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EMPIRICAL EVALUATION OF OIL PRICE VOLATILITY AND STOCK MARKET RETURNS IN NIGERIA

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Abstract: The study is on empirical evaluation of the impact of oil prices volatility on stock market returns in Nigeria from 1986 to 2021. With the understanding that energy runs like a bloodstream of any business of which oil is a major source, it becomes imperative to explore the incessant oil price fluctuations and its effects on critical indicators of the economy like stock market performance. The objectives include to examine the patterns of oil price volatility and stock market returns in Nigeria, analyse the influence of oil price fluctuations on Nigeria's economic growth, and investigate the causal relationship between oil price volatility and the stock market returns in Nigeria. Arbitrage Pricing Theory (APT) was employed as the framework while the methodology adopted the all-share indices (ASI) as the dependent variable, then, oil prices (OPRICE), exchange rate (EXCH), inflation rate (INFL), gross domestic growth rate (GDPGR), and interest rate (INT) as explanatory variables. Secondary data sourced from UNCTAD, etc. were analysed with aid of EVIEWS 2021. The Generalised Autoregressive Conditional Heteroscedasticity (GARCH) and Granger causality were the estimation techniques used. The study used unit root test to check the stationarity of the variables, the ARDL bound test to check for long-term relationships between the variables, and the ARDL model to estimate both short- and long-term relationships between the variables. A normality test revealed that the study's variables are all typical. Breuseeh-Gdfrey serial correlation revealed no association between the study's variables. The heteroscedasticity test showed there was no outlier's effect on the output of the result. It was found that inflation and exchange rate volatility are positive and statistically significant; inflation and interest rate are equally positive related to private consumption during the period under investigation. It found out inflation, oil price, exchange rate, and real gross domestic product have positive effect on stock market performance in Nigeria. The work concludes oil price is a major determinant of economic growth in Nigeria. It was recommended that all brokerage firms and investment advisors need to conduct periodic research on macroeconomic environment and advise their clients accordingly on the best counters to invest in owing to the various influences by macroeconomic environment on the stock market performance.

Keywords: Oil, Prices, Volatility, Stock, Market, Returns

INTRODUCTION

1.1 Background of the study

Oil plays a significant role in the global economy, hence there has been a lot of research done to understand the financial and economic effects of fluctuations in oil prices. There is controversy about the relationship between the oil price and the stock market returns, making it an unpredictable factor in economic growth (Ndlovu, 2019). Oil is a major source of energy globally and a crucial element of Nigeria's economy, significantly influencing its economic and political landscape. Although Nigeria's oil industry dates to the early 20th century, it was not until after the Nigerian Civil War (1967-1970) that oil began to dominate the economic sphere. The discovery of crude oil has had both positive and negative impacts on Nigeria's economy. The oil sector contributes approximately 90% of Nigeria's total revenue. It generates employment opportunities, boosts foreign exchange reserves, and supplies energy to various industries and commerce. Nigeria joined the Organization of Petroleum Exporting Countries (OPEC) in 1971 and established the Nigerian National Petroleum Corporation (NNPC) in 1977, a state-controlled entity involved in both the upstream and downstream sectors (Blair, 1976), following the discovery of crude oil by Shell D'Arcy Petroleum, pioneer production commenced in 1958 from an oil field in Oloibiri, Eastern Niger Delta.

On the negative side, oil exploitation has led to significant environmental degradation in surrounding communities. This has caused a loss of livelihood and other economic and social challenges. Despite NNPC's efforts to maximize capacity and improve petroleum product distribution, inefficiencies persist, leading to inconsistent supply and allocation issues. Crude oil prices have experienced significant volatility over time. According to Olayungbo and Ojeyinka (2021), the first major global oil price shock occurred from 1973 to 1974, when prices surged from $3 to $12 per barrel due to the Arabian embargo. The second shock occurred between 1978 and 1979 during the Iranian Revolution, with prices rising from $12 to $18 per barrel. The third shock took place during the Iraq-Iran conflict (19801990), which saw oil prices increase from $28 to $40 per barrel. The 2008-2009 global financial crisis caused oil prices to plummet from $100 to $47 per barrel.

The Nigerian Stock Exchange (NSE), established in 1960 and renamed in 1977, is a critical institution in Nigeria's capital market. It has branches in major cities, with its head office in Lagos and another office in Abuja (Akigbo, 1996). The NSE opened in 1961 with 19 listed equities. Today, it lists 328 securities with a total market value of approximately N28.26 trillion as of January 2020 (Akigbo, 1996). The NSE and the Securities & Exchange Commission (SEC), which enforces the Investments & Securities Decree 1999, regulate transactions on the Exchange. The deregulation of Nigeria's capital market in 1993 and the repeal of foreign participation restrictions in 1995 allowed foreigners to engage as operators and investors. Since 1987, the NSE has been a part of the Reuters Electronic Contributor System, facilitating global distribution of stock market data, trade statistics, and company news.

The primary objectives of the NSE include developing a system for capital formation, offering efficient resource allocation, providing unique financing options, maintaining market discipline, and broadening share ownership (Akigbo, 1996). The influence of oil price volatility on the capital market is significant. Oil price fluctuations impact the stock market by reflecting the market's expectations of future profitability (Akigbo, 2014). The stock market absorbs the current and expected future impacts of oil price shocks, which are reflected in stock prices and returns. With oil production and exportation playing a crucial role in driving economic growth and development, the volatility of oil prices has been a subject of great importance in the country's

financial landscape (Wang et al, 2022). Over the period from 1990 to 2022, Nigeria experienced notable fluctuations in oil prices, which, in turn, had a profound impact on the performance of its stock market.

The effect of oil price volatility on the economy is complex and unsettled, with no consensus on the relationship between financial variables and oil prices. Researchers like Salisu and Oloko (2015), Babatunde et al. (2013), and Fowowe (2013) argue that there is a direct relationship between oil prices and stock market performance. This study aims to link these variables, examining the impact of oil price volatility on stock market returns using disaggregated data. The Nigerian Stock Exchange serves as a catalyst for mobilizing and utilizing private and public savings for productive uses (Akigbo, 1996). Fluctuations in oil prices can pose threats to the stock market, given the oil industry's critical role in providing foreign exchange and total revenue for Nigeria's socio-political and economic wellbeing.

1.2 Statement of the Problem

Oil discovery in Nigeria has driven economic growth and infrastructural development but has also caused significant environmental harm, particularly water pollution that has devastated aquatic life and stripped local fishermen of their livelihood. As a mono-economy heavily reliant on oil, Nigeria's macroeconomic stability is highly sensitive to fluctuations in oil demand and supply. The 1970s oil boom led to the neglect of non-oil revenues, an expanding public sector, and poor financial discipline, exposing Nigeria to oil price volatility and financial instability. Despite the efforts by various governments to revive agriculture and diversify the economy which include initiatives like Operation Feed the Nation (OFN), Green Revolution, and National Economic Empowerment and Development Strategy (NEEDS), etc., the economy remains vulnerable. Nigeria's open economy is highly susceptible to crises, which significantly impact its volatile stock market, posing challenges for investors and financial analysts. The Nigerian stock market experiences high volatility due to risks and price shocks. Risk-averse investors often avoid the market due to the uncertainty and volatility in expected returns (Ashamu et al., 2017). High volatility increases unfavourable market premiums, and investors demand higher returns on investments (Atoi, 2014). Oil price fluctuations induce large variations in stock market returns, making oil prices a significant concern for scholars. Most research focuses on developed economies, with limited studies on developing economies like Nigeria, despite its significant stock exchange.

1.3 Objectives of the Study

The broad objective of this research study is to examine the causality between oil price volatility and stock market returns. To achieve the broad objectives, it is pertinent to streamline the specific objectives which are to: i) Determine effect of oil price fluctuation on the economic growth in Nigeria. ii) Establish the nexus trend between oil price volatility and stock market in Nigeria. iii) Determine the impact of oil price volatility on stock market returns in Nigeria.

1.4 Research Questions

In line with the research objectives, the study aims to provide the answers to the following research questions. i.

i. Does oil price volatility have an impact on stock market returns?

ii. What is the effect of oil price fluctuation on the economic growth in Nigeria?

iii.Is there any nexus between oil price fluctuations and economic growth in Nigeria?

1.5 Research Hypothesis

To carry out this study, the following hypothesis must be tested:

H_{01}. Oil price volatility has no significant impact on stock market returns.

H_{02}. There is no significant effect of oil price volatility on stock market returns.

H_{03}. There is no significant nexus of oil price fluctuation and economic growth.

1.6 Scope of the Study

This research study focused on oil price volatility effect and stock market returns in Nigeria from 1986-2021. The study starts in 1986, a year prior to 1987 because there was a world stock market crash called 'black Monday' with worldwide losses of about US$1.71trillion and this significantly affected the world's market, and it ends with 2021 because of the difficulty in finding accurate and verified data. The study will not cover other African countries who may be facing similar challenges. But the findings of this study can be used as a guide.

