VIF) were used to determine multicollinearity. According to the research, GDP and OP have a beneficial effect on SMP. Both INF and EC are detrimental to the SMP.

Wanigasuriya (2022) employed the All-Share Price Index (ASPI) as a proxy to represent the stock market performance, and inflation, interest rate, exchange rate, foreign direct investment, gross domestic product, and broad money supply were used as the macroeconomic variables. Secondary data was collected from 1997 to 2019. The Autoregressive Distributed Lag (ARDL) Bound test procedure was adopted to investigate the effects of macroeconomic determinants on ASPI and to investigate the existence of a cointegration among the variables. Error Correction representation of the ARDL mechanism is adopted to determine the short-run dynamics relationship between the variables and long-run adjustment of the model. His study showed that there is a long-run and short-run relationship exists between the ASPI and macroeconomic variables. Gross Domestic Product has a significant and positive impact on ASPI in the long run, while the current value of GDP does not affect ASPI in the short run. In contrast, the past value of GDP affects ASPI negatively in the short run. Also, there is a negative relationship between M2 and ASPI in the long run, while positive correlation between these two variables in the short run. In addition, Lemeirut (2021) investigated how Tanzanian stock market returns were affectedby macroeconomic factors, particularly the money supply, interestrates, inflationrate, and exchange rate. The study discovered that while the exchange rate had a significant negative impact on stock market returns, the money supply, inflation rate, and interest rate had a significant positive impact.

Norehan and Ridzuan (2020) investigated the impact of macroeconomic variables in the stock market in Malaysia from the period 1981 to 2017 using annual data. The inflation rate, exchange rate, broad money, and domestic savings are the selected macroeconomic variables that were chosen in this study. The study implemented Autoregressive Distributed Lag (ARDL) estimation to investigate the short-run and long-run elasticities of the proposed model. The results from the Augmented Dickey-Fuller and Phillips-Perron tests of stationarity indicated that all the variables were non-stationary at a level I (o) but stationary at the first difference I (1). The finding based on long-run elasticities reveals that inflation and exchange rate are significant and positively influencethe stock market in Malaysia. Meanwhile, domestic savings and broad money have a negative impact on the stock market in the long run.

The performance of the Nigerian capital market was examined by Ejikeme (2017) concerning four selected macroeconomic indicators, including real gross domestic product, prime lending rate, foreign exchange rate, and inflation. The performance of the capital markets was gauged using the NSE all-share index and market capitalization from 1986 to 2009. According to the results, only inflation is stationary at a level, whereas all other time series

are stationary at the first or second difference. The variables are co-integrated, as the Johansen cointegration technique shows. In both instances, the likelihood ratio showed two cointegrating equations. The following intriguing conclusions are drawn from the error correction model: The real gross domestic product determines the performance of the Nigerian capital market, which has a positive effect on the performance of the Nigerian capital market. The study demonstrates how Nigeria's high and rising inflation rate has a detrimental effect on the stock market's performance. But even though it had a negative impact of 5% on the all-share index, the market capitalization was unaffected. The performance of the capital market is negatively impacted by the prime lending rate, while it has little effect on the foreign exchange rate of the naira to the US dollar.

Worlu and Omodero (2017) evaluate the impact of macroeconomic variables on stock market performance in Africa from the period of 2000 to 2015. The four major African countries investigated were Ghana, Kenya, South Africa, and Nigeria. Time series data were employed and analyzed using multiple regression and a t-test for hypothesis testing. With the use of SPSS software, the results revealed a negative impact of GDP, inflation, and real exchange rate on SPI in Nigeria. An insignificant relationship among all the variables was also observed. The result for South Africa's stock market showed that GDP and inflation had a negative impact on the stock market, and the real exchange rate had no impact on the stock market. The impact of GDP on Ghana's stock market was negative, while the others had no impact. Real exchange rate had a negative impact on the Kenyan stock market, but GDP and inflation had no impact. The researchers, therefore, conclude that macroeconomic variables have to be checked by the governments of the African countries to avoid this scenario of negative effects, since they are major determinants of the success of the stock markets in every economy.

Conclusively, it can be observed that the previous literature reviewed, on the impact of macroeconomic variables like inflation, exchange rates, and interest rates on the stock market, some studies indicate positive relationships, and others highlight negative correlations, which indicates variations in findings. Moreover, most studies used linear models in their investigations and neglected the non-linear relationship, which involves huge capital commitment over a long time. Models like ARDL, VECM, and ECM have been widely used, but there are variations in their results, particularly concerning the short-term and long-term effects of these variables. A notable gap in the literature is the lack of consensus on the interaction between these variables in emerging markets like Nigeria, where macroeconomic instability may have unique implications for stock market behavior.Therefore, there is a need to employ non-linear analysis, such as the non-linear ARDL time series approach, to show both the positive and

negative effects of macroeconomic variables on stock market performance. The NARDL technique is robust to take care of the potential problem of endogeneity and varying order of integration in a regression equation.

