The Impact of Financial Indicators and Stock Market Volatility on Stock Returns in Nigeria: Evidence from Panel Analysis

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Abstract

Stock markets play a critical role in economic development by facilitating capital formation and investment. However, in emerging economies like Nigeria, stock market performance is often characterised by high volatility, structural inefficiencies, and sensitivity to macroeconomic conditions, raising concerns about the stability and predictability of stock returns. This study investigates the impact of financial indicators and stock market volatility on stock returns in Nigeria, employing the Generalised Method of Moments (GMM); and established the presence of long-term memory in the stock market in Nigeria, which indicates that the movement in stock market prices are carried directly from the past to the present. Additionally, findings show that the historical movement of the stock prices is characterised by a rough series with local anti-persistence. This means that the stock prices possess mean-reverting tendencies. Moreover, the results of the study show that return on equity (ROE), return on assets (ROA), and stock market volatility are significant determinants of changes in the stock market returns. Also, the health of the economy, measured by the level of inflation and economic growth, and monetary policy, are important factors that investors should consider before making their choices on which stocks to buy.

Keywords: Financial Indicators; Information Entropy; Panel Analysis; Stock Market Volatility; Stock Returns

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1. Introduction

The development of any market-based economy significantly depends on the performance of its stock market. This is because a well-functioning stock market enables economic growth by providing a platform for issuing, purchasing, and selling shares, bonds, and other securities (Emamgholipour *et al.,* 2013). The stock market also facilitates income generation through dividends and capital appreciation, allowing investors to become part owners of established companies without bearing the risks associated with starting new ventures (Lee *et al*., 2016). Consequently, the performance of the stock market directly influences economic growth and development (Karki, 2018).

In Nigeria, the capital market comprises two segments: the primary market and the secondary market. In the primary market, firms issue shares that have never been previously traded, enabling initial public offerings (IPOs). These shares are subsequently listed on the Nigerian Stock Exchange for trading on the secondary market, where investors buy and sell existing shares without direct involvement from the issuing companies (Okonkwo *et al.,* 2014; Obiakor, 2016). The Nigerian stock market thus serves as a critical avenue for investment, wealth creation, and economic stability by providing liquidity and transparency in financial transactions.

Moreover, like the prices of goods and services, the stock market prices are primarily influenced by supply and demand forces, which reflect investor sentiment and market psychology. In addition to this, the dynamics of stock prices are often shaped by macroeconomic factors, such as Gross Domestic Product (GDP), inflation rates, interest rates, and monetary policy, as well as microeconomic factors including company-specific attributes like earnings performance, corporate governance, dividend policy, and asset management (Fadiran & Olowookere, 2016). Factors such as market news cause volatility in the stock prices and significantly influence the market dynamics, further complicating investors' decision-making processes.

To evaluate investment opportunities, investors oftentimes rely heavily on financial information, which can be categorised as internal or external. Internal sources include the statement of profit or loss, financial position, and cash flow statements from which the financial indicators are derived, whereas external information is typically sourced from regulatory bodies and stock exchanges (Emamgholipour *et al.,* 2013; Musallam, 2018). As a result, financial indicators - such as earnings per share (EPS), dividend yield, return on equity (ROE), and return on assets (ROA) – play significant role in investors' assessment of a company's health, growth prospects, and future returns (Xi *et al.,* 2021). Proper analysis of these indicators enables investors to align their investment decisions with their individual risk-return preferences and income objectives.

However, reliance solely on financial information to make investment decisions is not sufficient, particularly due to the possibility of significant economic disruptions. For instance, the global financial crises of 2007-2009 and the recent COVID-19 pandemic have highlighted the vulnerability of stock markets, causing substantial volatility and uncertainty (Benjamin *et al.,* 2021), and have resurfaced the issue of stock market profitability compared with other potential investment opportunities. Emerging markets, such as Nigeria, were disproportionately affected by these events due to their relative vulnerability, weaker financial reporting standards, and prevalent information asymmetries. For example, Nigeria’s total market capitalisation significantly declined during the 2007–2009 crisis, dropping investor confidence dramatically (Iyiola *et al.,*

2012; Njiforti, 2015). These experiences underscore the urgent need for comprehensive studies to understand the determinants of stock market returns and help investors manage their investment risks effectively.

