(RESEARCH ARTICLE)

Announcement of accounting performance variables predictory power on share prices of listed deposit money banks in Nigeria

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Abstract

The study assessed the announcement of accounting performance variable predictory power on share prices of listed Deposit Money Banks in Nigeria. The study adopted an ex-post facto research design to assess the relationship between return on equity, return on assets, price-earnings ratio, and earnings per share-on-share prices of deposit money banks in Nigeria. A sample of 12 Deposit Money Banks quoted on the Nigerian Exchange Group was selected between the years 2012 to 2021. Panel data methodology was adopted because it combines time series and cross-sectional data. The methods of data analysis were descriptive statistics, correlation, and regression techniques, and other econometric statistical analyses were adopted. The results obtained disclosed that the shares market price of DMBs and accounting performance indicators (ROE, ROA, EPS PER) are related in the long run. Additionally, Granger causality tests showed that share prices are even more predicted by the explanatory variables. Further analysis revealed that all the explanatory variables have a strong and positive correlation with the share prices of DMBs. The regression result of the study showed that return on equity and return on asset hurt the share prices of DMBs while price-to-earnings ratios and earnings per share had a positive impact on share prices. Based on the findings, the study concluded that the accounting performance indices of DMBs of Nigeria are important predictors of share price oscillations in the capital market.

Keywords: Performance variables; Predictory power; Share price; Deposit Money Banks.

1. Introduction

Globally, the banking industry is an important arm of the financial sector germane to the development of the economy by providing financial services to the citizens. The crucial role banks played as financial intermediaries; in mobilizing and channeling funds from surplus units to deficit units of the economy cannot be overemphasized. According to Atseye, Mboto, Ugah, and Okio, (1), a well-articulated banking system is a prerequisite for rapid growth and development in a modern economy that desires to be called a developed or developing economy. The banking system and the stock exchange are all under the umbrella of the financial system that works in synchronization to achieve the macroeconomic objective of the economy, especially striving toward financial inclusion. The bank is the custodian of funds and helps through the stock exchange to pool large and long-term capital resources through issuing of shares to individual and corporation organizations, and often investors considered the Banks a better place to invest their funds due to historical performance and their ability to pay dividend Lawal, Nurudeen, & Abiodun, (2).

According to Grigoryan, (3), the stock is an aggregation of stockbrokers and traders who can buy and sell shares of stocks. Many large companies have their stocks listed on the stock market. This makes the stock liquid and thus more attractive to investors Dhankar, (4). There is a large number of investors who invest huge amounts in the stock market,

but it involves risk since the prices of stock may rise or fall within no time Usmani, Adil, Raza &. Ali, (5). That is why predicting stock prices is not an easy task and many researchers are working on it even when investors, analysts, and economists have formulated many theories and created ways whereby investors can predict the share price movement and make a profit. Predicting share price movement is the act of trying to determine the future value of company stock or other financial instruments traded on any capital market which is a function of many techniques Sharanya, Debeeru, and Lavanya (6).

One primary objective of deposit money banks is to make a profit by enhancing their performance. To do so, banks place great importance on their share price, which broadly reflects the corporations' overall financial health which is a function of historical performance trends. According to Lawal, Nurudeen, and Abiodun, (2), predicting stock prices depends on a company's financial reports and performance, etc. Remi (7), also asserted that firm stock prices have a direct relationship with managerial efficiency and earnings potential, which is one of the signals of firm performance. Therefore, the performances of Deposit Money Banks (DMBs) can contribute to the movement of share prices in the capital market Athanasoglou, Brissimis, & Delis, (8).

Over time, accounting performance ratios have been used as proxy variables to predict the market prices of firms' shares through the assessment of historical information. This notwithstanding, many still question the efficacy of accounting performance ratios in predicting share prices which is the foundation upon which this paper is initiated to assess the effect of accounting performance variables on share price movement in the stock market.

Objectives of the Study

The objectives formulated from the topic that guided the hypotheses tested are:

- to assess the effect of return on equity on share price oscillation of quoted Deposit Money Banks in Nigeria.
- to evaluate the effect of return on assets on share price oscillation of quoted Deposit Money Banks in Nigeria.
- to examine the effect of the price-earnings ratio on the share price oscillation of quoted Deposit Money Banks in Nigeria.
- to examine the effect of earnings per share on the share price oscillation of quoted Deposit Money Banks in Nigeria.

2. Theoretical framework

2.1. The Structure Conduct Performance Model (Mason, 1939)

The Structure Conduct Performance (SCP) model is one of the earliest frameworks used to examine the factors that determine the performance of banks taking into consideration both internal and external parameters such as the micro economics factors and capital base, market share, historical profit trends, etc. The theory was propounded by Mason in 1939. The theory presupposes that there is a correlation between industry structure and the profitability of banks. The structure of an industry refers to the factors such as technology, concentration, and market conditions. Conduct refers to how individual firms behave in the market; it involves pricing decisions such as interest rate, commission, fees, advertising decisions, and decisions to invest in research and development, among other factors. Financial performance refers to the resulting profits which emanate from how well a firm was able to use the resources controlled by past events.

Mason (9) was the earliest to suggest that for firms with large markets, shares play a key role in the capital market and such firms can hold large shares of the market, their profit is a function or is determined by the concentration level of the market as a result of the surge in demand for their products and shares in the market. He demonstrated that the profits of firms operating in highly concentrated industries are significantly higher than that of firms operating in industries with lower concentration. The Structure Conduct Performance (SCP) hypothesis presupposes that a higher banking industry concentration permits the collusion of banks to set higher prices and consequently gain substantial profits from their many products offered to customers and the level of patronage in the capital is because many investors considered banks to be more liquid and have the capacity to generate high profit (Mason, (9); Stigler (10); Clark (11); and Samad (12).

The structure conduct performance model is an approach that revolutionized the study of the industrial organization by establishing the use of microeconomic analysis or perspective to establish the connection between stock price and other structures of firms. the structure of the firm is the foundation upon which the firm reputation is anchored and many investors used that as the yardstick to determine performing, underperforming, and non-performing stocks in

the capital market. However, the structure comprises the management style, human capital, technology, demand for the products, community relations in terms of corporate social responsibilities, performance trends, etc.