METHODOLOGY

Data Source and Variable Descriptions

This study employs annual time series data from 1985 to 2022, and the data used were sourced from the Central Bank of Nigeria Statistical Bulletins, 2022, and Nigerian Bureau of Statistics (2022). The data used include measures of stock market by market capitalization, industrial production, inflation, Foreign direct investment, and exchange rate

Table 1: Definition of variables and their measurement

Variable	Code	Definition
Market capitalisation	lnMKP	It represents the total stock market value of all the companies, which is measured by the total number of companies' shares multiplied by their current price.
Industrial Production	lnIPO	Industrial production measures the amount of output from manufacturing, mining, and electricity.
Inflation rate	lnINF	Consumer price index, which changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly
Exchange rate	lnEXC	The value of one country's currency in relation to another country's currency. Naira to dollar
Interest rate	lnINT	Theseare the charges for using an asset or on money lend out to an individual or firm.
Foreign Direct Investment	lnFDI	An investment made by entities – investors, firms – in one country into a foreign business enterprise with the intention or objective of obtaining a lasting profit.

Source: Author's Compilation (2024)

Model Specification

This study adapts and modifies the model of Olokoyo, Ibhagui, and Babajide (2020), which investigated the long-term effects of macroeconomic factors on stock market performance (market capitalization) in Nigeria between 1981 and 2018. As stated in their model:

MCAP= f(INT,EXR, GDPG, INFL, FKF, TRD) ….. ……(1)

By augmenting, the study included Industrial production (LNIPO) and Foreign Direct investment (FDI) to the remaining variables in the model, the modified model for the study was stated in equation 2 as:

lnMKP= f(lnIPO, lnINF, lnINT, lnEXC, lnFDI) ….. ……(2)

The equation (2) above can be further transformed into a mathematical model as follows:

$\ln MKP=\beta_0 + \beta_1 \ln IPO + \beta_2 \ln INF + \beta_3 \ln INT + \beta_4 \ln EXC + \beta_5 \ln FDI$ …… (3)

Also, equation (3) can be transformed into an econometric model as follows:

$\ln MKP_t=\beta_0 + \beta_1 \ln IPO_t + \beta_2 \ln INF_t + \beta_3 \ln INT_t + \beta_4 \ln EXC_t + \beta_5 \ln FDI_t + \varepsilon_t$ …(4)

Where:

$\ln MKP_t$ indicates Market Capitalization,
$\ln IPO_t$ indicates Industrial Production,
$\ln INF_t$ indicates Inflation Rate,
$\ln INT_t$ indicates Interest rate,
$\ln EXC_t$ indicates Exchange rates,
$\ln FDI_t$ indicates Foreign Direct Investment,
ε_t indicates Error Term,
β1-β5 indicates the coefficients of the explanatory variables. The error term (εt) is added to take account of all the omitted variables or variables not included in the model, as well as the influence of any measurement error that might affect the dependent variable. Thea priori expectation is that at the end of the analysis, industrial production, exchange rate, interest rate, and Foreign Direct investment will have a positive effect on the stock market, while inflation is expected to have a negative effect on the stock market.

Estimation Techniques

To analyze the econometric model specified above, unit root tests based on the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests will be carried out first to find out whether the time series variables are stationary or not. Also, the non-linear test of unit root that is KPSS (Kwiatkowski, Phillips-Schmidt-Shin) was used. It is important to note that multiple unit root tests were employed because, as Bida (2010, as cited in Bello 2021) noted that the ADF and PP tests have problems of lower power in rejecting the null hypothesis of a unit root. Thus, Bello (2021) highlights that KPSS was found to have very large powers over the conventional unit root test; as such, it was employed to complement the results of the ADF and PP tests.Moreover, the Brock-Dechert-Scheinkman (BDS) (1996) test of nonlinear would be used to see if the series is linear or nonlinear, and the nonlinear ARDL techniques of estimation were applied to examine the nonlinear effect of macroeconomic variables on the stock market, as well as the asymmetric nature of their relationship. BDS tests are superior than other tests because theygive strong statistical power in revealing information about whether a model is linear(Broock et al., 1996, as cited in Jakada et al., 2023). And it is model-free and can uncover complex nonlinear structures that linear models may miss (Brock et al., 1996). Unlike other tests, the BDS test does not rely on parametric assumptions, making it more robust in

identifying hidden dependencies (Broock et al., 1996, as cited in Jakada et al., 2023).