LITERATURE REVIEW

2.1 Conceptual Review

Oil price changes affect numerous economic variables such as interest rates, investment decisions, economic growth, investors' confidence etc. these variables have been documented to affect both the stock market and exchange rate market (Hamilton, 1983; Amano & Van Norden, 1995). Again, oil prices are expressed in US dollars in the international market; hence, the dollar exchange rate may affect the price perceived by oil producing nations (Roubaud & Arouri, 2018). This study reviews the connection between these variables (Oil price, exchange rate and stock market returns) using a bivariate and multivariate approach. To some economists, there is a positive correlation between crude oil price and stock market performance (Cong, Weiy, Jiao & Fan, 2008; Boyer & Filion, 2007; Sadorsky, 2001).

According to Babatunde (2013) while the initial effects were contained due to low levels of exposure to complex financial instruments, the large swings in oil prices, combined with the resulting depreciation of the naira and drop in investor confidence led to growing pressures about the oil price volatility which was supported with exposure of oil subsidy frauds by importers of fuel products, who had a high foreign currency obligations owing to the high fuel prices in 2008, the subsequent falling oil prices and devaluations of naira added to the shocks experienced in the Nigerian stock market.

2.1.1 Oil Price and Exchange Rate

Theories generally posit that crude oil prices and exchange rates are positively correlated in oil-exporting countries, with higher crude oil prices leading to currency appreciation and vice versa. Crude oil price shocks affect exchange rates through two primary channels: the terms of trade channel and the wealth effect channel. The terms of trade channel suggests that a negative shock to the terms of trade drives down the price of non-tradable goods in the domestic economy, causing the real exchange rate in oil-exporting economies to depreciate and vice versa. The wealth effect channel indicates that a drop in crude oil prices results in losses for oil exporters but gains for oil importers, shifting current account balances and leading to portfolio reallocations between oil trading companies (Akigbo, 2014).

A negative oil price shock transfers wealth from oil exporters to oil importers, or higher oil prices lead to higher production costs and inflation, which have contractionary effects on the economy and trade balances. To restore or improve trade balances, the exchange rate must adjust. The impact of oil prices on exchange rates can vary between advanced and emerging market economies. Hamilton (2009) notes that oil price shocks respond directly to economic or geopolitical events and economic downturns (demand-side shocks). Supply-side shocks are driven by disruptions in oil production, such as the Iranian invasion of the U.S. embassy in 1978, the Iraq invasion of

Kuwait in 1980, the Arab Spring in 2000, and the Iranian attack on Saudi oil fields in 2019. These events disrupted oil production without corresponding reductions in demand, driving up prices. Demand-side shocks, on the other hand, are influenced by global economic movements. For example, the economic growth in China and other developing economies significantly increased oil demand without a matching supply increase, leading to high oil prices. Conversely, during the 2007-2009 global financial crisis, a dramatic reduction in oil demand led to a collapse in oil prices.

Kilian (2009) identifies three types of oil price shocks: supply-side shocks, aggregate demand shocks, and precautionary demand shocks. Geopolitical unrest often triggers precautionary demand shocks, causing uncertainty about future oil availability and driving up prices. For instance, geopolitical events lead economic agents to expect shortages in oil supply, which results in high oil prices. According to Salisu and Oloko (2015), crude oil price shocks affect exchange rates through the terms of trade and wealth effect channels. A negative oil price shock transforms wealth from oil exporters to importers, leading to higher production costs and inflation, which adversely affects trade balances. To improve trade balance, the exchange rate must adjust. The relationship between exchange rates and oil prices can differ between advanced and emerging market economies.

2.1.2 Exchange Rate and Stock Market Returns

Aruori (2011) emphasized that the relationship between the movement of exchange rate and stock returns could be explained with several perspectives. The flow-oriented model of exchange rate behaviour posits that depreciation in the exchange rate for instance would lead to improved trade balance as exports become cheaper. This would result in upward shift in aggregate demand (AD), hence overall expansion in real gross domestic product with the attendant positive effect on stock market performance. The stock-oriented model, on the other hand, emphasizes the role of capital accounts in the determination of a country's exchange rate. In this theory, the exchange rate equates the demand and supply of financial assets (stock and bonds). Thus, expectation of future exchange rates affects the current price of financial markets (Aruori. 2011). From another perspective Brown & Yucel, (2002) aligning with the arbitrage price theory argued that a rise in real interest rate will reduce the present value (PV) of the future cash flow which consequently make stock returns to fall. As the real interest rate rises, capital flows increase, causing the domestic currency to appreciate and fall in stock returns, they argued.

2.1.3 Oil Price and Stock Price

Oil price may impact stock performance through several channels such as uncertainty, fiscal, output and stock variation channels (Degiannakis, Filis & Arora, 2018). Oil price is susceptible to high volatility due to supply shocks and therefore, the risk of uncertainties occasioned by oil price volatility usually affect investors' portfolio, particularly, portfolio managers seeking to make optimal portfolio allocations (Arouri, 2011); cited in Salisu and Oloko (2015). Also, Uncertainty channels views explain that rising crude oil prices heightens uncertainty in the real economy (firms and households) due to its effect on inflation, consumption, and output (Brown & Yucel, 2002). For a firm, it tends to reduce the demand for irreversible investment and consequently, expected cash flow declines. On the household, increased uncertainty, resulting from higher cost of crude oil also increases the households' ability to save rather than consume. (Brown & Yucel, 2002).

Given the above, the value of postponing investment and consumption decisions rises and hence, economic growth and stock market returns stifles. Oil prices also impact stock performance through a more direct channel—that is, the stock variation channel. The nexus suggests that stock returns are impacted by factors that can alter expected cash flows and discount rates. However, this depends on whether the firm is an oil user or oil producer.

Given that oil is a major production factor, any increase in oil price will result in an increased production cost (assuming a case of absence of substitution effect between production factors). This leads to reduced profit levels and future cash flows. For the oil producer, increase in crude oil prices results in increased profit margins and thus, increased future cash flows (Basher & Sadorsky, 2006). Furthermore, higher interest rate response by the monetary authority to an inflationary pressure from the rising oil prices also affect the discount rate; an important factor in stock price formulation (Basher, Haug & Sardosky, 2012).

2.2 Theoretical Review

Theory-based framework from various ideas have been used in the past to support analyses of the impact of oil price volatility on stock markets. As a result, the theoretical foundation for this study comes from the Arbitrage Pricing Theory (APT).

2.2.1 Arbitrage Pricing Theory (APT)

The Arbitrage Pricing Theory is a multi-factor asset pricing model which assumes that an asset's returns may be forecasted using a linear relationship between the assets expected return and several other macroeconomic variables that influence risk. Stephen Ross, an American economist, created this idea in 1976. The APT provides a multi-factor pricing model for securitized assets to analysts and investors. The APT provides analysts and investors with a multi-factor pricing model for securities that is based on the link between the projected return of a financial asset and its risk characteristics. The goal of APT is to determine the fair market price of a security that has been temporarily mispriced. APT is a more flexible and complicated alternative to the Capital Asset Pricing Model (CAPM). The theory allows investors and analysts to tailor their studies to their specific needs. Arbitrage is the practice of the simultaneous purchase and sale of an asset on different exchanges, taking advantage of slight pricing discrepancies to lock in a risk-free profit for the trade. APT provides traders with a model for calculating an asset's theoretical fair market value. Having determined that value, traders then look for slight deviations from the fair market price and trade accordingly. For example, if the APT pricing model determines the fair market value of a company's stock to be ₦50, but the market price drops to ₦45, the trader will buy the shares in the idea that additional market price action will rapidly "correct" the market price back to ₦50/share. Thus, this study uses the APT to link crude oil prices and other selected macroeconomic variables (such as the exchange rate, inflation rate, and interest rate) to stock market performance in Nigeria from 1981 to 2019. Its theoretical underpinning is derived from the APT.

2.2.2 Capital Asset Pricing Model (CAPM)

The capital asset pricing model was pioneered by notable authors including Sharpe (1964), Umer (1965), Mossin (1960). The CAPM is a single factor model, quantifies the expected rates of return of an asset with level of market systematic risk. The CAPM has variously been lead among others by Chen (2003) and Kim et al. (a) 2017. It is a finance model that establishes a linear relationship between the required return on an investment and risk. CAPM evolved to measure this systematic risk. It is widely used throughout finance for pricing risky securities and generating expected returns for assets, given the risk of those asset and cost of capital. Algebraically, CAPM is presented as

$$R_i = R_f + \beta_i(R_m - R_f) \quad (2.1)$$

$Where: m = market\ portfolio,\ R_m = Expected\ return\ on\ portfolio,\ R_f = Risk\ free\ return$

$R_i = Return\ on\ Asset,$

$$\beta_i = \frac{COV(R_i, R_m)}{\delta_m^2} \quad (2.2)$$

Equation 2.2 is called the beta of the asset (i) and (m) is the variance of the market portfolio. For any portfolio < = (<1---<n) of ranky assets, its beta can be constructed as a weighted average of individual asset betas as follows:

$$E(R_i) = R_f + \beta_\lambda(E(R_m) - R_f \quad 2.3$$

$Where: E(R_i) = capital\ asset\ expected\ return,\ R_f = risk - free\ rate\ of\ interest$

$\beta_\lambda = sensitivity,\ E(R_m) = expected\ return\ of\ the\ market$

$$\beta_\lambda = \sum_{i=1}^{\rho} \alpha_i \beta_i \quad 2.4$$

The Beta value indicates a measure of risk for individual assets/portfolio. It measures the non-diversifiable or transferable part of risk known as systematic risk. According to this model, the expected return of an asset depends on its stand-alone risk. However, the CAPM has unrealistic assumptions for example, the perfect competitive market environment does not hold as forces of demand and supply often guide investors decision making as they affect prices of assets. Also, tax liabilities affect the level of investment and the type of asset to invest in. The model also assumes that at the risk-free rate, borrowing will be unlimited. However, individual investors cannot borrow at the same rate with government and its agencies.