In the SCP model, an industry's performance is the success of an industry in producing benefits for consumers depending on the conduct behaviour of the market players (the firm and investor or seller and buyer) which depends on the structure of the market and the firm distinctive penetration strategy because the structure of firms in terms of its capital which is a function of successive performance both financial and non-financial over a long period of times Grigoryan (3)

2.2. Concept of stock trading in the capital market

The stock market has become an essential market playing a vital role in economic prosperity that fosters capital formation and sustains economic growth. Stock markets are more than a place to trade securities; they operate as a facilitator between savers and users of capital through the pooling of funds, sharing risk, and transferring wealth. Stock markets are essential for economic growth as they ensure the flow of resources to the most productive investment opportunities. Moreover, during certain times of the year, it is easy to notice that stock prices appreciate every morning, and this may take place many times in one day for some stocks. This means that stock prices are determined by supply and demand forces influenced by corporate firm characteristics which are performance indices most especially quarterly earnings announcements.

Following the works of Al-Tamimi and Al-Mazrooei (13), he identified company fundamental factors; performance of the company, a change in the board of directors, appointment of new management, and the creation of new assets, dividends, earnings, and external factors; government rules and regulations, inflation, and other economic conditions, investor behavior, market conditions, money supply, competition, uncontrolled factors or environmental circumstances as influencers of share prices. He developed a simple regression model to measure the coefficients of correlation between stock price and earnings per share; dividend per share; oil price; gross domestic product; consumer price index; interest rate and money supply. He discovered that earnings per share had the most influencing factor on the share price. The information reflected by the current stock price includes information particular to the company offering the shares and information general to the market. For example, the former set of information includes earnings information, dividend announcement, firm growth, firm size, company solvency rating, mergers and acquisitions, etc. while the latter set includes all the information about the macro economy of the nation like the inflation rate, interest rate, unemployment rate, etc. which are general to all stocks traded in the market. All this information follows a random order in their occurrences and is reflected by the share prices, therefore no one can accurately predict their occurrence.

The behaviour of stock returns has been extensively debated over the years. Researchers have examined the efficient market and random walk characterization of returns and alternatives to a random walk. The validation of random walk implies that the market is informationally efficient. In an efficient market, current prices fully reflect available information and hence there is no scope for any investor to make abnormal profits Fama (14). In respect of empirical evidence, early studies have found shreds of evidence in favour of the random walk hypothesis (RWH). In the later periods, however, studies have supported mean reversion in returns. Fame's model is criticized for its assumption that market participants arrive at rational expectations forecast.

2.3. Prediction Methodologies of Share Prices

2.3.1. Fundamental analysis

Fundamental analysts are concerned with companies' key financial variables and the shares. They evaluate a company's past performance as well as the credibility of its accounts. Many performance ratios are created that aid the fundamental analyst in assessing the validity of a stock, such as the P/E ratio. Warren Buffett is perhaps the most famous of all fundamental analysts. He uses the overall market capitalization-to-GP ratio to indicate the relative value of the stock market in general, hence this ratio has become known as the "Buffett indicator Mohamed (15) & Mislinski (16).

What fundamental analysis in the stock market is trying to achieve, is finding out the true value of a stock, which then can be compared with the value it is being traded with on stock markets and therefore finding out whether the stock on the market is undervalued or not. Finding out the true value can be done by various methods with basically the same principle. The principle is that a company is worth all of its future profits added together. These future profits also have to be discounted to their present value. This principle goes along well with the theory that a business is all about profits and nothing else. Contrary to technical analysis, fundamental analysis is thought of more as a long-term strategy.

Fundamental analysis is built on the belief that human society needs capital to make progress and if a company operates well, it should be rewarded with additional capital and resulting in a surge in stock price. Fundamental analysis is widely

used by fund managers as it is the most reasonable, objective, and made from publicly available information like financial statement analysis. Another meaning of fundamental analysis is beyond bottom-up company analysis, it refers to top-down analysis from first analyzing the global economy, followed by country analysis and then sector analysis, and finally, the company level analysis to figure out factors that are capable causing an increase or decrease in share price.

2.3.2. Technical analysis

Technical analysts or chartists are not concerned with any of the company's fundamentals. They seek to determine the future price of a stock based solely on the trends of the past price (a form of time series analysis) Foley (17). Numerous patterns are employed such as the head and shoulders or cup and saucer. Alongside the patterns, common metrics used in technical analysis are:

Simple Moving averages: By using this metric, you try to even out the day-to-day movements of the stock by taking averages for a certain number of days, say 1 week, 10 days, 1 month, 3 months, etc.

Exponential moving averages: An exponential moving average is a weighted moving average that assigns more importance to recent price movements than the older ones.

Candlestick patterns: In this metric, candle stick-like images are plotted for each day of trade for a stock. It involves data points like opening price, closing price, range, etc. When candlestick images are plotted for several days, some patterns emerge based on which trading/investing decisions are taken.

Volume breakouts: This metric involves identifying a pattern when the stock breaks out of its set patterns with huge volumes. This signifies a change in the trend of the stock price.

Momentum indicators: Several metrics that indicate the momentum of the stock like the Stochastic oscillator, Relative Strength Index, and Moving Average Convergence Divergence are also used as metrics to predict if the movement in stock prices is a change in trend or a range-bound movement, or an insignificant movement. Technical analysis is rather used for short-term strategies, than long-term ones. And therefore, it is far more prevalent in commodities and forex markets where traders focus on short-term price movements. There are some basic assumptions used in this analysis, the first being that everything significant about a company is already priced into the stock, the other being that the price moves in trends, and lastly that history of prices tends to repeat itself which is mainly because of the market psychology.

2.3.3. Technological Methods/Machine Learning

With the advent of the digital computer, stock market prediction has since moved into the technological realm. The most prominent technique applicable to finance is the use of artificial neural networks (ANNs). The ANNs are mathematical function approximators Zlogan, (18). The most common form of ANN in use for stock market prediction is the feed-forward network utilizing the backward propagation of errors algorithm to update the network weights. These networks are commonly referred to as Backpropagation networks. Another form of ANN that is more appropriate for stock prediction is the time recurrent neural network (RNN) or time delay neural network (TDNN). Examples of RNN and TDNN are the Elman, Jordan, and Elman-Jordan networks. (See the Elman and Jordan Networks.)