Non-Linear ARDL Model (NARDL)

The Nonlinear Autoregressive Distributed Lag (NARDL) model is an extension of the ARDL model that captures asymmetric effects of independent variables onthe dependent variable (Pesaran et al., 2001; Shin et al., 2014). It decomposes explanatory variables into positive and negativeshocks to assess whether increases or decreases in independent variables have different impacts on the dependent variable. It is important to note that positive shock refers to an unexpected increase in a macroeconomic variable, while negative shock indicates an unexpected decrease. These shocks represent sudden changes that can influence the stock market either favorably or unfavorably, depending on the nature of the variable and the economic context. Thus, the NARDL model does not require the order integration among the variables to be the same; the technique can accommodate the order of integration to be either at level or at first difference, that is,I(1) or I(0) respectively (Alkhawaldeh et al. 2020, as cited in Jakada et al., 2023).

Thus, the model stated as Eq. 4 of this study will extend in form as follows:

$$lnMKP_t=\beta_0 + \beta_1 lnIPO_t^{+} + \beta_1 lnIPO_t^{-} + \beta_2 lnINF_t^{+} + \beta_2 lnINF_t^{-} + \beta_3 lnINT_t^{+} + \beta_3 lnINT_t^{-} + \beta_4 lnEXC_t^{+} + \beta_4 lnEXC_t^{-} + \beta_5 lnFDI_t^{+} + \beta_5 lnFDI_t^{-} + +\varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots(5)$$

Equation 6 above shows that lnMKPt denotes the natural logarithm of stock market performance at time t, proxied by market capitalization. The variables $IPO_{t,}$, $INF_{t,}$, $INT_{t,}$ EXC_t and FDI_t represent industrial production, inflation rate, interest rate, exchange rate, and foreign direct investment, respectively. Each of these variables has been decomposed into two components: positive shock (denoted by superscript+) and negative shock (denoted by superscript −). These shocks are calculated as cumulative increases or decreases in the respective variables over time.The coefficients β_i^{+}andβ_i^{-} capture the long-run elasticities of stock market performance concerning positive and negative shocks i^{th}macroeconomic variable.The optimal lag lengths *p* and *q* for the dependent and independent variables are selected based on the Akaike Information Criterion (AIC) to ensure efficiency in parameter estimation and model diagnostics.

$$\mathbf{lnIPO}_t^+ = \sum_{k=1}^{t} \Delta\mathbf{lnIPO}_t^+ = \sum_{k=1}^{t} \mathbf{max}((\Delta\mathbf{lnIPO}, 0), \quad \mathbf{lnIPO}_t^- = \sum_{k=1}^{t} \Delta\mathbf{lnIPO}_k^- = \sum_{k=1}^{t} \mathbf{min}((\Delta\mathbf{lnIPOk}, 0) \ldots (6)$$

Equation 6 above separates the changes in industrial production into two cumulative components.lnIPO_t^+Captures the cumulative positive shock (increases) in industrial production. And lnIPO_t^-Captures the cumulative negative shocks (decreases) in industrial production.This decomposition helps to analyze whether increases in industrial production affect the stock market differently than decreases.

$$\mathbf{lnINF}_t^+ = \sum_{k=1}^{t} \Delta\mathbf{lnINF}_t^+ = \sum_{k=1}^{t} \mathbf{max}((\Delta\mathbf{lnINFk}, 0), \mathbf{lnINF}_t^- = \sum_{k=1}^{t} \Delta\mathbf{lnINF}_k^- = \sum_{k=1}^{t} \mathbf{min}((\Delta\mathbf{lnINFk}, 0) \ldots (7)$$

Equation 7 divides inflation into two components; $\Delta\mathrm{lnINF}_t^+$ Captures all positive shocks (rising) changes in inflation. And lnINF_t^- The sum of all negative (falling) changes in inflation.This enables the model to examine whether rising inflation has a different effect on stock performance than falling inflation.

$$\boldsymbol{ln}\mathbf{INT}_t^+ = \sum_{k=1}^{t} \Delta\boldsymbol{ln}\mathbf{INT}_t^+ = \sum_{k=1}^{t} \mathbf{max}((\Delta\boldsymbol{ln}\mathbf{INTk}, 0), \boldsymbol{ln}\mathbf{INT}_t^- = \sum_{k=1}^{t} \Delta\boldsymbol{ln}\mathbf{INT}_k^- = \sum_{k=1}^{t} \mathbf{min}((\Delta\boldsymbol{ln}\mathbf{INTk}, 0)..(8)$$

Equation 8 divides interest rate changes into two: $\boldsymbol{ln}\mathrm{INT}_t^+$ show cumulative increases in the interest rate (positive shock). And $\boldsymbol{ln}\mathrm{INT}_t^-$ show cumulative decreases in the interest rate (Negative shock). This distinction is crucial to determine whether change in interest rates affect the stock market differently.

$$lnEXC_t^+ = \sum_{k=1}^{t} \Delta lnEXC_t^+ = \sum_{k=1}^{t} \max((\Delta lnEXCk, 0), lnEXC_t^- = \sum_{k=1}^{t} \Delta lnEXC_k^- = \sum_{k=1}^{t} \min((\Delta lnEXCk, 0)(9)$$