2.2.3 The Discount Cash Flow Model (DCF)

The relationship between oil price shocks and stock market return can also be theoretically explored or viewed through the discounted cash flow model (equity pricing model) developed by Huang et al (1996). The model has been adopted in several literature (Sek, 2015; Basher, 2014; Zakanya and Abdala, 2013; Abeng, 2017; Degiannakis, 2017). According to this model, macroeconomic variables including commodity prices can exert a significant effect on stock returns of firms. The price of equity at a given point in time is equal to the expected present value of the discounted future cash flows as follows:

$$PV = \sum_{t=1}^{n} \frac{E(C_t)}{(1+r)^t} \quad 2.5$$

Where: P = Stock price, C = cash flow, r = Discount rate (interest rate), E (.) = expectation operator. The realized stock returns R can be expressed approximately as $R = \frac{d(\rho)}{P}$ 2.6

Where d(.) is the difference operator. Stock returns, R, are determined by the systematic movements in expected cash flows and discount rates, which can be affected by changes in oil prices in several ways. For cash flows, it is assumed that oil, together with labour, capital and other inputs, represents import components in the production friction of most goods and services. Therefore, changes in the prices of these inputs including oil, affect cash flows of firms. i.e. rising oil prices increases production costs leading to dampened cash flows which ultimately translates to a reduction in stock prices. It however depends on whether a particular firm is a net producer or net consumer of oil. The discounted rate can also be affected by oil price changes. According to Huang et al (1996), expected discount rate consists of two components; expected inflation and expected real interest rate. Higher oil prices will lead to a negative effect the trade balance in oil importing economics. Imposing upward pressure on domestic prices (inflation) which leads to higher discount rate culminating in lower stock returns. As an important resource in the economy, oil prices can affect real interest rates. High oil price is expected to raise the rates of real interest rates which may likely lead to increases in stock returns.

2.3 Empirical Review

In a study of 22 emerging economies (Nigeria not included), Maghyereh and Al-Kandari (2004) findings implied that oil shocks have no significant impact on stock index returns in emerging economies. Agren (2006) argued that the stock market's own shocks, which are related to other factors of uncertainty than the oil price, are more prominent in explaining stock price movements.

Similarly, in Ghana, findings by Adjasi (2009) showed that higher volatility in Cocoa prices and interest rates increased volatility of the stock prices, whilst higher volatility in gold prices, oil prices, and money supply reduced volatility of stock prices. Other studies, however, found the existence of a weak relationship among the variables. For instance, Sujit and Kumar (2011) evaluated the dynamic relationship among gold price, oil price, exchange rate and stock market returns. The authors used daily data from January 2, 1998, to June 5, 2011, constituting 3,485 observations and adopted the vector autoregressive and cointegration techniques. The results showed that exchange rate was highly affected by changes in the other variables, while stock market plays a minor role in affecting the exchange rate. The study suggested that there is weak long-term relationship among the variables. Also, Sahu, Bandopadhyay, and Mondal (2015) investigated the dynamic relationships between oil price, exchange rate and the Indian stock market from 1993 – 2013. Results from the Johansen's cointegration test and vector error correction model showed that although there is a long run cointegrating relationships between crude oil price and Indian stock indices, no sufficient evidence existed to conclude that the direction of the relationship in the long run was from oil price to the Sensex. However, the Granger causality test showed that the volatility of stock prices in India granger caused the movement in oil price and exchange rate in the short-run. The study further showed that the observed relationship between oil price and stock indices was not because of exchange rate fluctuations, because the change in exchange rate had no significant impact on oil prices or stock prices in India during the study period.

In Nigeria, attempts have also been made to examine the relationship among oil price, exchange rate and stock market returns. The findings from the study by Fowowe (2013) on the dynamic relationship between oil prices and stock market returns in Nigeria, using the GARCH-Jump model showed the existence of a negative, but insignificant effect of oil prices on stock returns in Nigeria.

Another study was conducted by Mechri, Ben Hamad, De Peretti and Chart (2018) on the impact of exchange rate volatilities on stock markets dynamics in Tunisia and Turkey, using the GARCH estimation method. The variables used were stock market price returns, exchange rates, inflation rates, interest rates, gold prices and petrol prices index. The results indicated that exchange rate volatility has a significant effect on stock market fluctuations. Alzyoud, Wang and Basso (2018) also examined the dynamics of Canadian oil price and its Impact on Exchange Rate and Stock Market performance. The authors adopted the cointegration technique and used stock index, exchange rate, and crude oil price as variables in the study. The findings indicated that oil price, exchange rate, and their variations had a positive and significant impact on the Canadian stock market returns.

2.3.1 Trend Analysis in Oil Price and Stock Performance.

Before 2012, the movement of crude oil prices and the All-Share Index (ASI) in Nigeria was inconsistent. As crude oil prices increased, stock behaviour was often bearish, suggesting other factors influenced stock prices. From March 2012 to May 2014, the stock market was mostly bullish, with capital market indicators pushing positively except for a decline from June to September 2013 due to concerns over the US Federal Reserve's adjustment of its quantitative easing policy. This period saw higher and stable crude oil prices and increased

economic activities. However, during the recession in Nigeria from September 2014 to April 2017, both the ASI and crude oil prices declined significantly (Iyoha, 2017).

Despite the recession, the Nigerian stock market was listed among the best performing globally. The NSE ASI increased by 47.19% and crossed the 38,000 points mark by the end of the year, driven by strong corporate earnings from blue-chip companies, increased capital inflow, and portfolio investments (Central Bank of Nigeria Economic and Financial Review, December 2020). In 2014, the market started positively, but activities turned bearish due to foreign investors' withdrawal, currency risks, and the recovery of developed economies. The bearish sentiment worsened in the second half of 2014 due to the global economic recession, which saw crude oil prices crash from $110 to $40 per barrel. Attacks on oil installations by militants in the Niger Delta region led to a loss of about one million barrels of crude oil exports per day, further impacting the stock market. Other macroeconomic factors, such as declining foreign reserves and weak corporate earnings, contributed to the market's decline. Investors adopted a 'flight to quality' strategy amidst the uncertainty (Salisu & Oloko, 2015). In 2015, the bearish trend continued, with the NSE ASI falling by 17.4% to 28,642 points by year-end. The market's poor performance was due to political risk, currency volatility, and uncertainty in global crude oil prices. This bearish trend persisted into 2016, with the stock market recording a 16.05% loss in January. However, in May 2016, the market saw a slight improvement with a 0.38% gain, the highest monthly gain that year. By December 19, 2016, the market recorded a 5.33% gain, but the NSE ASI remained negative on most trading days, ending the year with an 18.0% year-to-date loss. In 2017, the market gradually recovered from the economic recession, with the NSE ASI index increasing by 42.0%, making it the third best-performing market globally. This improvement was partly due to the Central Bank's monetary policies that increased liquidity in the foreign exchange market.

In 2018, as the Nigerian economy continued its recovery, the NSE equities market started strongly, with the ASI reaching a ten-year peak of 45,092.83 in January. However, the market began to decline in the second quarter, with the ASI falling by 17.81% to 31,430.50 points by year-end. Macroeconomic factors, including political risks, oil price volatility, and rising global yields, contributed to the bearish sentiment. In the first half of 2019, market sentiments were driven by uncertainty in oil prices and the 2019 general elections. Post-election stability dampened the volatility in the equities market. With the approval and implementation of the 2019 budget, positive impacts on company earnings and consumer spending were expected to boost market activity in the second half of 2019. These periods also experienced higher and stable crude oil prices and increased economic activities (Central Bank of Nigeria Economic and Financial Review, December 2020).

For the purpose, of this study, a simple stock return series is specified as a function of exchange rate and crude oil price: $ASI = f(ER, P)$ where ER is the Bureau-de-Change exchange rate and P is the crude oil price. To determine if volatility in these series matters more than the crude oil price and exchange rate return series themselves, a variation of this equation is specified such that All-Share Index is a function of volatilities in crude oil price and exchange rate: $ASI = g(s)$.

THEORITICAL FRAMEWORK AND METHODOLOGY

3.1 Theoretical Framework

3.1.1 Arbitrage Pricing Theory (APT)

The study adopted arbitrage pricing theory (APT) as the theoretical framework. This was developed by Stephen Ross in 1976. The arbitrage pricing theory is a general theory of asset pricing that holds that the expected returns

of a financial asset can be modelled as a linear function of various macroeconomic factors or theoretical market indices, where the sensitivity to change in each factor is represented by a factor specific beta coefficient (Alexander, Sharpe, and Bailey, 2001). The model's derived rate of return will then be used to price the financial asset correctly; this asset price should be equal to the expected end of period return discounted at the rate implied by the model. In an event that the prices diverge then arbitrage actions should bring the price back to its correct level. APT assumes that asset returns are related to an unknown number of macroeconomic factors (Alexander, Sharpe, and Bailey, 2001). The model attributes the expected return of a capital asset multiple risk factors, and in the process measures the risk premiums associated with each of these risk factors. APT addresses the question of whether the risk associated with the macroeconomic variable is reflected in the expected market returns. According to (Chen, Roll, & Ross, 1986), economic variables have a systematic consequence on stock market returns because economic forces affect discount rates, the ability of the firm to generate cash and future dividend payments. The core idea of APT is that only a small number of systematic influences affect the long-term average returns of securities.