For stock prediction with ANNs, there are usually two approaches taken for forecasting different time horizons: independent and joint. The independent approach employs a single ANN for each time horizon, for example, 1-day, 2-days, or 5-days. The advantage of this approach is that network forecasting error for one horizon won't impact the error for another horizon—since each time horizon is typically a unique problem. A major finding with ANNs and stock prediction is that a classification approach (vs. function approximation) using outputs in the form of buy(y=+1) and sell(y=-1) results in better predictive reliability than a quantitative output such as low or high price (Enke, 2004). Since ANNs require training and can have a large parameter space; it is useful to optimize the network for optimal predictive ability.

2.4. Empirical Review

Several studies have been conducted on share price prediction by different researchers at different periods. For instance, Christopher (19) investigated the predictive power for the future domestic economic activity included in the domestic stock prices, using a Granger causality analysis in the frequency domain. We are able to evaluate whether the predictive power is concentrated in the slowly fluctuating components or the quickly fluctuating components. Using 1991Q1–2010Q2 quarterly data, for the G-7 countries, we found that the slowly fluctuating components of the stock

prices have large predictive power for the future GDP, while this is not the case for the quickly fluctuating components. This finding holds both in a single-country setting and in a multi-country setting. Therefore, macroeconomic policymakers could use the slowly fluctuating components of the stock prices to improve their predictions of the future GDP.

Oladiture and Agbaje (2019), examined the impact of return on assets on market stock prices of quoted deposit money banks in Nigerian. A sample of 10 deposit banks quoted on the NSE was selected between the years 2009 to 2017. Preliminary analysis such as descriptive analysis was first conducted and this was followed by panel data regression. The results obtained disclose that the market prices of commercial banks' stock and net asset per share ratio are related in the long run. Additional Granger Causality Test indicated that unidirectional causality found the existence between stock prices and returns on assets. The study concluded that returns on assets do not significantly associate with stock prices of money deposit banks in Nigeria. The study suggested that further research could address other financial ratios even for a longer period.

Malaolu, Ogbuabor, and Orji (20), examined the macroeconomic determinants of stock price movements in Nigeria using a detailed econometric framework to provide the foundation for evidence-based policies. Both the long-run and short-run dynamic relationships between the stock price movement and the macroeconomic variables were analyzed with time series data that spanned from 1985 to 2010 using the Engle-Granger two-step cointegration test. We established that there is no cointegration between the variables, indicating the absence of a long-run relationship. Results of the regression indicate that the monetary policy variables (real exchange rate, real interest rate, and money supply), as well as political instability, are not the determinants of stock price movements in Nigeria; however, inflation was found to be a major determinant of stock price movements. The study recommends that the monetary authorities (that is the Central Bank of Nigeria, CBN) and policymakers should pay attention to changes in money supply and inflation given their sensitivity to stock price movements in Nigeria.

Shynkevich, et al. (21) explored whether the simultaneous usage of different financial news categories can provide an advantage in financial prediction systems based on news. Five categories of news articles were considered: news relevant to a target stock and news relevant to its sub-industry, industry, group industry, and sector. Each category of news articles was pre-processed independently and five different subsets of data were constructed. The findings have shown that the highest prediction accuracy and return per trade were achieved for MKL when all five categories of news were utilized with two separate kernels of the polynomial and Gaussian types used for each news category. The highest kernel weights were assigned to the polynomial kernels indicating that this kernel type contributes the most to the final decision. The SVM and kNN methods based on a single category of news, either SS, SIS, IS, GIS, or SeS, demonstrated worse performance than MKL. These results indicate that dividing news items into different categories based on their relevance to the target stock and using separate kernels for learning from these categories allows the system to learn and utilize more information about future price behavior which gives an advantage for more accurate predictions.

Indronil and Pryonti (22) investigated the impact of stock price prediction. The objective of the paper was to find the best possible method to predict the closing prices of stocks through a comparative study between different traditional statistical approaches and machine learning techniques. Predictions using statistical methods like Simple Moving Average, Weighted Moving Average, Exponential Smoothing, Naive approach, and machine learning methods like Linear Regression, Lasso, Ridge, K-Nearest Neighbors, Support Vector Machine, Random Forest, Single Layer Perceptron, Multi-layer Perceptron, Long Short-Term Memory are performed. Moreover, a comparative study between statistical approaches and machine learning approaches has been done in terms of prediction performances and accuracy. After studying all the methods individually, the machine learning approach, especially the neural network models are found to be the most accurate for stock price prediction.

Mirfakhr et al. (23) studied the relationship between financial variables and stock price through Fuzzy regression in Iran Khodro Company (Accepted in Tehran Stock Exchange) during the years 1998 to 2007. They used the variables of earnings per share (EPS), dividends per share (DPS), and the ratio of price to earnings as financial variables. The research findings showed that there is a significant and positive relationship between earnings per share (EPS) and stock price, but the relationship between cash dividend per share (DPS) and the ratio of price to earnings (P/E) with stock price is negative and significant.

Zeytinoglu et al (24) tested the effects of market ratios on the stock return of current and future years of insurance companies listed in the Istanbul Stock Exchange from the years 2000 to 2009. In this study, the market ratios include price to earnings ratio (P/E), the ratio of market value to book value (M/B), and earnings per share (EPS). Research findings suggest that there is no significant relationship between market ratios and stock return of the current and

future years and only the relationship between the ratio of market value to book value (M/B) and stock return of current and future years is positive and significant.

Irungu (25) explored the impact of financial performance indicators on the stock prices of commercial banks in Kenya. The study used the company size (total assets), liabilities, and cost-to-income ratio as independent variables, while the market share price is used as the dependent variable. The study sample consists of 10 commercial banks listed on the Nairobi Stock Exchange (NSE), Kenya for the year 2011. Multiple regression models have been deployed to analyze the impact of the independent variables on the dependent variables. The results concluded that the model is significant.