Equation 9 shows that exchange rate movements were $lnEXC_t^+$ show currency appreciations (positive shocks) and $lnEXC_t^-$ show depreciations (negative shocks).This allows the model to identify asymmetric impacts of exchange rate movements on the stock market.

$$lnFDI_t^+ = \sum_{k=1}^{t} \Delta lnFDI_t^+ = \sum_{k=1}^{t} \max((\Delta lnFDIk, 0), lnFDI_t^- = \sum_{k=1}^{t} \Delta lnFDI_k^- = \sum_{k=1}^{t} \min((\Delta lnFDIk, 0).(10)$$

Equation 10 shows $lnFDI_t^+$ that is increases in FDI inflows (Positive shock)and $lnFDI_t^-$ Indicates negative shocks (i.e, decreases in FDI inflows).According to the same process conducted under the ARDL approaches. The equation is stated as follows:

$$\Delta lnMKP_t = a_0 \sum_{j=1}^{b} \alpha_j \Delta lnMKP_{t-j} + \sum_{j}^{b} (\alpha_t^+ \Delta lnIPO_{t-j}^+ + \alpha_t^- \Delta lnIPO_{t-j}^-) + \sum_j^b q(\alpha_t^+ \Delta lnINF_{t-j}^+ + \alpha_t^- \Delta lnINF_{t-j}^-) + \sum_{j}^{b} (\alpha_t^+ \Delta lnINT_{t-j}^+ + \alpha_t^- \Delta lnINT_{t-j}^-) + \sum_{j}^{b} (\alpha_t^+ \Delta lnEXC_{t-j}^+ + \alpha_t^- \Delta lnEXC_{t-j}^-) + \sum_{j}^{b} (\alpha_t^+ \Delta lnFDI_{t-j}^+ + \alpha_t^- \Delta lnFDI_{t-j}^-) + + \gamma_1 \Delta lnMKP_{t-1} + \gamma_2^+ lnIPO_{t-1}^+ + \gamma_3^- lnIPO_{t-1}^- + \gamma_2^+ lnINF_{t-1}^{\mp} + \gamma_3^- lnINF_{t-1}^- + \gamma_2^+ lnINT_{t-1}^+ + \gamma_3^- lnINT_{t-1}^- + \gamma_2^+ lnEXC_{t-1}^+ + \gamma_3^- lnEXC_{t-1}^- + \gamma_2^+ lnFDI_{t-1}^+ + \gamma_3^- lnFDI_{t-1}^- + + \varepsilon t \ldots\ldots\ldots (10)$$

Where $\sum_{j=1}^{b} \alpha_j^+$ and $\sum_{j=1}^{b} \alpha_j^-$ captures the short-run positive as well as negative effects of Industrial production, Inflation, interest rate, Exchange rate, and FDI on the stock market, while γ_i^+ + and γ_i^- captures the long-run effect of Inflation, interest rate, Exchange rate, FDI, and Industrial production on the stock market.Error Correction Model (ECM) of Eq. 12is shown below:

$$\Delta ln MKP_t^+ = \alpha_0 + \sum_{j=1}^{b} \alpha_i \Delta lnMKP_{t-j} + \sum_{j}^{b}(\alpha_i^+ \Delta lnIPO_{t-j}^+ + \alpha_i^- \Delta lnIPO_{t-j}^-) + \sum_{j}^{b}(\alpha_i^+ \Delta lnINF_{t-j}^+ + \alpha_i^- \Delta IlnNF_{t-j}^-) + \sum_{j}^{b}(\alpha_i^+ \Delta INT_{t-j}^+ + \alpha_i^- \Delta IlnNT_{t-j}^-) + \sum_{j}^{b}(\alpha_i^+ \Delta lnEXC_{t-j}^+ + \alpha_i^- \Delta lnEXC_{t-j}^-) + \sum_{j}^{b}(\alpha_i^+ \Delta lnFDI_{t-j}^+ + \alpha_i^- \Delta lnFDI_{t-j}^-) + \pi_i ECM_{t-1} + \varepsilon t \quad \ldots (12)$$

The Error Correction Term (ECT) plays a crucial role in linking short-term dynamics to long-term equilibrium in the ECM framework. The ECT represents the deviation from the long-run equilibrium at the previous time period. The expected sign of the ECT is negative.Because if the ECT is negative and significant, it implies that the system is correcting itself over time and moving back to equilibrium. Therefore, from equation 12, ECM is represented by $\pi_i$which indicates the long-run equilibrium speed of adjustment following the short-term shock. The short-run adjustment asymmetries are represented by α_i^+ and α_i^-, whereas the short-run coefficients are represented by α_i. Like ARDL, the bound test uses the F statistic for a joint significance test to ascertain whether a co-integration relationship exists (Pesaran et al. 2001, as cited in Jakada et al., 2023). The standard Wald test is then used to investigate the long-run symmetry $\gamma = \gamma^+ + \gamma^-$ for lnIPO, lnINF, lnINT, lnEXC, and lnFDI, respectively, and the short-run symmetry $\alpha = \alpha^+ + \alpha-$ forlnIPO, lnINF, lnINT, lnEXC, and lnFDI. Then, the dynamic multiplier effect is assessed after confirmation of the long-run relationship, where a 1% change in