3.2 Method of Analyses

GARCH model was employed measure the volatility in exchange rate, oil prices, inflation and interest rate using the GARCH as developed by Robert (1982). The approach to estimate volatility in financial markets; we can think of heteroskedasticity as time-varying variance (i.e., volatility). Conditional implies a dependence on the observations of the immediate past, and autoregressive describes a feedback mechanism that incorporates past observations into the present. GARCH then is a mechanism that includes past variances in the explanation of future variances. More specifically, GARCH is a time series modelling technique that uses past variances and past variance forecasts to forecast future variances. The principal method employed to analyse the time series behaviour of the data involves unit root test, co-integration test, normality test, heteroskedasticity, and the estimation of an error correction model (ECM). Specifically, we employ unit root test to detect the order of integration of the variables using the Dickey Fuller and Augmented Dickey Fuller (ADF) Test by dickey And fuller (1979) The unit root test is necessary because research has shown that non-stationary data leads to spurious regression. We employ Co- integration test to examine whether there is long-run co-movement in the variable using the Engle and granger two stage technique. The ECM measures the short run dynamic adjustments towards long run equilibrium. We commence by testing for unit root in the data. The first step is to determine the order of integration of the variables before testing for co-integration.

3.2.1 Model Specification

To examine the impact of macroeconomic variables on stock return in Nigeria, a model anchored on the theory as used by Ray, (2012) is adapted as follows.

$$ASI = f(CPI, IP, MS, EXCH) \quad 3.1$$

Where ASI represents stock market performance, CPI represents consumer price index, IP represents industrial production, MS represents money supply and EXCH represents exchange rate while f represents the functional relationship. However, the model is modified to INTR, INFL, OILP, and INV as in equation 3.2.

$$ASI = f(EXCH, INTR, INFL, OILP, RGDP) \quad 3.2$$

The reason for the inclusion of oil price as one of the explanatory variables and variable of interest is that. It is said that increase in oil price led to an appreciation of the naira as more foreign currencies are generated through

improved oil revenue as further shown by growth in value of oil export as a percentage of total export. However, contrary to expectation Nigeria, an oil exporting country still experiences the golden rule- "oil up, stock down" which should be applicable to oil importing countries. This may be an indication the country's failure to translate its huge foreign exchange earnings from oil into an improved industrial sector productivity. It also an indirect manifestation of the deleterious effect of huge annual foreign exchange expenditure on importation of petrol/diesel for energy supply bothering on the inability to locally refine a substantial part of its crude oil and the apparent collapse of power supply by the Power Holding Company of Nigeria (PHCN) for domestic and industrial use. It is recommended that the most viable solution towards improved economic performance lies in refining the Nigerian crude oil locally so that the huge benefits of the naturally endowed oil can be fully realized rather than developing the economies of other nations.

Also, the inclusion of investment as control variable, it is simply because there is a close relation between the stock market and investment. That is fluctuations in the stock market can affect investment of firms. The relationship between stock market prices and firms' investment in physical capital is captured by the "q theory of investment", developed by James Tobin (1969). That is, an increase in the prospective return on capital or a decrease in the market's discount rate raises q and thereby increases investment. With a simple form of adjustment cost for changing the capital stock, the optimal amount of current investment depends only on the current value of q.

Definition of Variables

The variables used in the model are defined below:

i. **Dependent Variable** ASI = All Shares index

ii. **Independent Variables**: EXCH = Exchange Rate, INTR = Interest Rate, INFL = Inflation, OILP = Oil Price, RGDP = Real GDP

Expressing equation 3.2 in linear form yields equation 3.3.

$$ASI = \beta_0 + \beta_1(EXCH)_1 + \beta_2(INTR)_2 + \beta_3(INFL)_3 + \beta_4(OILP)_4 + \beta_5(RGDP)_5 \quad 3.3$$

Where β_0 = constant, B_1 to β_5 represents various slope coefficients while EXCH, INTR, INFL, OILP and RGDP remain as defined above. Putting the variables in the sane scale of measurement and adding the stochastic disturbance term yields equation 3.4.

$$LASI = \beta_0 + \beta_1 L(EXCH)_1 + \beta_2 L(INTR)_2 + \beta_3 L(INFL)_3 + \beta_4 L(OILP)_4 + \beta_5 L(RGDP)_5 + \mu \quad 3.4$$

Where, L represent the natural log of the variables. This is necessary to avoid large fluctuation in the variables. All other variables remain as defined above. On a-priori B_1, β_2, β_3, $\beta_5 > 0$ and $B_4 >$ or < 0 Exchange rates supposed to have positive relationship with stock market: due to globalization, businesses are affected either directly or indirectly by international trade activities.

3.2.2 Data Analysis

Research has shown that most time series data poses unit root i.e. they are not stationary. Thus, research carried out with them is likely to be spurious or non-sense. A test of stationarity in time series data is very important because since the 1970s, macroeconomic aggregates in Nigeria have been fluctuating greatly. The consequence of using non-stationarity is so grave that well established models are breaking down as they continuously fail to predict outcomes. The problem according to Granger and Newbold, (1974) is that regression results on non-

stationarity series may, most times be "spurious or nonsensical" to the extent that a relationship would be accepted as existing between two variables as measured by their co-efficient of determination when in fact no relationships exist. Inference from non — stationary time series apart from being spurious, violate the classical econometric assumption, thus making the result unreliable for policy making. Also, pre-estimation test such as unit root tests and cointegration test were carried out while, post estimation tests such as stability test, normality test, auto correlation test etc. were also carried out to establish the consistency and reliability of the models adopted in this study.

- **Unit Root/Stationarity Test**

Adopting the Engel — Granger (1987) and Engel and Yule, (1987), we proceed to modelling a framework by first testing for stationarity to provide a more definitive answer to the non-stationarity, in each time series, the Dickey – Fuller (1979) regression is estimated as follows for unit root.

$$\Delta Y_t = \lambda Y_{t-1} + V_t \qquad 3.5$$

If λ equals 0, Y_t is non-stationary, as a result Y_t and X_t are not co-integrated. In order words, if λ is significantly different from 0, $Y_t$and X_t are found integrated individually. Given the inherent weakness of the unit root to distinguish between null and the alternative hypotheses, it is desirable that the augmented Dickey — Fuller (ADF), 1981 test be applied. To be co-integrated; both Y_t and X_t must have the same order of integration (Engel and Granger, 1987, and Granger, 1986). The ADF regression is specified as follows:

$$\Delta Y_t = \alpha + \beta_{1t} + \delta X_{t-1} + \sum_{t=1}^{m} \beta_i \Delta X_{t-i} + \varepsilon_t \qquad 3.6$$

Δ is the first difference operator, _____ is the new random error term, M is the optimum number of lags needed to obtain "white noise'. This is approximated when the DW values approaches 2.0 numerically. The null hypothesis of non-stationarity is rejected if the estimated ADF statistic is found to be larger in absolute term or more negative than its critical values at 1 or 5 percent level of significance.

- **Concept of Co-integration**

Co-integration among the variables is used to determine the existence of a long run equilibrium relationship between the variables. The concept of co-integration (Granger, 1986, Mill 1990) creates the link between integrated processes and the concept of steady state equilibrium. The idea behind co-integration is that 'although two different series may not themselves be stationary, some linear combination of them may be indeed stationary with the generalization to more than two series" (Komolafe, 1996). Economic variables are inherently non-stationary and thus, could meander without any tendency to return to equilibrium in the long run. Implicit in the co-integration theory is the fact that there exists a linear combination of these non-stationary variables that is stationary. The traditional approach to the modelling of short-run disequilibrium is the partial adjustment method. However, an extension of this in the co-integration technique is the Error correction mechanism (ECM) (Granger and Newbold, 1977). The original co-integration relationship is specified as follows:

$$Y_t = \beta_0 + \beta_1 X_t + \mu_t \qquad 3.7$$

Analysing the long-run behaviour of Y_t implies investigating co-integrating relationship in (1). If μ_t is stationary then, the 1(1) variables in X_t may be thought of as capturing the long run component of Y_t while ε_t captures the short run or temporary movements.

- **Error correction technique**

If the Y_t and X_t are found to be co-integrated, then there must exist an associated Error Correction Model (ECM), according to Engel and Granger (1987). The usual ECM may take the following form:

$$\Delta Y_t = \alpha_0 + \beta_{1t} \sum_{t=1}^{m} \Delta X_{t-1} + \delta_i \sum_{t=1}^{m} \Delta Y_{t=1} + \gamma_t \varepsilon_{t-1} + \varphi \quad 3.8$$

Where, Δ denotes first difference operators, ε_{t-1} is the error correction term, m is the number of lags necessary to obtain "white noise" and φ_t is another random disturbance term. If /δ/ is significantly different from zero, then Y_t and X_t will have longer run relationship. The (ECM) error correction term (ε_{t-1}) depicts the extent of disequilibrium between Y_t and X_t. the ECM, reveals further that the change in Y_t not only depend on lagged changes in X_t but also on its own lagged changes. The estimate of the parameters of the ECM are generally consistent and efficient (Hendry and Richard, 1983). Inference about the long run Granger causality can be drawn from the ECM model. The presence of co-integration will indicate at least, unidirectional long run causality from ΔX_{t-1}, if statistically significant will indicate a short run causality from ΔX_{t-1} to ΔY_{t-1}. The statistically significant non-Zero co-efficient of ΔY_{t-1}will indicate feedback to ΔY_t from its own lagged values. It may be noted that even in the absence of co-integration, the error correction model may be estimated to detect if there is any short run granger causality.