3. Research Methodology

The research design that was adopted is the ex-post-facto because the variables were collected from secondary sources from the firm's financial statements of the companies, and share price data was gotten from the Nigerian Exchange Group's annual publication. The researchers had no influence in recalculating or manipulating any variable because all existed as secondary sources. The population of the study is a total of fourteen (14) banks listed on the Nigerian Exchange Group, but twelve were purposively selected as the sample of the study based on the time frame and availability of data as most of the banks that had reporting issues in filling their annual report with relevant authorities were eliminated for purpose using those with complete information.

3.1. Model specification

concerning the main objective of this study, which was to assess the announcement of accounting performance variable predictory power on share prices of listed Deposit Money Banks (DMBs) in Nigeria. The panel regression model used is as stated below:

$$SP = f (ROE, ROA, PER, EPS) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

When transformed into an econometric form, the model becomes:

$$SP = a_0 + a_1 ROE + a_2 ROA + a_3 PER + a_4 EPS + U \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where:

SP = share prices of quoted DMBs;
ROA = return of asset;
ROE = return on equity;
PER = price to earnings ratio;
EPS = earnings per share;
a_0 is the intercept or constant;
$a_1 – a_4$ are the coefficients of the independent variables of the research; and U is the error term.

Table 1 Definition of Variables and Theoretical Expectations

Variable	Definition	Sign
SP	Share prices: which is the simple average of share price obtained by dividing the sum of the opening and closing share prices of the year by 2.	+/-
ROE	Return on equity: measures how well the company is investing the money invested in it by shareholders. It is obtained by dividing net profit by the total equity.	+/-
PER	Price to earnings ratio: an indication of whether the current share price is expensive or cheap obtained by dividing the current price of the stock by the earning per share.	+/-
ROA	Return on asset: a proxy for the performance of deposit money banks. Measured as the ratio of net profit to total assets.	+/-
EPS	Earnings per share: shows the amount of money shareholders are entitled to in the event of liquidation. Measured as the ratio of net profit to total numbers of share outstanding.	+/-

4. Results

4.1. Descriptive statistics

The result of the descriptive analyses of the various series in Table 2 below shows a considerable level of variability in the behavioural pattern of the series. The results from Table 2 show that the share prices of the Nigerian DMBs have a total mean score of 9.73466. This indicates that on average listed DMBs value their shares at N9.73. The standard deviation of 11.1359 discloses a significant variation of simple average share price with a minimum value of N0.50 and a maximum value of N47.95. For return on equity (ROE), the maximum is 32.08000 whereas the minimum value of -394.3200 shows that among the selected banks were those who had negative returns on equity implying that shareholders are losing on their investment in the company.

Return on asset (ROA) has a mean value of 1.6490. This shows the average value of ROA of the banks has minimum and maximum values of -9.5300 and 5.62000 and respectively. The difference between the maximum and the minimum values informed the range of data. The negative ROA during the period signifies inefficiency in the use of total assets for the generation of revenue. The standard deviation for ROA was 1.7691. This demonstrated that the ROA among the banks is diverse.

Further analysis of the descriptive statistics revealed that the mean value of price to earnings ratio (PER) was 5.4693 for the same period with a standard deviation of 3.936143. The maximum and minimum values for PER were 27.0300 and -1.2400 respectively. Finally. Earnings per share (EPS) has a mean score of 1.9591. This implies that the DMBs have an average of 19% which shows investors' willingness to pay for more shares, with a minimum of -1.2800 and a maximum of 7.7900. The 2.1113 standard deviation signifies a substantial level of dispersal of earnings per share of the banks during the period of the study.

Table 2 Result of descriptive statistics

	SP	ROE	ROA	PER	EPS
Mean	9.734667	9.182833	1.649083	5.469333	1.959167
Median	5.735000	12.02000	1.365000	4.605000	1.050000
Maximum	47.95000	32.08000	5.620000	27.03000	7.790000
Minimum	0.500000	-394.320	-9.530000	-1.240000	-1.28000
Std. Dev.	11.13592	38.85301	1.769149	3.936143	2.111395
Skewness	1.557860	-9.53786	-2.254034	2.230871	1.260227
Kurtosis	4.731956	98.82032	17.06948	10.85356	3.714729
Jarque-Bera	63.53695	47727.08	1091.365	407.9275	34.31765
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1168.160	1101.940	197.8900	656.3200	235.1000
Sum Sq. Dev.	14757.05	179637.2	372.4566	1843.693	530.5007
Observations	120	120	120	120	120

Source: E-views 12.0 statistical software

Furthermore, the analysis indicated that the measurement of skewness showed that SP, PER, and EPS were found to be positively skewed while ROE and ROA were found to be left-skewed (negatively skewed). The coefficient of the kurtosis indicated that all the variable was found to be peaked (3.00 and above) (Leptokurtic) relative to the normal distribution. The Jarque-Bera (JB) test measures the difference in skewness and kurtosis of the series with those from the normal distribution. The Jacque-Berra test of normality indicates a normal arrangement for the variables and confirms that the series are suitable for generalization.

4.2. Correlation of the study variables

The data were subjected to correlation analysis to test for highly correlated variables to avoid the problem of multi-collinearity in the model. The table below shows the relationship between all explanatory variables and the relationship between all the independent variables themselves. This gives an insight into the magnitude of the pairs of independent variables. The correlation coefficient results were summarized in Table 3 below.

Table 3 Correlation Results

	SP	ROE	ROA	PER	EPS
SP	1.00000				
ROE	0.24138	1.00000			
ROA	0.65929	0.39983	1.00000		
PER	0.17558	0.16304	0.14944	1.00000	
EPS	0.76868	0.27397	0.66935	-0.11861	1.0000

Source: E-views 12.0 statistical software

From Table 3 the correlation coefficient of return on equity (ROE) was 0.24138. This signified a positive correlation between return on equity and share prices because as the former increases, share price also increases. The correlation coefficients between return on asset 0.65929 and share price indicate a strong positive relationship. Return on asset and share price has a positive relationship because when the latter increases, the return on asset equally increases for each of the periods. Similarly, the correlation coefficient of price to earnings (PER) was 0.17558. Going by this, as PER increases, the share price will increase due to a positive relationship. Regarding the earning per share (EPS) of the firms, there is an indication that an increase in EPS which is 0.77 leads to the same percentage increase in share price proxies respectively.