$lnIPO_{t-1}^+, lnIPO_{t-1}^-, lnINF_{t-1}^+, lnINF_{t-1}^-, lnINT_{t-j}^+, lnINT_{t-j}^-, lnEXC_{t-j}^+, lnEXC_{t-j}^-, \Delta lnFDI$

Can be derived from Eq. 13, Eq. 14, Eq. 15, Eq. 16, and Eq. 17.

$$L_b^+ = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta lnIPO_t^+},\ L_b^- = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta lnIPO_t^-} = 1,2,3 \ldots\ldots\ldots Noting\ that\ b \to \infty,$$

$$L_b^+ \to \omega_2^+, L_b^- \to \omega_3^- \ldots\ldots (13)$$

$$L_b^+ = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta IlnNF_t^+},\ L_b^- = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta IlnNF_t^-} = 1,2,3 \ldots\ldots\ldots Noting\ that\ b \to \infty,$$

$$L_b^+ \to \omega_4^+, L_b^- \to \omega_5^- \ldots\ldots (14)$$

$$L_b^+ = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta IlnNT_t^+},\ L_b^- = \sum_{i=0}^{b} \frac{\vartheta MCAP_{t+i}}{\vartheta INT_t^-} = 1,2,3. Noting\ that\ b \to \infty,$$

$$L_b^+ \to \omega_6^+, L_b^- \to \omega_7^- \ldots\ldots\ldots\ldots\ldots (15)$$

$$L_b^+ = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta ElnEXC_t^+},\ L_b^- = \sum_{i=0}^{b} \frac{\vartheta MCAP_{t+i}}{\vartheta EXC_t^-} = 1,2,3 \ldots\ldots\ldots Noting\ that\ b \to \infty,$$

$$L_b^+ \to \omega_8^+, L_b^- \to \omega_9^- \ldots\ldots (16)$$

$$L_b^+ = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta FlnFDI_t^+},\ L_b^- = \sum_{i=0}^{b} \frac{\vartheta lnMKP_{t+i}}{\vartheta lnFDI_t^-} = 1,2,3 \ldots\ldots\ldots Noting\ that\ b \to \infty,$$

$$L_b^+ \to \omega_{10}^+, L_b^- \to \omega_{11}^- \ldots\ldots (17)$$

Shocks impacting the system may be shown, with dynamic adjustment from and to the new equilibrium, based on the predicted dynamic multipliers. Using a WALD test statistic, the study further examines symmetric effects across the short and long terms. The test's null hypothesis asserts unequivocally that $T_{lnx}^+ = T_{lnx}^-$. In the same way, the short run is tested using the usual Wald test. From this test, the null hypothesis is that

$$\sum_{i=0}^{q-1} \theta_{t-1}^{+i} = \sum_{i=0}^{q-1} \theta_{t-1}^{-i}$$

It is important to note that the bound test is used to determine whether a long-run equilibrium relationship exists between the variables in an ECM framework. If the F-statistic is greater than the upper critical value, the null hypothesis of no cointegration is rejected, indicating that a long-run equilibrium relationship exists, and vice versa.The bound test is appropriate for assessing long-run relationships because it doesn't require the variables to

be strictly stationary, and it can be used even when the variables are a mix of I(0) and I(1) processes. This is a common feature in economic time series data. Bound test can be interpreted if cointegration is found (i.e., the F-statistic exceeds the upper critical bound), which implies that there is a stable long-term relationship between the variables. And if the test indicates no cointegration (F-statistic below the lower bound), then the variables do not have a long-term relationship, and the model may not be suitable for capturing such dynamics.The Wald test is used to assess the joint significance of the parameters in the model. It tests whether the coefficients of the differenced variables (the short-run effects) are significantly different from zero.This indicates that these short-run variables do not significantly affect the dependent variable. Wald test is appropriate because it specifically tests the short-run relationships between the variables by examining the impact of changes in explanatory variables on the dependent variable. Italso helps to determine whether short-run adjustments contribute meaningfully to the overall model dynamics.If the Wald test statistic is significant (p-value < 0.05), the null hypothesis is rejected, suggesting that the short-run variables are indeed influencing the dependent variable and vice versa.

RESULTS AND DISCUSSION

Descriptive Statistic

This highlights the main features of the data employed for the study. The description includes the values of the overall mean, minimum, maximum, and standard deviation of the variables in the analysis.