3.2.3 Nature and Sources of Data

The data used in the study are collected from various publications of the Central Bank of Nigeria and (CBN), World Development Indicator (WDI), National Bureau of statistic (NBS). Specifically, the data used are time series data, which includes the exchange rate (EXCH), interest rate (INTR), inflation (INFL), oil price (OILP) and Real GDP(RGDP).

3.2.4 Criteria for Model Evaluation

To analyse the model, we employed the economic criteria which is used to measure the sign and size of the parameters in the model.

Statistical Criteria: This includes the T-statistic, F-statistic, and R^2

Co-efficient of determination (R^2)

Coefficient of determination also known as R square (R^2) or goodness of fit tells the proportion of the total variable in the dependent variable y that is explained by the regression line or the explanatory variables x. in a single / simple regression model, it is the square of the correlation coefficient in a simple regression model. The value of the R^2 lies between 0 and 1 i.e. $0 \leq R^2 \leq 1$ when the $R^2 = 0$, it means the explanatory variable do not explain the dependent variable and when the $R^2 = 1$, it means the model is best fit. If the R^2 is multiplied by 100, then it shows the percentage of total variation in y the dependent variable that is explained by variation / changes in x. the closer the R^2 is to one. The stronger is the explanatory power of the estimated regression line, and thus the closer are the observation to the line. If $R^2 = 0.56$ it means that 56% of total variation in y is explained by the regression line / changes in x and the other 44 remains unexplained by x.

Test of individual statistics of the slope coefficient (T. Test)

This tests the individual significance of the co-efficient, to do this, we test the null hypothesis that $b_i = 0$ against the alternative hypothesis that $b_i \neq 0$ in employing the t test, we compare the computed t-value with the value read from the student's t table at given level of significance, (α) and n-k degree of freedom/ if the absolute value of the computed t value is greater than the absolute value of the theoretical, t value, we reject the null hypothesis (H_0) at the given level of significance i.e. if $t_{cal} > t_{tab}$, reject H_0; Accept H_1 $t_{cal} < t_{tab}$, Accept H_0, reject H_1. Alternatively, the rule of thumb can be used, which state that if the t_{cal} is greater than 2 at the 5 percent level of significance, we reject the null hypothesis and conclude that the parameter is statistically significant in explaining the dependent variables.

The F Statistic (Test for overall significance of the model)

This is used to test for the statistical significance of the entire slope coefficient jointly on the dependent variable using a level of significance. The F statistic is done by comparing the F_{cal} with the F tabulated. When the F_{cal} is greater than the F_{tab} we reject the null hypothesis and conclude that the entire variable put together is statistically significant in explaining the dependent variable.

Econometric Criteria

This includes the test for serial correlation.

D.W Statistic Durbin – Watson Test

It is the most popular test for serial/autocorrelation. The Durbin-Watson statistic is used to test the presence of serial correlation in a model, to determine whether there is serial correlation in the model, we compare the Durbin Watson value from the model to the Durbin-Watson critical value at 5%. If the value of Durbin Watson lies between the upper limit and four minus upper limits (i.e. **u<dw<4-du),** We reject the null hypothesis at the 5 percent level of significance and conclude that there is no autocorrelation (positive or negative autocorrelation) in the model.

Table 3.2.5: Definitions and Measurement of Variables

S/N	Variable	Symbol	Measurement
1	All Shares Index	ASI	Obtained by multiplying the price/share by the no. of shares outstanding
2	Exchange Rate	EXCH	The price of one country's currency expressed in another country currency
3	Inflation Rate	INFL	The rate of inflation reported in CBN Statistical Bulletin
4	Interest Rate	INTR	An accrued amount that includes principal plus interest
5	Real GDP	RGDP	Real Gross Domestic product
6	Oil Prices	OILP	The price of bulk oil, usually quoted in US dollars per barrel

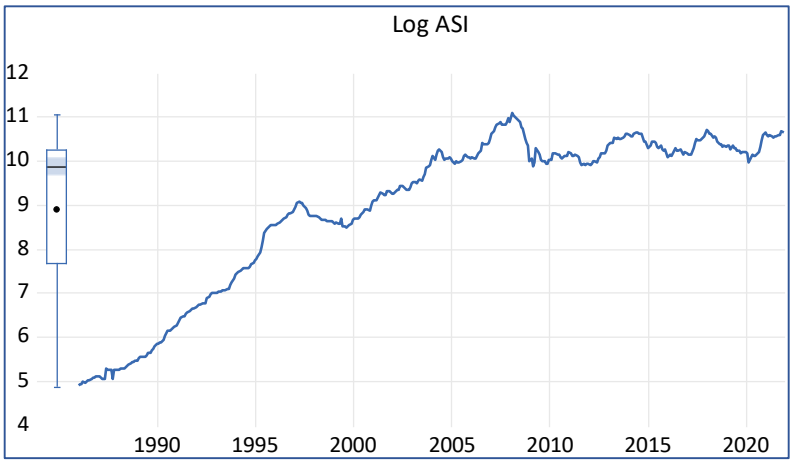
PRESENTATION AND ANALYSIS OF RESULTS

4.1 Presentation of Results

4.1.1 Trend Analysis

In this section, graphical illustrations of the various variables that were used within the time to see their direction were conducted and this helps to show whether they are increasing or not and see their cyclical pattern. Thus, a graphical sketch of each of the variable over time was made as shown in figures 4.1 to 4.6.

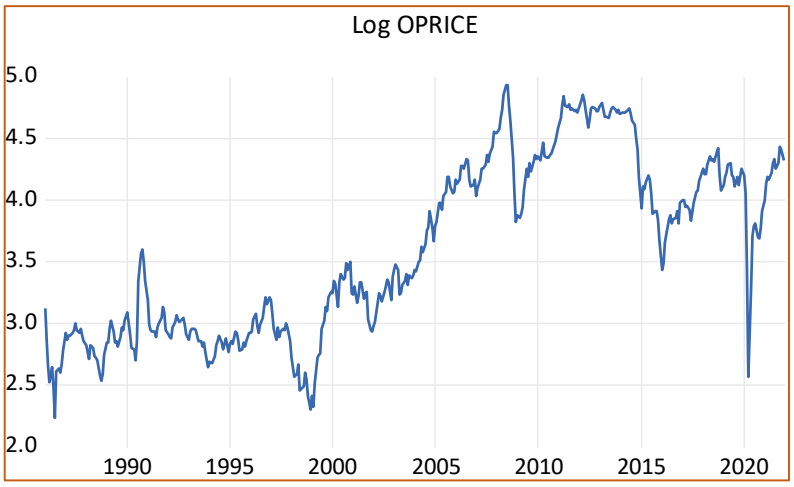
Figure 4.1: All-Shares Index



Source: Author's Analysis using EViews 12

Figure 4.1 shows the level of All-Shares Index in Nigeria and the trendline pattern during reviewed period. The ASI was fluctuating frequently for the periods, at some points it was above trendline while other times below trendline, which makes the capital market unstable. In conclusion, the Nigerian ASI reflects the volatility of the country's stock market, influenced by various domestic and global economic factors. It underscores the economy's sensitivity to external shocks, like oil price volatility. The data highlights the importance of economic diversification to reduce reliance on oil and promote overall economic stability.

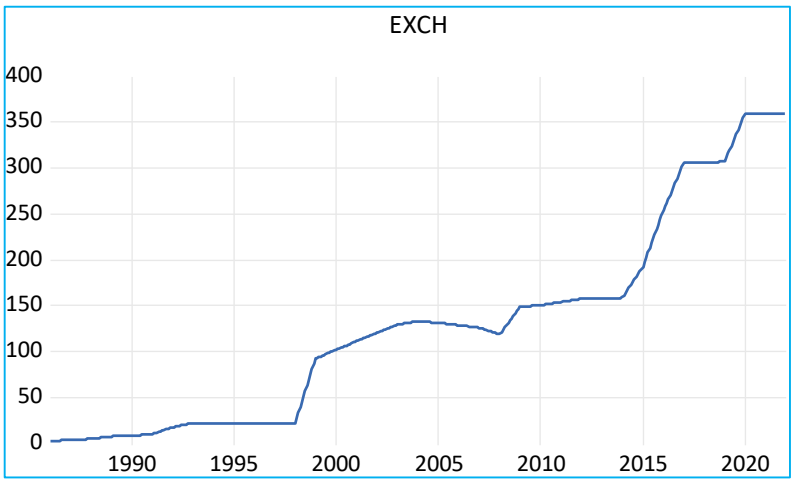
Figure 4.2: Oil Price



Source: Author's Analysis using EViews 12

Figure 4.2 shows the trend of oil price and the trend line pattern during reviewed period. Oil prices were stagnant for some years and skyrocketed for some years and went back to the initial price before it skyrocketed again. This can be because of demand and supply. This invariably affects cost of running business and business performance upon which stock market indicators are driven. Nigeria's heavy reliance on oil also made it vulnerable to external shocks, highlighting the need for policies that encourage non-oil sectors and other sources of energy to reduce the level of dependence on oil.