Existing literature have shown differing views on the factors that determine the stock market returns: some studies emphasise macroeconomic factors (e.g., Okech & Mugambi, 2016), others underline internal company factors (Musallam, 2018), while a third group supports the interplay of both internal and external variables (Vora, 2018; Allozi & Obeidat, 2016). According to Al-Tamimi *et al.* (2011), an increase or decrease in demand for a given security is affected by the company's peculiarities, external factors, and market volatility. Investors need a more parametric measurement to assess the outcome of their investments due to the high risks and uncertainty permeating the market. The uncertainties and risks involved in investing in stocks necessitate investors to look for financial indicators and measures that have a significant impact on stock price when making investment decisions (Vora, 2018). To earn more income, equity and investment managers need to pay more attention to the financial parameters that significantly impact stock returns (Allozi & Obeidat, 2016).

Furthermore, it has become increasingly important to understand these dynamics through a panel analysis of firms from different sectors. Despite the evident value of previous studies, there are still limitations in the existing literature. The few available studies - including Allozi & Obeidat (2016), Bashir & Amir (2018), and Yudha *et al.* (2019) - highlight financial indicators' varied impacts across different sectors. However, unlike the previous studies that are subject to model misspecification because of the omission of important variables, this study covers the possible misspecification from past studies by capturing market volatility in the model estimation. The omission of an important variable in a model could result in misleading results. Interestingly, market volatility has been observed over time through the global financial crises to be a significant determinant of stock market returns.

Considering this gap, this study investigates the specific financial indicators most relevant to investors in Nigeria and their impacts on stock returns, taking into account both internal and external factors. Additionally, the study incorporates macroeconomic variables - such as GDP growth, inflation rates, and interest rates. By examining these relationships comprehensively, this study aims to enhance investors' decision-making capabilities, particularly in developing markets like Nigeria where information limitations and governance issues persist. Therefore, this study aims to examine the effect of financial indicators and market volatility on stock market returns, employing the panel analysis of firms in the key economic sectors of the Nigerian economy. This study contributes to knowledge by considering the panel of economic sectors and including the market volatility index derived from information entropy.

The remaining part of this study is divided into four sections. In section two, we review the literature. Section three presents the methodology and data employed in the study. Sections four and five present the empirical results/discussion, and conclusion.

2. Review of Previous Literature

Some of the interesting findings in the literature review are highlighted in a few words in this section. The theoretical foundation of this study is based on market behaviour theories,

particularly the Efficient Market Hypothesis (EMH) developed by Fama (1970) and Mandelbrot's alternative fractal theory. EMH suggests that stock prices reflect all available information instantly, implying no historical influence on future stock prices (Birău, 2011; Oprean *et al.*, 2014). However, Mandelbrot challenged this view, proposing that financial markets exhibit long-range dependence and historical memory, known as the "Joseph effect," and sudden price changes, termed the "Noah effect" (Jones & Breunig, 2007; Mandelbrot & Hudson, 2010).

According to Mandelbrot, market data retain memories of past events, influencing future price movements. Such long-term dependencies contradict the efficient market's assumption of price independence (Jones & Breunig, 2007). Mandelbrot further argued that financial markets demonstrate fractal characteristics - complex patterns exhibiting self-similarity at different scales, implying that market behaviour is inherently unpredictable and chaotic (Lin, 2015; Kuklik & Vacek, 2013). Entropy, a measure capturing market complexity and uncertainty, complements this perspective by quantifying volatility and unpredictability in financial markets (Sheraz *et al.*, 2015).

Empirical studies examining financial indicators and their impact on stock returns have provided mixed results. Common financial indicators analysed include earnings per share (EPS), dividend yield, return on equity (ROE), return on assets (ROA), gearing ratios, and book-to-market ratios (Macharia & Gatuhi, 2013; De Kai & Abd Rahman, 2018; Parab & Reddy, 2018). Various studies, such as Kheradyar *et al.* (2011) and Tejosaputro *et al.* (2017), reported positive relationships between financial ratios like book-to-market and stock returns. However, results from studies such as Olowoniyi and Ojenike (2012) suggest that firm size and expected growth positively influence stock returns, while asset tangibility has little effect. Vora (2018) found EPS strongly correlated with stock returns, unlike ROA and ROE, which showed weaker correlations. Contrastingly, Pražák and Stavárek (2017) found financial leverage positively impacts stock returns, whereas profitability and margin ratios had mixed or insignificant results.