Table 2. Descriptive Statistic

	lnMKP	lnIPO	lnINFL	lnINTR	lnEXC	lnFDI
Mean	6.930	9.417	2.677	2.727	4.083	0.472
Median	7.435	9.468	2.542	2.806	4.815	0.630
Maximum	10.843	9.725	4.288	3.454	6.054	2.179
Minimum	1.887	9.029	1.684	1.791	-0.112	-1.660
Std. Dev.	2.968	0.197	0.688	0.376	1.599	1.115
Skewness	-0.375	-0.218	0.928	-0.511	-0.884	-0.195
Kurtosis	1.714	1.873	3.001	2.973	2.815	1.974
Jarque-Bera	3.510	2.310	5.457	1.659	5.011	1.907
Probability	0.172	0.315	0.065	0.436	0.081	0.385
Sum	263.370	357.882	101.736	103.658	155.1598	17.961
Sum Sq. Dev.	325.986	1.442	17.545	5.244	94.688	46.041
Observations	38	38	38	38	38	38

Source: E-views 12 Output (2024)

Table 2 indicates the descriptive statistics for all the five variables under study. The results show that Market Capitalization (lnMKP) exhibits a higher standard deviation compared to other variables, suggesting a higher degree of volatility. This aligns with the expectation that stock market capitalization can be quite volatile. Also, Inflation (lnINF) and Foreign Direct Investment (lnFDI) have relatively higher standard deviations compared to other variables, indicating more variability in these macroeconomic indicators.The skewness values indicate that most variables, except for lnINF, are negatively skewed, suggesting they are leaning toward the left of the distribution. Inflation, however, is positively skewed, indicating a tendency toward the right. The kurtosis values show that most variables have platykurtic distributions (values less than 3), meaning the data have lighter tails than a normal distribution. This suggests that extreme values are less common, which could be important for risk assessments.

Unit Root Tests

Unit root tests are conducted in the study to determine the order of integration of the variables, before performing various estimation techniques. This study includes the Augmented Dickey-Fuller (ADF) test, Phillips-Perron (PP) test, and KPSS. The ADF and PP tests assess whether a time series has a unit root, indicating non-stationarity. If the null hypothesis of a unit root is not rejected, the series is considered non-stationary, and differencing is applied. The first differencing involves subtracting each value from the previous one, and the unit root test is re-applied. If the differenced series becomes stationary, it is classified as I(1). If not, a second differencing may be applied, resulting in an I(2) classification. However, for models like ARDL or NARDL, further differencing is not recommended, as they require variables to be I(0) or I(1).

Table 3:Unit Root Test Results

	LEVEL			FIRST DIFFERENCE		
Variables	**ADF**	**PP**	**KPSS**	**ADF**	**PP**	**KPSS**
lnMKP	-1.362	-1.327	0.723	-4.783*	-4.804*	0.268*
lnIPO	-1.603	-1.603	0.700	-5.760*	-5.763*	0.155*
lnINF	-2.320	-3.037	0.143	-5.428*	-6.809*	0.395*
lnINT	-2.048	-2.272	0.355	-5.726*	-5.719*	0.138*
lnEXC	-2.349	-2.873	0.708	-5.850*	-5.556*	0.470*
lnFDI	-2.096	-1.832	0.405	-7.786*	7.816*	0.311*

Note: ** denotes significance at 1% level, ** 5% level of significance, ***10% level of significance*

Table 3 shows the unit root test results of the ADF, PP,and KPSS tests which suggest that all variables are non-stationary at the level but become stationary at the first difference, meaning they are integrated of order one

(I(1)). This is crucial for conducting further time series analysis and modeling. The fact that the KPSS test confirms these results lends robustness to the findings.

BDS (Brock, Dechert, and Scheinkman) test

It is a non-parametric statistical test used to detect non-linear dependence in a time series, specifically assessing whether the data follows a linear process or exhibits non-linear dynamics.

Table 4: BDS Test Statistics results

Series	D2	D3	D4	D5	D6
lnMKP	0.197*	0.331*	0.423*	0.497*	0.551*
lnIPO	0.170*	0.295*	0.376*	0.427*	0.462*
lnINF	0.084*	0.138*	0.180*	0.230*	0.257*
lnINT	0.106*	0.158*	0.171*	0.172*	0.176*
lnEXC	0.196*	0.330*	0.423*	0.488*	0.535*
lnFDI	0.058*	0.136*	0.187*	0.225*	0.233*

Note *, ** and *** represent levels of significance at 1%, 5% and 10%, respectively

The result of the BDS test in Table 4 confirms the presence of nonlinearity in the relationships among the variables, rejecting the null hypothesis at the 1% significance level. This reinforces the choice of using a non-linear ARDL model for the analysis, which is better suited to capturing complex dynamic relationships in the data.