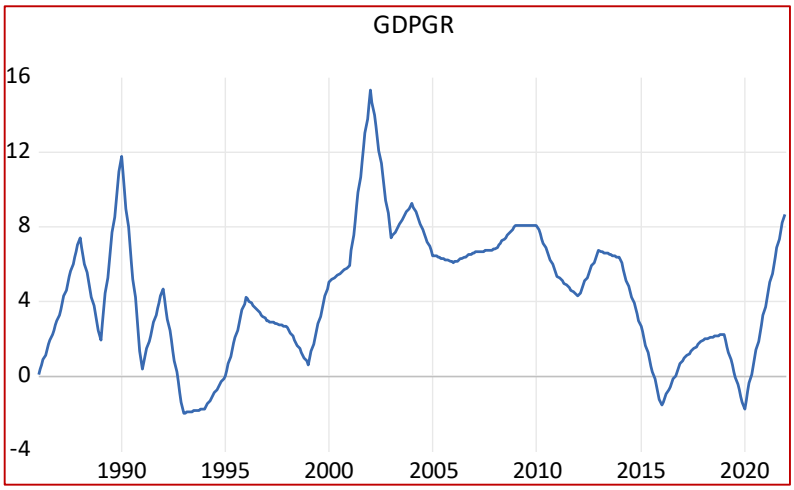
Figure 4.3: Exchange Rate



Source: Author's Analysis using EViews 12

Figure 4.3 shows exchange rate volatility trend during the reviewed period. From 1986 to 1996, it was essentially zigzagging and varied frequently, but it was still somewhat steady. However, starting in 1997, it was no longer stable. Between 2000 and 2020, it was extremely volatile. Of course, this can negatively impact Nigeria's stock market performance. The data suggests that the Nigerian economy has faced significant volatility over the years, influenced by various internal and external factors such as oil prices, volatile exchange rates, and high dependence of importation of consumable goods, etc. This implies that, if serious action is not taken, this trend may have adverse impact on economic growth and development.

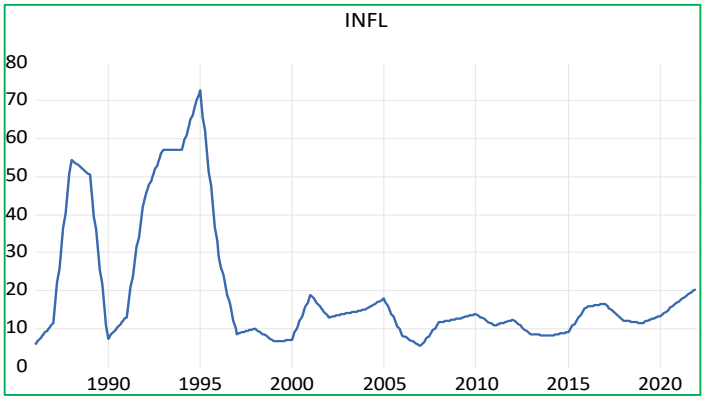
Figure 4.4: GDP Growth Rate



Source: Author's Analysis using EViews 12

Figure 4.4 shows the real GDP trend during reviewed period. Overall, Nigeria's GDP growth rate indicates a mixed economic performance, with periods of growth and recession. The heavy reliance on oil revenues has made the economy susceptible to fluctuations in global oil prices, which significantly influenced growth rates. To achieve sustained and stable economic growth, Nigeria has been working towards economic diversification and addressing structural challenges. Nonetheless, economic growth is influenced by numerous factors, and achieving long-term sustainability requires continuous efforts in various sectors of the economy.

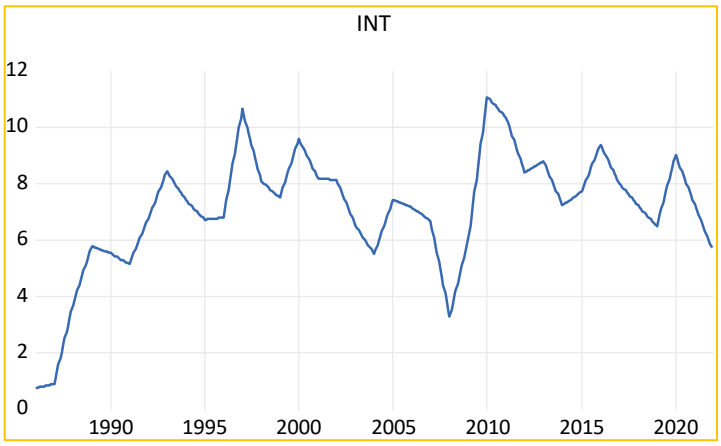
Figure 4.5: Inflation Rate



Source: Author's Analysis using EViews 12

Figure 4.5 shows the trend of inflation rate during reviewed period. Interest rate was very high in 1986-1990, skyrocketed in 1986 and 1987 as well as 1992 to 1997; but went below trendline from 1997 to 2020. In summary, the inflation trend in Nigeria's economy has been characterized by fluctuations over the years. Several factors have influenced inflation, including oil price volatility, global economic conditions, monetary and fiscal policies, and structural challenges within the economy. To achieve more stable inflation rates, Nigeria needs to implement effective monetary and fiscal policies, diversify its economy, address structural issues, and promote sustainable economic growth.

Figure 4.6: Interest Rate



Source: Author's Analysis using EViews 12

Figure 4.6 shows interest rate trend within reviewed period. From 1986 to 2021, Nigeria's interest rates have exhibited a notable fluctuation, reflecting the country's economic situation and monetary policies. The late 1980s and early 1990s saw high volatility, with interest rates ranging from approximately 0.7% to over 9%, while the early 1990s experienced several peaks, reaching around 10.77%. Subsequently, there was a gradual decline in rates until the mid-2000s, followed by a period of rising rates from 2006 to 2009 due to inflation and global financial challenges. From 2010 to 2016, rates showed a moderate decline, stabilizing in the range of 6% to 7.5% since then. The effect of interest rates on stock market returns appears insignificant and suggests that changes in interest rates may not have a notable impact on the Nigerian stock market.

4.1.2 Descriptive Statistics

Table 4.1 presents the statistical properties of the variables under study. The emphasis is on the mean, skewness, Jarque-Bera statistics, and its probability for the variables involved.

Table 4.1 Descriptive Statistics

	LOG(ASI)	LOG(OPRICE)	EXCH	INFL	INT	GDPGR
Mean	8.918784	3.593225	126.3965	19.63280	7.089196	4.302662
Median	9.899855	3.458244	126.0951	13.18114	7.344341	4.396731
Maximum	11.09213	4.928412	359.8946	72.83550	11.06417	15.32916
Minimum	4.902307	2.231089	1.754523	5.388008	0.724167	-2.035119
Std. Dev.	1.791551	0.716557	107.1580	16.17657	2.011650	3.430461
Skewness	-0.946079	0.167757	0.739581	1.707700	-1.081472	0.253667
Kurtosis	2.552464	1.659073	2.629395	4.592789	4.800631	2.868568
Jarque-Bera	68.04994	34.39179	41.85480	255.6347	142.5708	4.943913
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.084420
Sum	3852.915	1552.273	54603.30	8481.370	3062.533	1858.750
Sum Sq. Dev.	1383.362	221.2984	4949100.	112784.7	1744.143	5072.036
Observations	432	432	432	432	432	432

Source: Author

In the study, the means of the variables: All-share index, (ASI), oil price (OPRICE), interest rate (INT), exchange rate EXCH, Inflation rate (INFL) and gross domestic product (GDPGR) are the variables employed. Table 4.1 shows that, apart from ASI and INT, other variables are positively skewed. The ASI, OPRICE, EXCH and GPGR are said to be platykurtic because they are less than 3, while INFL and INT are leptokurtic because they are greater than 3. The Jarque-Bera statistics for all the variables are all significant at 5 percent level. This implies that the variables of this model are not normally distributed.

4.1.3: The Pairwise Correlation Matrix

Table 4.2 moves further from descriptive statistics to examine the degree of correlation of the variables employed.

Table 4.2: Correlation Matrix

	LOG(ASI)	LOG(OPRICE)	EXCH	INFL	INT	GDPGR
LOG(ASI)	1.000000					
LOG(OPRICE)	0.773029	1.000000				
EXCH	0.748965	0.646874	1.000000			
INFL	-0.530124	-0.484548	-0.419091	1.000000		
INT	0.535660	0.289268	0.324882	-0.138592	1.000000	
GDPGR	0.178544	0.229906	-0.068930	-0.358411	-0.081446	1.000000

Source: Author

The explanation here is based on dependent variable and explanatory variables alone. The correlation matrix as shown in table 4.2, shows the degree of relationship among the variables used. The ASI and OPRICE have a positive and strong relationship together at 0.773029. The ASI and EXCH also have strong and positive relations together. The INFL rate as expected has a negative but average relationship with ASI. The INT rate has a positive but moderate relationship with ASI. Finally, GDPGR has a positive but a very weak relationship with ASI.