Thus, as the selected accounting performance indices increase, there is also a corresponding increase in share prices during the period. Finally, the results revealed that all the selected explanatory variables indicate no multicollinearity problem.

4.3. Cross-Sectional Dependence Test

The cross-sectional dependence test helped in deciding whether to use first or second-generation panel unit root tests. To this end, three tests were performed: the Breusch-pagan Lagrange Multiplier (LM), the Pesaran scaled Lagrange multiplier (LM), and the Pesaran cross-sectional dependence (CD).

Table 4 Cross-Section Dependence Test

Test	Statistics	d.f.	Prob.
Breusch-Pagan LM	197.0392	66	0.0000
Pesaran scaled LM	11.40550		0.0000
Pesaran CD	-1.2948915		0.1953

Source: E-views 12.0 Statistical software

Evidence from Table 4 below suggests rejection of the null hypothesis of no cross-sectional dependence i.e there is cross-section dependence among the regressors at a 5% level of significance for the Breusch-pagan Lagrange Multiplier (LM), and the Pesaran scaled Lagrange multiplier (LM) tests. This means that there is a certain level of dependence among the selected accounting performance indices. Thereby confirming the appropriateness of the first-generation panel unit root tests for this study.

4.4. Panel Unit Root Test

Having described the nature of our data series and found some of them to be normal, the data were analyzed for unit root at individual intercept. The purpose of selecting individual intercepts is to ensure that the data will be treated with

recognition of differences in the cross sections; that is, each bank in the panel is treated as different from other banks instead of pooling them together as was obtainable in the descriptive statistics section above.

Table 5 Panel Unit Root Test Result - Newey-West automatic bandwidth selection and Bartlett kernel

Variable	Levin, Lin & Chu Stat	Prob.**	Conclusion
SP	-6.21668	0.0000	Stationary panels
ROE	-5.99823	0.0000	Stationary panels
ROA	-5.18127	0.0000	Stationary panels
PER	-13.4262	0.0000	Stationary panels
EPS	-5.96602	0.0000	Stationary panels

** Probabilities are computed assuming asymptotic normality; Source: E-views 12.0 statistical software

The results indicate the variable was found to be stationary at intercept and level I (0) as all the null hypotheses of unit root both with an assumption of common unit root process and individual unit root process were rejected given that each series' probability value consistently yields a value less than 5%. Therefore, we reject the null hypothesis and conclude that the data is stationary.

4.5. VAR lag order

As statistically established, it is important to determine the lag length for the model. To achieve this, the researchers engaged all the automatic lag selection criteria of Final Prediction Error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC), and Hannan-Quinn information criterion (HQ) as shown below;

Table 6 VAR lag order selection criteria

Lag formation	FPE	AIC	SC	HQ
0	920.8300	18.17678	18.28363	18.21997
1	59.41737	15.43572	15.96996*	15.65167
2	40.65659*	15.05446*	16.01609	15.44317*

* Indicates lag order selected by the criterion (tested at 5% level each); Source: E-views 12.0 statistical software

The VAR lag order selection criteria in Table 6 reveals that a lag length of 2 is selected at a 5% level based on Final prediction error (FPE), Akaike information criterion (AIC), and Hannan Quinn information criterion (HQ), indicating that VAR (2) specification is the estimation model and the plausible description of the data used

4.6. Panel Cointegration Test

The results of the stationarity analysis presented in Table 7 show that all the modeled variables are integrated in the same order. This section is dedicated to analyzing the possibility of estimating an ordinary least square long-run relationship among the variables selected in this study. Therefore, the study then applies the Pedroni cointegration tests to explore the long-run relationships among the variables.

Table 7 Pedroni cointegration tests

Alternative hypothesis: common AR coefs. (within-dimension)				
	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-1.455418	0.9272	-2.673801	0.9963
Panel rho-Statistic	1.851897	0.9680	2.869071	0.9979
Panel PP-Statistic	-7.771897	0.0000	-5.053570	0.0000
Panel ADF-Statistic	0.460700	0.6775	-2.209625	0.0136

Alternative hypothesis: individual AR coefs. (Between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	4.037846	1.0000		
Group PP-Statistic	-10.52411	0.0000		
Group ADF-Statistic	-0.820159	0.2061		

Source: Computed from E-View Windows 12.0

The results of the cointegration test proved that the variables are cointegrated as the probability coefficient of the variables for PP and ADF are less than 0.05, hence we conclude based on the above results that the market prices of deposit money banks' share prices and accounting performance indices (ROE, ROA, PER, and EPS) are related in the long run.

4.7. Granger causality test

At the unit root test, all the variables showed that variability increases with time and is non-stationary at the original series. Finally, all the variables found a unit root at lag 2. Therefore, the Granger Causality test was performed to obtain the source of any relationship or association that may exist between the share prices of DMBs and any other variable paired with it among all the variables in our study. The Granger causality test is a statistical test that explains the association of two variables based on prediction.

**Table 8** Result of Causality Test at lag 2

Null Hypothesis	Obs	F-stats	Prob
ROE does not Granger Cause SP	96	0.44329	0.6433
SP does not Granger Cause ROE		36.1181	3.0021
ROA does not Granger Cause SP	96	0.47986	0.6204
SP does not Granger Cause ROA		10.1020	0.0001
PER does not Granger Cause SP	96	0.58673	0.5582
SP does not Granger Cause PER		0.10678	0.8988
EPS does not Granger Cause SP	96	3.65258	0.0298
SP does not Granger Cause EPS		1.97767	0.1443
ROA does not Granger Cause ROE	96	26.4405	9.E-10
ROE does not Granger Cause ROA		0.01243	0.9876
PER does not Granger Cause ROE	96	0.54110	0.5840
ROE does not Granger Cause PER		10.5564	8.E-05
EPS does not Granger Cause ROE	96	29.5962	1.E-10
ROE does not Granger Cause EPS		0.17026	0.8437
PER does not Granger Cause ROA	96	2.09279	0.1292
ROA does not Granger Cause PER		1.02094	0.3643
EPS does not Granger Cause ROA	96	5.65131	0.0049
ROA does not Granger Cause EPS		1.69025	0.1902
EPS does not Granger Cause PER	96	0.04162	0.9593
PER does not Granger Cause EPS		1.21274	0.3021