NARDL Bounds Test

The NARDL bounds testing procedure is employed to determine the long-run cointegrating relationship amongst the variables as well as the coefficients of long-run and short-run. The results of bounds F-tests are presented inTable 5

Table 5: NARDL Bounds Test

	F-Stat	Level of Sig	Critical values I(O)	I(1)	Bound Decision
Asymmetric ARDL K=10	15.906	10%	1.83	2.94	Cointegration Exist
		5%	2.06*	3.24*	Cointegration Exist
		2.5%	2.28	3.5	Cointegration Exist
		1%	2.54	3.86	Cointegration Exist

Note: * indicates the rejected null hypothesis of no cointegration at 5%.

The NARDL Bounds Test in Table 5indicates the presence of cointegration among the variables. The F-statistic exceeds the critical values, rejecting the null hypothesis of no cointegration at the 5% significance level. This suggests that a long-term relationship exists between market capitalization and the macroeconomic variables under study.

Non-Linear Wald Test

The Non-Linear Wald Test is a statistical test used to examine the significance of non-linear restrictions in econometric models, especially when the model includes non-linear relationships between variables. This test is widely used in models that allow for non-linear dynamics or asymmetry, which allows for both positive and negative changes in explanatory variables to have different impacts on the dependent variable.

Table 6: Non-Linear Wald Test

Variables	Long run		Short run	
	F- stats	Prob	F-Stats	Prob
lnIPO	39.500	0.008*	5.205	0.022*
lnINF	29.499	0.012*	0.234	0.661
lnINT	45.990	0.006*	30.127	0.011*
lnEXC	21.273	0.019*	3.424	0.064
lnFDI	28.248	0.013*	12.051	0.040**

Note: * indicates significance level at five percent significance level, respectively

Non-linear Wald testshows that the null hypothesis of no asymmetric relationship between macroeconomic variables (lnIPO, lnINF, lnINT, lnEXC, lnFDI) and market capitalisation is rejected in the long run, as shown in Table 6. Thus, there is an indication of asymmetry in the connection between all the macroeconomic variables and lnMKP in the long run. In the short run, there is evidence of an asymmetric relationship between all the variables (lnIPO, lnINT, lnFDI) and Market capitalization, except Inflation(lnINF, lnEXC), which shows no evidence of an asymmetric relationship with Market capitalization in the short run.

Estimates from the Short-run and Long-run NARDL Model

Table 7 describes the short and long-run estimates of the Non-linear ARDL model, which measures the asymmetries relationship between the macroeconomic variables and the stock market. In the long run, a decrease in industrial production (lnIPO_NEG) leads to a significant increase in market capitalization. This means that a 1% decrease in industrial production leads to a significant increase in market capitalization by 19.81%. Whereas an increase in inflation (LNINFL_POS) causes a significant decrease in market capitalization.By 0.92%. This finding was supported by Phong et al. (2019), who found that both the positive and negative cumulative sum of changes of inflation exacerbate VNIndex. Nevertheless, inflation is normally deemed as "the enemy of the stock market". Also, the negative shock in inflation (lnINF_NEG) lead to leads to a significant increase in market capitalization. Thus, a reduction in the inflation rate lowers costs and improves profitability, making stocks more attractive and leading to higher market capitalization. However, an increase of 1% in Interest rate (lnINT_POS)causes market

capitalization to decrease by 2.16%. And decrease in interest rate (lnINT_NEG) has a significant negative impact on market capitalization.
The positive shock in the Exchange rate (lnEXC_POS) increases market capitalization in the long run. Likewise, a 1% decrease in exchange rates (LNEXCH_NEG) leads to a 33.4% increase in market capitalizationin the long run.This contradicts the findings of Okere et al. (2021),who revealthat exchange rate has an insignificant relationship with the stock market,and Phong et al. (2019) demonstrate that exchange rates have insignificant effects on the Vietnam stock market (VNIndex) in the long run.However, negative shock in Foreign Direct Investment (lnFDI_NEG) decreases market capitalization in the long run. This means that a 1% decrease in (lnFDI_NEG) causes an immediate decline in market capitalization by 1.163%. This designates that the Nigerian stock exchange is more sensitive to inflows of foreign investment, and the negative impact of FDI on market capitalization highlights the interdependence between foreign investment and market stability in Nigeria. The negative ECT (Error Corrections Term) coefficient necessitates that the speed of adjustment towards the state of long-run equilibrium was, however, moderate, as a shock in the system will return it to equilibrium at an average speed of 2.9%.