4.2 Analysis and Interpretation of Results

4.2.1 Stationary Test

The study considered the unit root before estimating cointegration equation to choose appropriate econometric estimation to be used. Testing the stationarity of economic time series is critical since typical econometric approaches assume that the time series are stationary when they are not. As a result, traditional statistical tests are likely to be ineffective, and not co-integrated, the ordinary least squares (OLS) estimate of regressions in the presence of non-stationary variables produce misleading regressions (Granger and Newbold, 1974).

Table 4.3: The Results of Unit Roots Test

Variables	ADF	P-value (Level)	ADF	P-value (1st Difference)	Remark
Log (ASI)	-1.447325	0.5595	-8.829806	0.0000	I (1)
Log OPRICE)	-2.328190	0.1636	-13.85884	0.0000	I (1)
EXCH	-0,014796	0.9558	-3.825417	0.0029	I (1)
GDPGR	-3.244426	0.0242	-3.349441	0.0134	I (0)
INFL	-4.085014	0.0011	-4.117710	0.0000	I (0)
INT	-4.441870	0.0003	-4.374314	0.0004	I (0)

Source: Author's computation from EViews 12

NB: I (1) Stationarity of the variables at first difference, *Unit root hypotheses are tested at 1%, **Unit root hypotheses are tested at 5% and ***Unit root hypotheses are tested at 10%

The stationarity of the variables was evaluated using the Augmented Dickey-Fuller (ADF) test, which involved unit root tests to examine the trends of all variables. The outcomes of the unit root tests are presented in Table 4.3. According to the results from the Augmented Dickey-Fuller test, GDP growth rate, inflation rate and interest rate exhibited stationarity at the level. However, the all-share index, oil price and exchange rate stationarity at the 5 percent significance level after undergoing first-order differencing.

Because of the objectives of this study emphasizing on volatility of oil price on stock market returns, this study adopts the Generalized Auto-regressive Conditional Heteroskedasticity (GARCH) model.

The trend analysis also showed us that there is volatility clustering of the series in virtually all the variables employed for this study.

Table 4.4: Estimation of GARCH MODEL

Dependent Variable: LOG(ASI)
Method: ML ARCH - Normal distribution (Marquardt / EViews legacy)
Date: 07/27/23 Time: 20:42
Sample (adjusted): 1986M02 2021M12
Included observations: 431 after adjustments
Convergence achieved after 51 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(8) + C(9)*RESID(-1)^2 + C(10)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.010566	0.013897	-0.760309	0.4471
LOG(OPRICE)	0.011365	0.005524	2.057201	0.0397
EXCH	-0.000176	3.01E-05	-5.839223	0.0000
INFL	0.000284	0.000158	1.800160	0.0718
INT	-0.000789	0.001344	-0.586612	0.5575
GDPGR	0.002072	0.000781	2.651872	0.0080
LOG(ASI(-1))	0.999486	0.002535	394.3313	0.0000
Variance Equation				
C	0.000271	7.17E-05	3.775402	0.0002
RESID(-1)^2	0.440670	0.090984	4.843394	0.0000
GARCH(-1)	0.581494	0.054501	10.66942	0.0000

R-squared	0.998726	Mean dependent var	8.928103
Adjusted R-squared	0.998708	S.D. dependent var	1.783120
S.E. of regression	0.064091	Akaike info criterion	-2.951745
Sum squared resid	1.741669	Schwarz criterion	-2.857404
Log likelihood	646.1010	Hannan-Quinn criter.	-2.914496
Durbin-Watson stat	1.634520		

The estimation output as shown in table 4.4, shows the results of the regression for the variables used to capture oil price volatility and stock market returns in Nigeria. The lagged value of all-share indices has a positive and significant impact on the current value of ASI. The response of the current value of ASI to the previous value of ASI is 0.999486 with a probability value of 0.0000 meaning that it is significant at 1 percent level. The economic implication is that a 1 percent increase in ASI (-1) may lead to 0.999486 percent increase in the current value of ASI or stock market returns in Nigeria. The oil price also exhibits a positive and significant effect on all-share indices in Nigeria. The coefficient of response of ASI to OPRICE is 0.011365 with a probability of 0.0397 revealing that it is significant at 5 percent level. By implication, a 1 percent increase in the oil price leads to 0.011365 increase in all-share indices in Nigeria. The exchange rate (EXCH) has a negative and significant impact on all-share indices. The response of ASI to EXCH is -0.000176 with a probability value of 0.0000 showing that it is significant at 1 percent level. The economic intuition is that a 1 percent increase in EXCH will lead to 0.000176 decrease in all-share index or stock market returns in Nigeria. The inflation rate (INFL) has a positive and significant on all-share indices or stock market returns in Nigeria. The response of ASI to INFL is 0.000284 with a probability of 0.0718 meaning that it is significant at 10 percent level. This implies that a 1 percent increase in INFL will lead to a 0.000248 percent increase in stock market returns or all-share index. The interest rate has a negative but insignificant effect on all-share index or stock market returns in Nigeria. The response of ASI to INT is -0.000789 with a probability of 0.5575. The economic intuition is that a one percent increase in INT may not have any significant impact on stock market returns or ASI in Nigeria.

The gross domestic product growth rate (GDPGR) has a positive and significant impact on all-share index or stock market returns in Nigeria. The response of ASI to GDPGR is 0.002072 with a probability of 0.0080 which shows that it is significant at 5 percent level. The economic implication is that a 1 percent increase in GDPGR will lead to 0.002072 percent increase in ASI of stock market returns in Nigeria.

The estimated variance equation is as follows:

$$\hat{h}_t = \underset{(3.775402)}{0.000271} + \underset{(10.66942)}{0.581494\hat{h}_{t-1}} + \underset{(4.843394)}{0.440670\hat{u}^2{}_{t-1}}$$

The coefficient of constant variance term, the ARCH and GARCH parameters are positive and statistically significant at 1 percent level. This gives the result of the GARCH model. The time-varying volatility includes a constant (0.000271) plus its past ($0.581494\hat{h}_{t-1}$) and a component which depends on past errors $0.440670\hat{u}^2{}_{t-1}$.

These findings clearly established the presence of time-varying conditional volatility of returns of the stock. This, result also indicates that the persistence of volatility shocks, as presented by the sum of ARCH and GARCH parameters ($b_1 + \theta_1$), is very large. It denotes that the effect of today's shock remains in the forecast of variance for many periods in the future.

Table 4.5: Granger Causality

Pairwise Granger Causality Tests
Date: 07/27/23 Time: 06:10
Sample: 1986M01 2021M12
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG(OPRICE) does not Granger Cause LOG(ASI)	430	0.65586	0.5195
LOG(ASI) does not Granger Cause LOG(OPRICE)		9.24011	0.0001
EXCH does not Granger Cause LOG(ASI)	430	7.54490	0.0006
LOG(ASI) does not Granger Cause EXCH		1.27020	0.2818
INFL does not Granger Cause LOG(ASI)	430	2.37528	0.0942
LOG(ASI) does not Granger Cause INFL		4.71790	0.0094
INT does not Granger Cause LOG(ASI)	430	4.63126	0.0102
LOG(ASI) does not Granger Cause INT		4.67642	0.0098
GDPGR does not Granger Cause LOG(ASI)	430	0.59304	0.5531
LOG(ASI) does not Granger Cause GDPGR		0.30950	0.7340
EXCH does not Granger Cause LOG(OPRICE)	430	4.86593	0.0081
LOG(OPRICE) does not Granger Cause EXCH		1.94615	0.1441

Based on the results of the Granger causality test conducted as shown in table 4.5, the following conclusions can be drawn. At a 5% level of significance, there is evidence of a unidirectional causal relationship between oil price (OPRICE) and stock market returns proxy by all-share index. However, the reverse relationship does not hold true, suggesting that changes in ASI granger causes Oil price in Nigeria. On the other hand, exchange rate granger causes ASI, but ASI does not granger cause EXCH. This is also an example of a unidirectional relationship. Additionally, there is a bi-directional causal relationship between inflation rate (INFL) and real ASI in Nigeria. INFL granger causes stock market returns (ASI) while stock market returns also granger causes INFL. The interest rate INT also has a bi-directional causality with all-share index or ASI. That is INF granger causes all-share indices while ASI. In conclusion, based on these findings, it can be stated that there is a significant causal relationship between oil price volatility and stock market returns in Nigeria.

4.2.2 Statistic and Post- Diagnostic Results

Table: 4.6 GARCH Models and Diagnostic Tests

	Normal Dist.	Student t's	GED
Significant Coefficients	ALL	ALL	ALL
ARCH Significant?	YES	YES	YES
GARCH Significant?	YES	YES	YES
Log Likelihood	646.1010	667.0322	664.3149
Adjusted R-squared	0.998708	0.998767	0.998756
Schwartz IC	-2.857404	-2.940460	-2.927848
Heteroscedasticity	NO	NO	NO
Autocorrelation	NO	NO	NO

Source: Author's Computation (2023) from EViews 9

From a statistical standpoint as shown in table 4.6, the R-squared value of 0.998308 indicates that approximately 99.8 percent of the variation in the stock market is accounted for by the explanatory variables used in the model. The remaining 0.02 percent is attributed to the error terms. This suggests that our model fits the data well. The F-statistic (82.40192) indicates that the combined effect of the explanatory variables is statistically significant, implying a linear relationship among the variables. The Durbin-Watson statistic of 1.626636, which is approximately 2, indicates that there is no significant autocorrelation in the residuals according to the rule of thumb. Additionally, a diagnostic test was performed on the residuals of the model, revealing that they exhibit no significant serial correlation. However, it is worth noting that the residuals are not normally distributed, although they exhibit constant variances (heteroskedasticity).