Studies on macroeconomic factors influencing stock returns have also yielded varied outcomes. Indicators like Gross Domestic Product (GDP), interest rates, inflation, and exchange rates have shown different levels of impact on stock returns. GDP often has a positive relationship with stock returns (Fama, 1981; Kvietkauskienė & Plakys, 2017). Conversely, interest rates commonly exhibit a negative relationship (Maysami & Koh, 2000; Barnor, 2014). Inflation shows mixed findings, negatively impacting stock returns in some studies (Tarika & Seema, 2011) but positively in others (Sohail & Hussain, 2011). Similarly, studies by Alam and Uddin (2009) and Acikalin *et al.* (2018) support the negative relationship between interest rates and stock returns. Such mixed findings indicate the complexities and differing market sensitivities to macroeconomic factors.

Research findings regarding volatility's impact on stock returns have also been inconsistent. Some studies have found volatility positively linked to stock returns, aligning with traditional asset pricing theories suggesting riskier assets yield higher returns (Chiang & Doong, 2001; Shin, 2005). Conversely, others reported negative or insignificant relationships (Dimitriou & Simos, 2011; Olasehinde–Williams, 2018). For example, Singal and Smith (1999) found cyclical patterns with negative impacts at economic peaks and positive at troughs, highlighting volatility's complex role in asset pricing.

Sector-specific studies further underscore the complexity in linking financial indicators to stock returns. Dadrasmoghadam and Akbari (2015) found profitability ratios positively influence stock returns in Iran's agricultural sector, while Razak *et al.* (2020) found negligible impacts of similar indicators in the construction sector in Indonesia. Geetha and Swaaminathan (2015) reported that EPS significantly affects stock returns in India's automotive and IT sectors. Bashir and Amir (2018) identified ROE and EPS as significantly impacting stock returns in manufacturing, but ROA showed no significant relationship. These sector-specific differences highlight that the impact of financial indicators can vary considerably across industries. In summary, empirical evidence on the relationship between financial indicators, macroeconomic variables, stock market volatility, and stock returns is diverse and often contradictory. This diversity underscores the need for context-specific analysis, particularly regarding sectoral differences and market conditions.

One significant methodological research gap is that previous papers have neglected the role of market volatility in their findings. We address this issue by using information entropy to measure volatility ex-post instead of the VIX index measure used by studies like Kuklik and Vacek (2013), built using the S&P 500 market index, a measure of anticipated volatility. This study departs from previous studies and contributes to the literature by employing the residual-based volatility measure through the Single Index Model regression to capture volatility for the Nigerian stock market, since measures like the VIX index does not exist for the Nigerian economy.

3. Methodology and Data

3.1 Model Specification

This study adopts the Single-Index Model (SIM) methodological procedure of Singh and Gautam (2014) and Nugroho and Tjong (2021) and the empirical model of Parab and Reddy (2018) and Din (2017) with modifications. According to Nugroho and Tjong (2021), the Single Index Model (SIM) introduced by Sharpe (1963) indicates that the value of securities fluctuates based on the market price index. The SIM means that a certain number of securities indicate a price increase when the market goes up. In contrast, most securities show a price decrease when the market goes down. The variation in stock price value depends on the movement of market returns. Therefore, the risk-return model suggested by Sharpe is:

$$SR_{it} = \alpha_i + \beta_i M_{mt} + \varepsilon_{it} \quad (1)$$

Where R_i is the expected stock returns, α_i is the intercept coefficient, β_i is the slope, M is the market return measured by the All-share Price Index (ASI). On the other hand, ε_i represents the non-market influences. The return on each stock is calculated as:

$$SR_{it} = \ln(\frac{P_t}{P_{t-1}}) \quad (2)$$

Where SR_{it} is the expected stock returns on security i at time t. P_t and P_{t-1} are stock prices at time t and time $t-1$. The assumptions guiding the SIM residual are vital (Kuklik & Vacek, 2013), including serial independence of the residual error of all securities pairs and independent of the market return.