Source: E-views 12.0 Statistical Software

According to results obtained as contained in Table 8 above, share prices of the various selected firms were paired with each financial ratio performance indicator to form ten pairs of hypotheses; the result of the first pair suggests that both the null hypothesis which proposes that share prices Granger cause returns on equity and return on equity Granger cause share prices will be rejected. However, it follows that there is a unidirectional causality relationship between ROA and the share prices of DMBs. Further, share prices Granger cause return on asset. Thus, share prices are even more predicted by the values of return on assets. Furthermore, the Granger Casualty results revealed that the F statistic values of the price-to-earnings ratio suggest a multidirectional causality relationship between price-to-earnings (PER) and share prices. Thus, it can be argued that changes in PER cannot predict the present value of share prices. However, the values of the F statistic in Table 8 suggest that there are no links between the earnings per share and share prices (i.e EPS does not Granger cause SP) since the probability values are greater than 0.05. This means that earnings per share have no predictory power over the share prices of DMBs in Nigeria while other factors are held constant.

4.8. Forecasting Volatility

All the pre-mentioned statistical analysis gives more support to forecast the oscillations of share prices over the period, and since the selected observations from the descriptive statistics can be described as leptokurtic, fat-tailed, and normally distributed; the study proceeds to forecast the conditional volatility of share prices using the full sample from 2012 to 2021. The result is presented in Figure 1 below.
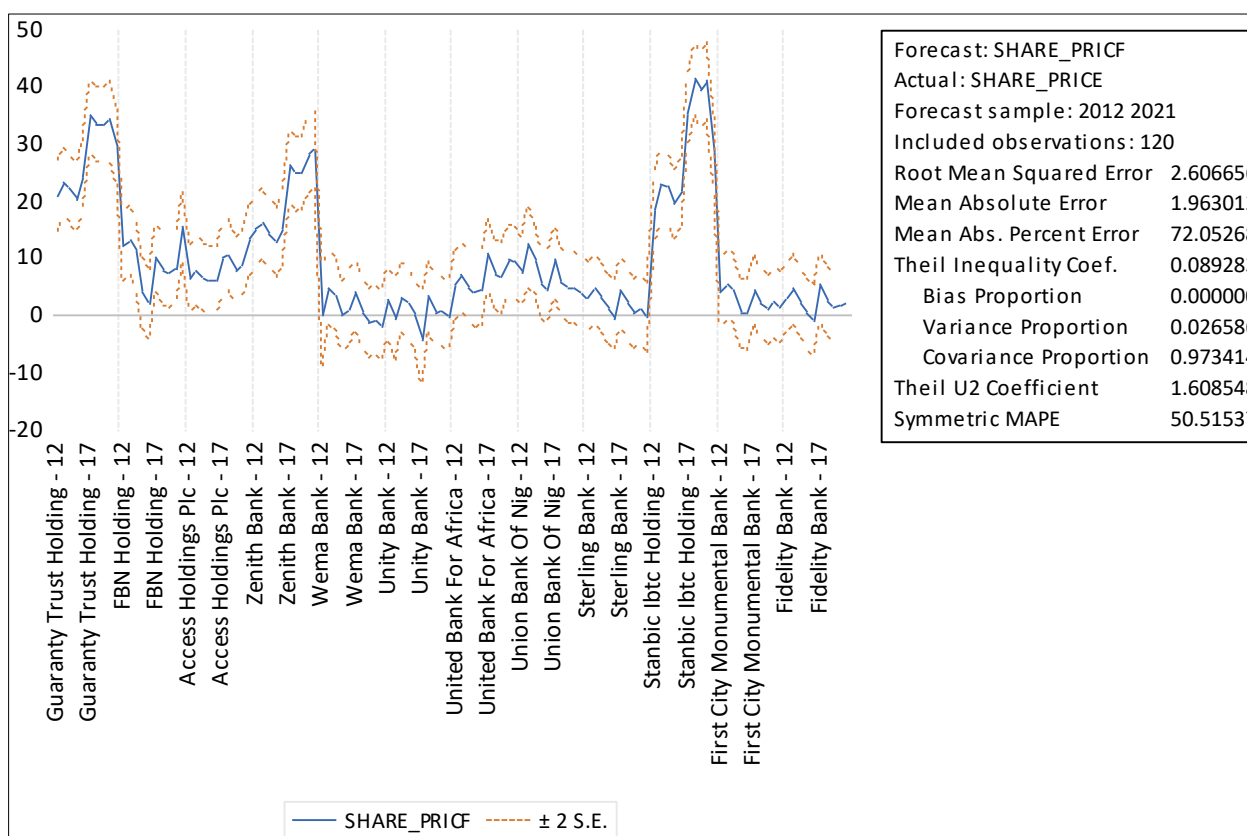
Source: E view 12.0 statistical software

Figure 1 Forecast volatility

By visual inspection of the share market prices of quoted DMBs during the period 2012-2021, it can be observed that volatility changes over time and tends to cluster share prices, which is an indicator for long memory too. In other words, the figure above shows the up and down movements of the share prices among selected DMBs in the long run. This block up and down movement is called cluster volatility. These blocks of up or/and down volatility indicate the presence of clustering volatility. This is more visible as some banks had stable price oscillations while others experienced increasing volatility during the period.

4.9. Analysis and discussion of results

As mentioned previously there are three approaches to Panel data: Pooled, Fixed, and Random effects model. This study employed the use of the Hausman test to determine the most suitable model.