4.3: Discussion of Results

The above Table 4.5 discusses the results according to the objectives earlier stated in the chapter one. This result provides answer to objective one and three: Objective one: the impact of oil price volatility on stock market returns in Nigeria. To achieve this stated objective, our result from ARDL model regression provides profound empirical answer to the objective. Thus, oil price (OILP), is positive and statistically significant at 5% level of significance. This indicates that a unit increase in oil prices will eventually lead to 0.295814 increase in stock market performance in the short run, at the same time, it was equally observed from the outcome that oil price is also positive and statistically significant in the long run. It equally suggests that one percent increase in oil price will bring about 0.047514 increase in stock market performance in Nigeria during the period under investigation. This result also corroborates with the study by Alamgir and Amin, (2021) who examined the nexus between oil price and stock market, and it was found out that, there is positive relationship between the oil price and stock market index, and the response of the stock market index to positive.

Second objective is to also determine effect of oil price fluctuation on the economic growth in Nigeria. To achieve the objective two, we investigate the coefficient and p-value from above Table 4.5, however, it was revealed from the outcome that the real gross domestic product is positively and statistically significant at 5% level of significance. This suggests that both short and long run, it was observed that a unit rise in real gross domestic product (which is economic growth) will bring about 2.235216 and 2.358845 increase in oil price in both short and long run respectively. Thus, this study's outcome undoubtedly corroborates with the study by Erdem,

Gozbasi, Ilgun and Nazlioglu, (2010) who investigated stock market and economic growth nexus in emerging markets, with findings that there is a close relationship between stock market performance and economic growth in the long-run and that stock market performance is an impetus for economic growth in the short run.

The third objective is to ascertain the nexus between oil price volatility and stock market returns: To achieve this, the outcome of granger causality test result from the Table 4.5 will salvage this. Thus, the granger causality estimate indicates that oil price (OILP) does granger caused all shares index (ASI), while OILP does not granger caused ASI. We therefore accept the hypothesis that oil price does granger caused all shares performance, and we fail to accept the hypothesis that ASI does granger caused OILP. This suggests that there is a unidirectional relationship that exist between stock market performance and economic growth in Nigeria. This equally suggest that an increase in oil price will amount to a rise in all-shares performance in Nigeria. The result above also, reveals the inflation (INF) does granger caused stock market performance (ASI), whereas stock market performance does not granger caused inflation. Owing to this fact, we fail to accept the hypothesis that inflation does granger caused stock market performance, and accept the hypothesis that ASI does not granger caused INF. This indicates that, there is a unidirectional found for ASI and INF in Nigeria during the period under investigation. The result equally, shows that the interest rate (INTR) does granger caused ASI, while ASI does not granger caused INTR. On this note, we fail to accept the hypothesis that INTR does granger caused ASI, and accept the hypothesis that ASI does not granger caused INTR. This implies that, there is a unidirectional found for INTR and ASI in Nigeria over the period under review.

Above result indicates that real gross domestic product (RGDP) does granger caused ASI, while ASI does not granger caused RGDP. On this note, we fail to accept the hypothesis that RGDP does granger caused ASI and accept the hypothesis that ASI does not granger caused RGDP. This implies that, there is a unidirectional found for RGDP and ASI in Nigeria during the period investigation. The study further suggests that there is unidirectional causality which occurring from exchange rate (EXR) and stock market performance (ASI) which does not granger caused ASI does not granger caused EXR. On this note, we fail to accept the hypothesis that EXR does granger caused ASI and accept the hypothesis that ASI not granger caused EXR. This indicates that, there is a unidirectional found between EXR and ASI during the investigation of this research in Nigeria.

5.1 Summary of Findings

The primary objective of this study was to examine the influence of oil price volatility on Nigeria stock market returns using time series data spanning from 1986 to 2021. The all-share index (ASI), oil price (OPRICE), exchange rate (EXCH), inflation rate (INFL), interest rate (INT), real GDP growth rate (GDPGR) are the variables used to capture this topic efficiently. The unit roots were conducted through Augmented Dickey-Fuller (ADF) and then used Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model and Granger causality. The estimation output provides valuable insights into the relationship between various economic factors and stock market returns in Nigeria. The findings are outlined in this section based on the research objectives guiding the study. i) To determine effect of oil price fluctuation on the economic growth in Nigeria. The study findings revealed that the oil price volatility studied have a varying effect on the stock market returns. The estimation output reveals the complex interplay of economic factors on Nigerian stock market returns. The lagged ASI indicates strong autocorrelation, suggesting past performance has a significant influence on current returns. Oil prices, exchange rates, inflation, interest rates, and GDP growth rate all have significant effects on stock market returns. Inflation influences investor behavior and expectations, while interest rates may not have a

significant impact. GDP growth rate positively correlates with stock market performance, leading to increased investor confidence and higher returns. Time-varying conditional volatility indicates that stock market returns in Nigeria are subject to changing levels over time. The Granger causality test reveals a unidirectional causal relationship between oil price and stock market returns (ASI), with changes in ASI granger causing oil price. The inflation rate causes real ASI, while interest rate has ab bi-directional causality with the all-share index. The R-squared value of 0.998308 indicates that explanatory variables account for 99.8% of stock market variation, with 0.020% due to error terms. Risk management strategies are needed to navigate the dynamic nature of the Nigerian stock market.

5.2 Conclusion: The findings from this study provide valuable insights into the intricate relationship between economic factors and stock market returns in Nigeria. These implications hold significance for investors, policymakers, and market participants in shaping investment decisions and economic policies. The strong positive impact of the lagged All-Share Index (ASI) on the current ASI indicates significant autocorrelation in stock market returns. Past performance holds a substantial influence over present stock market returns. Investors and policymakers must consider historical market trends to make well-informed investment choices and devise effective economic strategies. The substantial and significant effect of oil prices on the All-Share Indices reveals the Nigerian stock market's sensitivity to oil price fluctuations. Fluctuations in exchange rates can affect various sectors, particularly import-dependent companies listed on the stock exchange and should be carefully managed by policymakers. The positive and significant effect of the inflation rate on stock market returns indicates that inflation plays a pivotal role in shaping investor behavior and expectations. As inflation erodes purchasing power, investors may seek refuge in the stock market to counter the impact of rising prices. Policymakers should adopt measures to control inflation, as it can influence stock market dynamics. The positive and significant impact of the GDP growth rate on stock market returns underscores the positive correlation between economic growth and stock market performance. A thriving economy fosters a conducive environment for businesses, leading to heightened investor confidence and increased stock market returns. Investors and policymakers should consider these insights to make informed decisions that bolster stock market performance and foster economic growth. Additionally, the presence of time-varying volatility necessitates proactive risk management strategies to effectively navigate market uncertainties. By incorporating these advanced economic implications, Nigeria can work towards a more robust and sustainable stock market that contributes to overall economic prosperity.

5.3 Recommendations

The study recommends the following based on the findings.

i Given the significant positive impact of lagged All-Share Indices (ASI) on current ASI, investors and policymakers should place emphasis on monitoring market sentiment and historical performance trends. A comprehensive analysis of market sentiment can help in making informed investment decisions and developing effective economic policies to bolster stock market returns.

ii Considering the positive and significant effect of oil prices on All-Share Indices, it is crucial for investors to closely monitor oil price fluctuations. Policymakers should also keep a close eye on oil market dynamics, as Nigeria's status as a major oil producer can make the stock market susceptible to oil price changes. Implementing measures to mitigate the impact of oil price volatility on the stock market is essential for sustainable economic growth.

iii Government should institute mechanisms like benchmarking, through policy instruments that flags sensitivity of internal and eternal risk elements that interferes against natural flow of the domestic economy. This will guide for prompt mitigation measures.

iv To enhance decision-making processes, continuous data analysis and research should be conducted to better comprehend the causal relationships between economic variables and stock market returns. Data-driven insights will assist in formulating effective economic policies and investment strategies that align with market dynamics.

v The presence of time-varying conditional volatility, as evidenced by ARCH and GARCH parameters, necessitates the adoption of robust risk management strategies by investors. Diversification, hedging, and other risk mitigation techniques should be employed to navigate the dynamic nature of the Nigerian stock market.

vi The positive and significant impact of the GDP growth rate on stock market returns indicates the importance of fostering economic growth. Policymakers should prioritize economic policies that stimulate growth and create a conducive environment for businesses to thrive, ultimately boosting investor confidence and stock market performance.

Suggestions for Future Research:

1) Future studies could broaden their scope by examining the influence of oil price shocks on stock market returns in various regions, including West Africa, Sub-Saharan African countries, or the entire African continent who are members of OPEC.

2) Researchers may explore alternative estimation techniques, such as Dynamic OLS or Generalized Methods of Moment (GMM), to complement the current ARDL model and strengthen the findings.

3) Delving deeper into the complex dynamics between oil price volatility and stock market returns, future research could incorporate additional factors like education, technological advancements, and government policies. This would offer a more comprehensive analysis of the subject matter.

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