The SIM model is therefore extended to examine the impact of selected financial indicators on stock returns in the Nigerian stock market at a panel level. Using the Generalised Method of Moments (Difference-GMM) for the poolable data, the model of the study is stated as follows:

$$SR_{it} = f(EPS_{it}, ROE_{it}, ROA_{it}, GR_{it,} BV_{it,} V_{it,} INT_{it,} INF_{it,} GDPr_{it}) \quad (3)$$

Econometrically the functional representation in equation (1) is given as:

$$SR_{it} = \delta_0 + \delta_1 EPS_{it} + \delta_2 ROE_{it} + \delta_3 ROA_{it} + \delta_4 GR_{it} + \delta_5 BV_{it} + \delta_6 V_{it} + \delta_7 INT_t + \delta_8 INF_t + \delta_9 GDPr_t + \varepsilon_{it} \quad (4)$$

Where SR = stock returns, EPS = earnings per share, ROE = return on equity, ROA = return on assets, GR = gearing ratio, BV = book to market value of shares, V = volatility, INT = interest rate, INF = inflation rate, GDPr = GDP growth rate. $\delta_0 - \delta_9$ are coefficients showing the impact of earnings per share, return on equity, return on assets, gearing ratio, the book value of shares, market volatility, interest, inflation and gross domestic product growth rate, respectively, on stock returns while ε_{it} represents the error term of the model. The residual of the SIM captures the information entropy; it is one of the independent variables that measure volatility ex-post instead of the VIX index measured by Kuklik and Vacek (2013) built using the S&P 500 market index, a measure of anticipated volatility. This is the case when the stock returns series is observed to be volatile based on the entropy test or measurement. The best bet when this occurs is the SIM residual approach for uncertainty measures since we do not have a VIX index for the Nigerian stock market. Other financial indicators are measured as follows:

Table 1: Variable Definitions and Formulas

Variable	Definition	Formula
EPS (Earnings Per Share)	Profit allocated to each outstanding share	EPS = (Total Income after Interest and Tax) / (Average Outstanding Shares)
ROE (Return on Equity)	Return generated on shareholders' equity	ROE = (Net Income) / (Shareholders' Equity)
ROA (Return on Assets)	Return generated on total assets	ROA = (Net Income) / (Total Assets)
GR (Gearing Ratio)	Measure of financial leverage	GR = (Total Debt Liability) / (Total Equity)
BV (Book Value Ratio)	Proportion of equity relative to market capitalization	BV = (Common Stock) / (Market Capitalisation)
GDPr (GDP Growth Rate)	Rate of change in real GDP over time	GDPr = $[(GDPr_t - GDPr_{t-1}) / GDPr_{t-1}] \times 100$

Source: Author

3.2 Estimation Procedure

Hurst Exponent

The Hurst Exponent is used to measure the smoothness of a series. It is also related to the fractal dimension. It can determine whether the time series is random, persistent, or an anti-persistent process. The Hurst Exponent, H, was given by Hurst (1951). The formula is as follows:

$$H = \frac{\log(\frac{R}{S})}{\log(T)}$$

R/S is related to the rescaled range that Hurst developed. In 1996, Peters made this method used in the capital markets to find out if fractal characteristics and nonlinear behaviours existed in the capital markets. R/S has measured the mean-centred value range by dividing the T into standard deviation. The T is the duration of the time series (Lin, 2015).

Rescaling the range in finance involves transforming financial data to a standardized range for the purpose of comparison, analysis, or risk assessment. The logarithmic returns are usually used on the time series when analysing the capital market because it gives more accurate results. Thus we have:

$$x_t = In(\frac{P_t}{P_{t-1}})$$

Where x_t is logarithm return at time t, P_t is price at time t. Beginning with the time series *t*, with *u* observations:

$$X_{t,N} = \sum_{u=1}^{t} (x_u - M_N)$$

Where $X_{t,N}$ is the cumulative deviation over *N* periods, M_N is the average x_u over *N* periods. The difference between the maximum and the minimum levels, which gives the range R) is as follows:

$$R = Max(X_{t,N}) - Min\,(X_{t,N})$$

Where R is the range of X, Max (X) is the maximum value of X, Min (X) is the minimum value of X. Hurst divided this range by the standard deviation of the original observations, which increased with time to compare different types of time series. Then the formula is obtained:

$$\frac{R}{S} = (a * N)^H$$

N is the number of observations, and a is a constant, while H is the Hurst exponent.
Taking the logarithm of both sides:

$$Log\left(\frac{R}{S}\right) = log(a) + Hlog\ N$$

The Hurst approach lets us determine if the financial data are random walks; the characteristic parameter of the long-term memory. Hurst exponent H ranges between $0 \leq H < 1$ for stationary processes. The breaking value of 0.5 indicates no long-term memory, so the autocorrelations decay rapidly (exponentially or faster). Thus the series is a random walk, and the time series is a normal distribution. For $H > 0.5$, the series is persistent with

strong positive correlations characteristic of a trend-like behavior while remaining stationary. For H < 0.5, the series is anti-persistent, and it switches the direction of increments more frequently than a random process does. The Hurst exponent can be estimated by plotting log (R/S) against the log (n) and solving the gradient with a least-squares fit (Lin, 2015).

Fractal Dimension

Fractal dimension (D) is a measure of the roughness of the series and can also serve as a measure of the local memory of the series. For a univariate series, it holds that $1 < D \leq 2$. For self-similar processes, the fractal dimension is connected to the long-term memory of the series so that D+H = 2; this can be attributed to a perfect reflection of local behavior (fractal dimension) to global (long-term memory). However, the relationship usually does not hold perfectly for the financial series, so both D and H offer different insights into the dynamics of the financial series. In general, D = 1.5 holds for a random series with no local trending or no local anti-correlations. For a low fractal dimension D < 1.5, the series is locally less rough and thus resembles a local persistence. Reversely, a high fractal dimension D > 1.5 is characteristic of rougher series with local anti-persistence.

Information Entropy

Another way to study stock market volatility is to apply it to the concepts of physics, which significant literature has already proven to help describe financial or economic problems, such as the concept of entropy. Although there are different understandings of this notion, it is commonly used in literature to measure ignorance, disorder, uncertainty, volatility, or even lack of information. The residual of the SIM estimation is used to measure the volatility in this study. Thus, the residual of the SIM captures the entropy in the general model after the presence of market volatility has been confirmed. This study employs the Shannon entropy to study the uncertainty and risk in the market. The study of the market volatility is important because it determines if the volatility variable should be included in the model as a determinant of returns in the stock market. The Shannon entropy corresponds to a discrete random variable (X) of probability measure, $p_i = (x_i = i), i = 1,2,3 \ldots, n$, and it is given as:

$$S(X) = -\sum_{i=1}^{n} p_i \, lnp_i, 0 \leq p_i \leq 1 \; and \; \sum_{i=1}^{n} p_i = 1$$

The properties of entropy are well established as a measure of uncertainty.

Other estimations

Other estimation tests that are carried out include the cross-sectional dependency test and model estimation using the generalized method of moments (difference-GMM).

3.3 Scope and Data Collection

The study employed annual data of 35 listed firms from five sectors (7 firms per sector) over the period of 2005 to 2020. The scope is chosen based on data availability and the need to use data before the pandemic in order to avoid structural breaks in the available data caused by the financial crisis. The data sources include annual financial statements, firm records, and Nigerian stock market factbook publications. The five sectors of the study are consumer goods, financial services, industrial goods, oil and gas, and services sectors. The historical data collected and computed are closing stock prices, net income after tax, total assets, shareholder's equity, market capitalisation, total debt liability, and common stock. In addition, data on macroeconomic variables – interest rate, inflation rate, GDP growth rate, and market volatility are also included in the study.

4. Empirical Results and Discussion

4.1 Long-term Serial Dependence Test

Table 2 presents the autocorrelation and partial correlation function, plotted against lag 12.