Table 7. NARDL Model Estimation result

Variables	Coefficients	Std Error	T-Statistics	Probability
Part A: Long Run Estimates				
lnIPO_POS	-1.533	1.051	-1.458	0.240
lnIPO_NEG	19.809	2.796	7.084	0.005***
lnINF_POS	-0.933	0.197	-4.725	0.018**
lnINF_NEG	1.182	0.268	4.405	0.021**
lnINT_POS	-2.164	0.449	-4.818	0.017**
lnINT_NEG	-8.0517	0.842	-9.559	0.002***
lnEXC_POS`	2.786	0.525	5.303	0.013**
lnEXC_NEG	33.496	6.381	5.249	0.013**
lnFDI_POS	-0.056	0.179	-0.315	0.773
lnFDI_NEG	-1.162	0.223	-5.207	0.013**
C	-2.907	0.713	4.073	0.026**
Part B: Short Run Estimates				
D(lnIPO_POS)	-0.357	1.499	-0.238	0.826
D(lnIPO_NEG)	2.900	1.678	1.728	0.182
D(lnINF_POS)	-0.791	0.231	-3.418	0.041**
D(lnINF_NEG)	0.359	0.127	2.812	0.067
D(lnINT_POS)	-2.554	0.342	-7.450	0.005***
D(lnINT_NEG)	-0.413	0.386	-1.068	0.363
D(lnEXC_POS)	1.148	0.316	3.635	0.035**
D(lnEXC_NEG)	0.726	4.890	0.148	0.891
D(lnFDI_POS)	-0.936	0.216	-4.328	0.022**
D(lnFDI_NEG)	-0.040	0.050	-0.799	0.482

*, ** and *** indicate significance at the 10% level, the 5% level, and the 1% level, respectively

In the short run, a positive shock to Inflation (lnINF_POS) decreases market capitalization. This means that a 1% increase in inflation will immediately cause a decrease in market capitalization by 0.79% in the short run. Thus, this finding is in line with the long-run effect, higher inflation erodes purchasing power and leads to increased uncertainty, causing investors to be wary, hence reducing market capitalization. Also, an increase in interest rate D(lnINT_POS) has a significant negative impact on market capitalization. This asserted that higher interest rates increase the cost of borrowing, reduce consumer spending, and decrease corporate profits, leading to lower stock prices. This effect is consistent with the traditional view that higher interest rates are detrimental to equity markets. Studies on Nigeria's financial markets, such as Alagidede and Panagiotidis (2010), have shown that higher interest rates negatively affect stock market performance. Furthermore, positive shockin Exchange rate D(lnEXC_POS) increases market capitalization in the short run. In the same vein, positive shock in Foreign Direct Investment D(lnFDI_POS) has a significant negative impact on market capitalization in the short run. This means that a 1% increase in foreign direct investment will cause an immediate decline in market capitalization by 0.93%. This finding contradicts Owuru and Oladele (2023), who find positive impacts of stock returns on FDI.

Table 8: Summary of Diagnostic Checks for NARDL Model

Diagnostic Tests	F-Stat	P-value	Remark
Serial Correlation LM Test	8.699	0.233	Absence of Serial Correlation
Heteroskedasticity test	0.747	0.720	Residuals are Homoscedastic
Jarque-Bera Normality Test	0.735	0.692	Normally Distributed

From results in Table 8 showthat diagnostic tests support the model's validity, showing no issues with serial correlation, heteroscedasticity, or normality in the residuals. This confirms that the NARDL model is well-specified and robust. In a nutshell, the findings provide a comprehensive understanding of the relationships between macroeconomic variables and market capitalization in Nigeria. The use of the NARDL model has helped capture both the short-run and long-run dynamics, revealing asymmetries in the impact of macroeconomic variables. While some results align with existing literature, like the negative impact of inflation and interest rates, others, such as the negative effect of FDI on market capitalization, offer new insights. These findings contribute to the understanding of the Nigerian stock

market's sensitivity to macroeconomic shocks and provide valuable implications for investors and policymakers.

CONCLUSION AND RECOMMENDATIONS

The study concludes that the long-run negative shock in Industrial Production positively influences market capitalization. However, in the short-run a positive shock in inflation and interest rates negatively affect market capitalization. However, the positive shock in exchange rates positively impacts market capitalization in the short run. In the other hand positive shock in foreign direct investment (D(lnFDI_POS)) is negative and has a significant impact on market capitalization in the short run.

Moreover, considering the significant role of the exchange rate in the study government should endeavor to stabilize the Nigerian naira through the Central Bank of Nigeria (CBN) by implementing policy and injection of liquidity into the forex market, which will halt the naira slide and restore stability in the forex market.To boostinvestors' confidence in the Nigeria stock marketSecurities and Exchange Commission (SEC) and the Nigerian Exchange Group (NGX) should enforce compliance with listing and trading rules, promote corporate governance, and swiftly address malpractices. Also, enhancing investor education through nationwide programs, integrating capital market studies into school curricula, and encouraging brokers to offer advisory services will significantly boost public awareness and participation in the Nigerian stock market. Finally, the Nigerian government should encourage investment in technology by providing tax incentives and grants to tech startups to scale their operations. In the same vain, investment in renewable energy will reduce dependence on oil, support industrial growth, and offer innovative financing tools for capital markets through encouragement of public-private partnerships (PPPs) to develop mini-grid and off-grid energy projects, especially in underserved regions and facilitate green bond issuance and encourage renewable energy firms to raise capital through the stock market, this will serves a major contributor to GDP and a major driver of stock market in the future.

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