Table 9 The Hausman Test to Identify the Suitable Model

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	15.094650	4	0.06245
Variable	Fixed	Random	Difference
ROE	-0.007145	-0.009228	0.000002
ROA	0.186442	0.239757	0.001627
PER	0.182758	0.282091	0.001036
EPS	3.539937	3.950178	0.020546

Source: E-views 12.0 statistical software

In Table 9 above, the Chi-square test statistic was 15.0946 with an insignificant probability value of 0.0624. This, therefore, meant that the null hypothesis was rejected in favor of the Random effects model. Therefore, we accepted the Random effects model as suitable for this study.

4.10. Panel Regression Results

Table 9 shows the random effects robust regression results. The coefficients and the significance for each of the explanatory variables are also presented. The value of the intercept -0.489274, revealed that the predictive power of share prices of quoted deposit money banks in Nigeria will experience a 0.489274 unit decrease when all other variables (return on equity, return on asset, price-earnings ratio, and earnings per share) are held constant. The estimated coefficient which is -0.01526 for return on equity {ROE} shows that a 1.5 percentage change in ROE will cause a corresponding percent decrease in the predictive power of share prices in Nigeria. Hence, the result reveals an insignificant negative relationship between return on equity and share price. This means that a higher proportion of the return on equity leads to a lower share price. Further, the coefficient of 0.144349 for return on assets {ROA} shows that a percentage change in ROA will cause a corresponding percentage increase in the share prices of deposit money banks in Nigeria but was found to be statistically insignificant.

Table 9 also discloses the positive effect of the price-to-earnings ratio on share price and is statistically significant. The coefficient estimates of 0.477208 for the price-to-earnings ratio with a significant probability value of 0.0000 shows that a unit increase in the price-to-earnings ratio will result in an upward change in share price.

Table 10 Panel Least Square - Random Effect

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.489274	1.242417	-0.393808	0.6945
ROE	-0.015268	0.008864	-1.722471	0.0877
ROA	0.144349	0.264412	0.545924	0.5862
PER	0.477208	0.103862	4.594658	0.0000
EPS	3.836369	0.270919	14.16060	0.0000
Effects Specification				
			S.D.	Rho
Cross section random			2.982431	0.4655
Idiosyncratic random			3.196071	0.5345
Weighted Statistics				

R-squared	0.656162	Mean dependent var	3.124359
Adjusted R-squared	0.644202	S.D. dependent var	5.616647
S.E. of regression	3.350263	Sum squared resid	1290.790
F-statistic	54.86487	Durbin-Watson stat	1.222973
Prob(F-statistic)	0.000000		
Unweighted Statistics			
R-squared	0.797339	Mean dependent var	9.734667
Sum squared resid	2990.681	Durbin-Watson stat	0.527840

Source: E-views 12.0 statistical software

Lastly, the estimated coefficient for earnings per share (EPS) {0.477208} with a significant probability value shows that a percentage change in EPS will cause a corresponding percent increase in bank share prices. This shows that the higher the earnings per share of a bank, the higher the market prices of its shares. Furthermore, the R^2 {R-Squared} which measures the overall goodness of fit of the entire regression, had a value of 0.6561 which showed that accounting performance indicators explained the changes in share prices by approximately 65%. The adjusted R-Squared was 0.6442 which has a difference of 1% from the R-Squared which is within the acceptable range for a stable model. This showed that the model was stable. The test for the existence of autocorrelation was performed using the Durbin-Watson statistic. The Durbin-Watson result indicates 1.22 and since this value lies between 0 and 2, it can be deduced that there is an absence of autocorrelation among the successive values of the variables in the model.

4.11. Test of Hypotheses

4.11.1. Test of Hypothesis one

H_0: Return on equity does not have a significant impact on the share price oscillation of quoted DMB in Nigeria.

H_1: Return on equity has a significant impact on the share price oscillation of quoted DMB in Nigeria.

Results of Table 10 show that the coefficient of ROE was -0.015268 with an insignificant probability value of 0.0877. This signified that there was a negative and insignificant impact of return on equity on share price oscillation. We, therefore, accepted the null hypothesis that return on equity does not have a significant impact on the share price oscillation of quoted DMB in Nigeria.

4.11.2. Test of hypothesis two

H_0: Return on an asset does not have an impact on the share price oscillation of quoted DMBs in Nigeria.

H_1: Return on the asset has a significant impact on the share price oscillation of quoted DMBs in Nigeria.

From Table 10 the coefficient of return on assets was 0.144349 with an insignificant probability value of 0.5862. This signified that during the period return on assets exhibited a positive but insignificant impact on share price oscillation. Hence, we, therefore, accepted the null hypothesis that the return on an asset does not have an impact on the share price oscillation of quoted DMBs in Nigeria.

4.11.3. Test of hypothesis three

H_0: Price earnings ratio has an insignificant impact on the share price oscillation of quoted DMBs in Nigeria.

H_1: Price earnings ratio has a significant impact on the share price oscillation of quoted DMBs in Nigeria.

Based on the results of Table 10 the coefficient of PER was positive and statistically significant. This signified that price to earnings ratio positively impacted on share prices of DMBs in Nigeria because the coefficient is 0.477208 with a probability value of 0.0000. We, therefore, accept the alternative hypothesis that the price-earnings ratio has a significant impact on the share price oscillation of quoted DMBs in Nigeria.

4.11.4. Test of Hypothesis four

H_0: Earnings per share have an insignificant impact on the share price oscillation of quoted DMBs in Nigeria.

H_1: Earnings per share have a significant impact on the share price oscillation of quoted DMBs in Nigeria.

From Table 10 the study deduced that earnings per share have a coefficient of 3.836369 with a significant probability value of 0.0000. Implying that there was a positive impact of earnings per share on bank share prices. Hence, the study accepted the alternative hypothesis of the study and concluded that: earnings per share has a significant impact on the share price oscillation of quoted DMBs in Nigeria.

However, the F-statistics showed that entire explanatory variables were significant with F-statistic value of 54.86487 and probability value of 0.000000.

5. Discussion

The overall result of the descriptive analysis showed the absence of outliers in the data. The Jacque-Berra test of normality indicates a normal arrangement for the variables and confirms that the series are suitable for generalization. From the correlation results test for highly correlated variables and multicollinearity problem. The results revealed that all the selected explanatory variables indicate no multicollinearity problem. Additionally, the correlation coefficient for all the explanatory i.e., return on equity (ROE), return on asset (ROA), price to earnings (PER), and earnings per share (EPS) were strong and positive. This signified a strong positive correlation between independent variables and share prices because as the former increases, share price also increases based on the correction indicators.