Table 2: Autocorrelation and Partial Autocorrelation Function

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|. |	.|. |	1	-0.051	-0.051	1.4743	0.225
*|. |	*|. |	2	-0.185	-0.188	20.787	0.000
.|. |	.|. |	3	0.064	0.045	23.086	0.000
.|. |	*|. |	4	-0.051	-0.083	24.539	0.000
.|. |	.|. |	5	-0.026	-0.013	24.926	0.000
.|. |	.|. |	6	0.047	0.018	26.176	0.000
.|. |	.|. |	7	-0.005	-0.003	26.192	0.000
.|. |	.|. |	8	-0.016	-0.006	26.337	0.001
.|. |	*|. |	9	-0.055	-0.067	28.078	0.001
.|. |	.|. |	10	0.018	0.013	28.271	0.002
.|. |	.|. |	11	0.035	0.015	28.953	0.002
.|. |	.|. |	12	-0.042	-0.032	29.989	0.003

Source: Authors' Computation from Eviews Output (2025)

Autocorrelation and partial autocorrelation generally decline as the series forgets the past. However, the table shows that as we move from lag to lag, the p-value of the Q-stat is less than 0.05, which means there is a presence of serial correlation. This implies that history matters, and long-term memory is on the Nigerian stock market. The memory is being carried directly from the past to the present.

4.2 Hurst Exponents and Fractal Dimension Analysis

The Hurst exponent may be estimated by plotting the log (R/S) against the log (n) and solving the gradient with a least-squares fit. It determines if the financial time series are random walks, the characteristic parameter of the long-term memory.

Table 3: Sub-sample and Rescaled range values

Sub-samples	Observations	Average (R/S)	Log(n)	Log(R/S)
1	560	12.37588591	6.327937	2.51575
2	280	11.52108237	5.63479	2.444179
4	140	8.212035322	4.941642	2.105601
8	70	9.098279846	4.248495	2.208085
16	35	5.310440108	3.555348	1.669675

Source: Author's computation (2025)

Table 4: Hurst Exponent Regression Estimates

Variable	Coefficient	P-Value
Constant	0.813958	0.114181
Hurst Exponent	0.278187	0.031919
R^2	0.828275	
F-stat	14.46982	0.031919

Source: Authors' Computation from Eviews Output (2025)

Table 3 presents the calculated values of the rescaled range and the size of each sub-sample. Table 4 presents the Hurst exponent regression estimate. The result shows a Hurst coefficient of 0.278187 significant at 5% level. The coefficient falls within 0-0.5, which indicates that the market return series is stationary but anti-persistent. It switches between high and low values in the long term. This result implies that a low value of stock returns would most likely follow a high value of stock returns and that the value after will tend to be low, with the tendency to switch between high and low values lasting a long time into the future. Another implication is that stock price returns tend to reverse to their mean level over time. Therefore, with the Hurst exponent coefficient (H) of 0.278187, the fractal dimension becomes; D=2-0.278187=1.721813. Thus, the fractal dimension value is 1.721813, which indicates that a rough series with local anti-persistence characterises the stock price returns in Nigeria. This means that the stock price return possesses mean reversing tendencies.

4.3 Information Entropy Volatility Analysis

Table 5 presents the entropy measures for the selected listed firms and the sectors for the given probability distribution of stock price returns.

Table 5: Entropy Score Estimates

	Entropy Score
All samples	4.983295
Consumer goods sector	2.199418
Financial service sector	0.325828
Industrial goods sector	0.756138
Oil and gas sector	1.59717
Service sector	0.104741

Source: Authors' Computation from Eviews Output (2025)

The entropy captures data series overall linear or non-linear dynamism (volatility). Volatility shows a different pattern in empirical evaluation. This pattern could be linear or non-linear. From the report in table 4, all the results are positive, which means that the data

series is non-linear—the character of the financial series within the sectors and overall shows some level of non-linear volatility. For all the samples, the entropy measure is positive, indicating that the volatility in the selected companies is non-linear. Because of the presence of volatility in the series, this study includes the variable for volatility as a significant determinant of stock market returns. From the movement of the stock return series and the entropy results, there is the presence of volatility in the stock price returns.

4.4 Cross-Sectional Dependency Test

The cross-dependency test result is presented in Table 6. It shows the presence of cross-sectional dependency in the series. This is because the null hypothesis of no cross-sectional dependence is rejected in the three tests (Breusch-Pagan LM, Pesaran scaled LM, and Pesaran CD) at a 1% significance level.