A group panel unit root test was also conducted to ensure that the series were stationary and check the problem of having a spurious regression. From the result, it was estimated that SP, ROE, ROA, PER, and EPS were found to be stationary at intercept and level I (0) because the Levin, Lin & Chu t* statistic had a probability value of 0.0000 which is significant at 5% level of significance. The result of the panel unit root test gives impetus to carry out the panel cointegration tests to examine the long-run equilibrium relationship among the variables. The Pedroni cointegration tests proved that the variables are cointegrated, hence we conclude based on the above results that the market prices of DMBs' shares and accounting performance indices (ROE, ROA, PER, and EPS) are related in the long run.

The Granger causality test was also conducted to explain the association of two variables based on prediction. The result which proposes that share prices Granger cause returns on equity was rejected as the probability exceeded the 5% significant level. However, it follows that there is a unidirectional causality relationship between the return on assets and the share prices of deposit money banks. Thus, share prices are even more predicted by the values of return on assets. Furthermore, the Granger Casualty results revealed that price to earnings ratio suggests a multidirectional causality relationship between share prices. Thus, it can be argued that changes in PER cannot predict the present value of share prices. Earnings per share do not Granger cause share prices since the probability value is not significant at the 5% level.

Using the Hausman test to identify the suitable model for the study, the random effect model was adopted. From the panel least square regression results (random effect). The estimated DW-statistic is 1.22 hence it can be deduced therefore, that there is an absence of autocorrelation among the successive values of the variables in the model which suggests that the model is good for prediction. The panel least squares estimation R-square is 0.6561 indicating that about 65 percent of changes in the share prices of DMBs' in Nigeria are accounted for by return on equity, return on asset, price to earnings ratio, and earning per share all things being equal.

Further, the estimated regression analysis results in Table 9 revealed that return on equity has a negative coefficient result that was statistically insignificant on the share price. This implies that a percentage increase in ROE will cause a corresponding percent decrease in DMBs share prices in Nigeria. The positive impact of ROA on share price is in line with the work of Oladutire & Agbaje, (20) who found a positive and nsignificant influence of ROA on bank stock prices. Further, the results reveal a significant positive relationship between the price-to-earnings ratio and the share prices of quoted deposit money banks. The positive relationship between the price-to-earnings ratio and return on asset shows that when the bank's price-to-earnings ratio increases, the bank's share price also increases. However, this finding is contrary to that of Mirfakhr et al. (23) who found a negative impact of the price-earnings ratio on the movement of share prices.

6. Conclusion

This study assesses the predictive power of accounting performance indices on the share price oscillation of deposit money banks in Nigeria. To achieve the objective of the study, the researcher adopted the panel regression technique and present the following findings:

Return on equity showed a negative but insignificant impact on share prices of quoted DMBs in Nigeria, hence, the null hypothesis that returns on equity has no impact on share prices of deposit money banks in Nigeria was accepted.

Return on asset showed a positive impact on bank share prices in Nigeria but was found to be insignificant; hence, the null hypothesis that return on an asset does not have an impact on share price oscillation of quoted DMBs in Nigeria was accepted.

Price earnings ratio positively impacted on share prices of DMBs in Nigeria. We, therefore, accept the alternative hypothesis that the price-earnings ratio has a significant impact on the share price oscillation of quoted DMBs in Nigeria.

Earnings per share have a significant probability value and a positive impact on bank share prices. Hence, the study accepted the alternative hypothesis of the study and concluded that: earnings per share has a significant impact on the share prices oscillation of quoted DMBs in Nigeria

This study was undertaken to assess the predictive power of accounting performance indices on the share prices oscillation of deposit money banks in Nigeria. Data for the study were obtained from the financial statements of twelve deposit money banks in Nigeria between 2012 and 2021. This study was carried out to statistically evaluate the explanatory power of ROE, ROA, PER, and EPS on stock prices of deposit money banks in Nigeria. From our empirical analysis, the study employed the unit root test and Pedroni cointegration test to examine the long-run impact of the variables. From the test conducted, the study concluded that bank share prices and accounting performance indices have a long-run impact. Furthermore, the analysis of the correlation results revealed that all the explanatory i.e., return on equity (ROE), return on asset (ROA), price to earnings (PER), and earnings per share (EPS) have strong and positive share prices of DMBs. The Granger causality tests showed that share prices are even more predicted by the explanatory variables.

The estimated Panel regression analysis results revealed that return on equity has a negative impact on the share prices of deposit money banks. Signifying that changes in the stated variable during the period negatively affect bank share prices in Nigeria. However, return on asset, price-to-earnings ratios, and earnings per share had a positive and significant impact on share prices. This means that the chosen variables have a predictive power to positively influence the share prices of deposit money banks in Nigeria. From the results of the analyses and the observations obtained, it is firmly clear that the accounting performance indices of deposit money banks of Nigeria are important predictors of share price oscillations which are evidenced by the significant result for PER and EPS. It is equally important to note that share price oscillation depends not only on the chosen performance indicators but on other micro and macroeconomic factors of the economy.

Recommendations

From the findings, the study makes the following recommendations for policy and practice:

- It is recommended that banks adjust their policies to move the returns on equity and share price in the same positive direction.
- The study further recommends that bank management carefully examine the drivers or factors that may affect the return on assets of banks, instead of just computing the ratio based on figures from the audited financial statement.
- Since the price-earnings ratio and earnings per share significantly affect share price oscillations, regulatory authorities should monitor the changes in these ratios as it serves as an important prediction of share prices.
- The study also suggests that for further research, changes in stock price are functions of many factors including macroeconomic variables. This study therefore only gives a partial analysis, hence a study on a wide analysis is recommended.

Compliance with ethical standards

Disclosure of conflict of interest

There is no identified issue in the process of writing and gathering data for this paper that will result in a conflict of interest now and in the future either with the authors, organizations, or materials utilized. We hereby authorized your team to use all the attached materials for the review and publication of our article.

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