Table 6: Cross-Sectional Dependency Results

Sectors	Breusch-Pagan LM	Pesaran scaled LM	Pesaran CD
Consumer goods sector	294.7645***	41.16266***	17.16474***
Financial Services	65.21465***	5.742346***	6.802263***
Oil and gas sector	273.9294***	37.94773***	16.53438***
Industrial sector	58.7754***	4.748748***	5.101649***
Services sector	325.8017***	45.95181***	18.0482***
Overall Sample	9222.112***	9222.112***	9222.112***

*** p-value<0.01, ** p-value<0.05, * p-value<0.1; Source: Authors' Computation from Eviews Output (2025)

Moreover, for the overall sample, although there is the presence of cross-sectional dependency, the cross-section is higher than the time dimension (N>T). This makes the dynamic estimator most suitable to solve these inherent issues in the data. The study proposes the dynamic estimator of the Generalised Method of Moments (Difference - GMM). The Difference - GMM estimator provides more efficient standard errors in the face of endogeneity problem usually encountered in Panel analysis (Ullah, Akhtar & Zaefarian, 2018; Ullah, Zaefarian and Ullah, 2021).

4.5 Difference Generalised Method of Moments (Difference – GMM) Panel Estimation

Table 7 presents the regression analysis between stock price returns, volatility and financial ratios/indicators. The study modeled this relationship between the variables with relevant statistics. The empirical estimate using the p-value suggests the rejection of the null hypotheses, implying that the volatility of the stock returns (VOL), return on assets (ROA), return on equity (ROE), gross domestic product growth rate (GDPr), inflation (INF) and interest rate (INT) are significant determinants of stock market return at 1% significance level. However, the price to book value ratio (BV), earnings per share (EPS), and gearing ratio (GR) have a negligible impact on stock price returns (SPR). These results

suggest that the movement of price to book value ratio, earnings per share, and gearing ratio do not determine the direction of the stock price returns of the selected firms. While the volatility of stock price returns, return on assets, return on equity, GDP growth rate, inflation rate, and interest rate cause significant movement of the stock price returns. Moreover, the past value of stock price return (SPR (-1)) impacts the stock price return positively and significantly. This result buttresses the findings of this study that there is long-term memory in the Nigerian stock market. The memory is being carried directly from the past to the present.

Table 7: Difference – GMM Panel Regression Results

VARIABLES	Panel GMM
SPR(-1)	0.045771***
	(0.0025)
VOL	1.012053***
	(0.002334)
ROA	-0.002245***
	(0.000558)
ROE	0.000567***
	(8.85E-05)
BV	-0.030635
	(0.018652)
EPS	1.14E-05
	(5.84E-05)
GDPr	0.001849***
	(0.000707)
GR	-0.002338
	(0.002274)
INF	-0.003015***
	(0.000500)
INT	-0.006584***
	(0.001845)
AR(1)	-0.3856
AR(1) p-vaue	0.0000
AR(2)	-5.6667
AR (2) p value	0.6998
Observations	481
Hansen test (J-Statistics)	32.13403
Prob (J-statistic)	0.154171
Number of Cross sections	35
Instrument rank	35

Values in parentheses are standard errors of the coefficients; *** P-value<0.01, ** p-value<0.05, * p-value<0.1. Source: Authors' Computation from Eviews Output (2025). Cross-section fixed (first differences). White period standard errors & covariance (d.f. corrected).

This means that return on assets and return on equity are the only financial information that significantly impact stock price returns in the market among the selected firms. The observed result implies that the information on the return on assets drags the stock price returns. This speaks greatly to how the selected firms' assets are employed. This aligns with the findings of Parab and Reddy (2018) who found a significant and negative relationship between asset return and stock price. The result suggests that the asset turnover rate is not convincing enough to induce investors' confidence in the shares of the selected firms. Other studies found the return on assets to be a significant determinant,

including Zaheri and Barkhordary (2015) and Anwaar (2016). The result opposes studies such as Vora (2018), who found a weak relationship between return on assets and stock price returns, and Musallam (2018), who observed that return on assets is insignificantly related to stock price returns.

Furthermore, the study found that return on equity is a significant determinant of stock price returns of the selected firms. The results show that there is a positive relationship between return on equity and stock price returns. These results align with the findings of Zaheri and Barkhordary (2015), Wijesundera et al. (2016), and De Kai and Rahman (2018) and suggest that the higher the return on the shareholders' equity, the more the investment demand for the selected firms' shares. This finding is contrary to studies such as Vora (2018), who observed that return on equity is weakly related to stock price returns, and Anwaar (2016) and Musallam (2018), who found an insignificant relationship between return on equity and stock price returns.

Also, all the macroeconomic variables influence stock price returns significantly. More so, this study rejects the null hypothesis that stock market volatility does not affect the stock price returns in the Nigerian stock market, suggesting a significant relationship between stock market volatility and stock price returns. Financial theory suggests that volatility affects stock returns positively and that markets reward economic agents for the risk they assume with higher returns. The findings of this study were in line with financial theory and confirm the findings of studies such as Tabak and Guerra (2007), and Chiang and Doong (2001), who observed a positive relationship between volatility and stock returns. Also, Shin (2005) observed a positive but weak relationship between volatility and stock price returns. These findings are, however, contrary to studies such as Li et al. (2005); Hofileña and Tomaliwan (2014), and Thielen (2016), who found a negative and significant or weak relationship in some cases; Olasehinde–Williams (2018) and Cabak & Bergmark (2010) also found no relationship between volatility and stock price returns.

4.6 Post-Estimation Test

To validate the robustness of the Difference GMM estimation of stock price returns, we performed a set of standard diagnostic tests. The Hansen J-test for overidentifying restrictions produced a p-value of 0.1542, confirming the validity of the instrument set. The Arellano-Bond test for first-order autocorrelation (AR (1)) was significant ($p = 0.000$), as expected due to differencing, while the test for second-order autocorrelation (AR(2)) was not significant ($p = 0.6998$), satisfying the necessary assumption for valid moment conditions. The model employs White period robust standard errors, adjusting for heteroskedasticity, thereby ensuring valid inference. The number of instruments (35) matches the number of cross-sectional units (35 firms), avoiding the risk of instrument proliferation. The instruments used are theoretically strong and statistically relevant. These robustness tests collectively support the validity, consistency, and reliability of the Difference-GMM panel estimation results.

5. Conclusion and Policy Implications

This study contributes to the literature by investigating the impact of financial indicators and stock market volatility on stock market returns in Nigeria, using panel GMM on selected listed firms from the five major sectors. The findings of this study have significant policy implications. This study shows the presence of long-term memory in the Nigerian

stock market. Additionally, the historical movement of the stock prices is characterised by a rough series with local anti-persistence. This means that the stock price return possesses mean-reversing tendencies. This result implies that a low value of stock returns will most likely follow a high value of stock returns, and that the value after will tend to be low, with a tendency to fluctuate between high and low values, which can last for a long time. This study also provides helpful information about the nature of the Nigerian Stock market and factors that investors should consider before making investment choices. Evidence shows that financial indicators, particularly market volatility, return on assets and return on equity, are important determinants of the movement of stock prices on the Nigerian stock exchange. They influence the behaviour of investors in the market. Also, the health of the economy, measured by the level of inflation, economic growth, and monetary policy, are important factors that investors should consider before making their choices on which stocks to buy.

The study observes a significant relationship between stock price returns and other macroeconomic variables – inflation rate, GDP growth rate, and interest rate. The study reveals a significant relationship between interest rate and stock price return. The statistically significant influence of the monetary policy benchmark rate – the monetary policy rate on stock returns underscores the strong relationship between the Nigerian capital market and the monetary policy operations signaled by the monetary policy rate. This study establishes that the inflation rate inversely affects stock price returns. The negative relationship between inflation and stock price returns suggests that stocks are no safe zones for investors to preserve funds from being eroded by soaring inflation. The study also establishes that the GDP growth rate is an essential determinant of stock price returns, which suggests that the better the fundamentals of the economy represented by the GDP growth rate, the higher the willingness of investors to purchase the stocks of the selected listed firms.

Moreover, caution should be exercised in generalising the findings of this study because of the limitation in scope. The study only considers the Nigerian Stock Market. Moreover, due to the unavailability of data, other macroeconomic indicators such as money supply and unemployment are not considered in this study. Therefore, it is suggested that further studies should add other macroeconomic indicators such as monetary policy instruments like credit control and interbank rates as part of their variables. Further studies can extend this study to other African countries, in a panel of African exchanges.

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