



Effect of Audit Quality on Value Relevance of Accounting Earnings of Manufacturing Companies Listed in Nigerian Exchange Group

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study investigates the effect of audit quality on the relationship between accounting earnings and share prices of quoted manufacturing companies in Nigeria. The current research uses secondary data extracted from 19 sample companies listed on the Nigerian Exchange Group (NGX), from 2006 to 2021. Pooled Ordinary Least Squares (POLS) are used to estimate the results. The findings reveal that earnings per share (EPS) statistically significantly and positively impact the share price of quoted manufacturing firms in Nigeria. The results also indicate that book value per share does not significantly explain the variations in share price. Interestingly, findings show that the moderating role of audit quality has a greater interaction effect with book value per share of quoted manufacturing firms in Nigeria. Finally, the results also show that earnings per share and book value per share have a combined significant effect on the share price of quoted manufacturing companies in Nigeria. The study has valuable insights and implications for shareholders, board members,

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practitioners, academicians, and policymakers. Further, the study contributes to the current literature by investigating the impact of audit quality on the relationship between accounting earnings and the share price of manufacturing companies. The agency, shareholders, and stakeholder theories support the findings, which contribute to a better understanding of the role of audit quality in the value relevance of accounting earnings information. We recommend among others the need for quality auditing of financial statements of companies to enhance financial performance.

Keywords: Audit quality; accounting earnings; value relevance; share prices; earnings per share.

1. INTRODUCTION

The share prices of every company indicate how investors valued its ability to earn and grow its profit in the future [1]. This implies that shareholders and potential investors are concerned and genuinely interested in corporate entities' earnings information and auditors report on their client companies' financial and non-financial activities. Hence, the managers of such companies adopt several strategies to actualize maximum earnings that will please the shareholders [2]. Prior studies have shown the quality of a firm's management of earnings that are reported in the financial statements, and how this reflects on the market value per share of companies.

Management of accounting earnings through manipulation always ensures that earnings per share meet analysts' forecasts [3]. The current earnings signal future cash flows, and the inability of the generating companies to measure up the expectations of analysts concerning earnings per share could have a serious adverse return on share prices whereas achieving the investor's expectations will maintain the growth of share price [3]. The presumed essential role and ability of quality auditors to curtail earnings manipulations or management of financial statements across the world and Nigeria, in particular, is under doubt due to various cases of corporate earnings scandals [4,5,2,6,7,8]. The reliability and credibility of earnings reports of companies issued by different auditors tend to indicate the differences in the audit firm's quality. Hence, the much-celebrated trust by the company owners in the importance and value relevance of the audit function is on the verge of being eroded. In past decades, cases of accounting earnings scandals perpetrated under the purview of poor audit quality (AQ) involving various companies have been reported [9]. In Nigeria, a few examples of companies that have experienced such corporate failure are Cadbury Plc, African Petroleum Plc, and the collapse of several deposit money banks. Also, the recent

"three failed US banks had one thing in common: KPMG" Investors and potential shareholders are finding it difficult to make an informed decision due to the perceived inability failure of auditors to update the Shareholders and other claimants concerning misrepresentations in the financial statements [4,3]. The faithful representation of accounting earnings is in doubt and the failure of auditing to effectively and efficiently curtail management earnings machinations [10]. Thus, the reported income by some entities is questionable and its relationship with the audit process is given the pockets of corporate failures [5].

The issue is whether quality auditing significantly affects the relationship between accounting earnings and share prices. Investors or earnings analysts are concerned about corporate entities' reported incomes such as earnings per share. (EPS), meaningful gives information pertaining to the exact amount that an entity realized with respect to every share of its stock. EPS is generally accepted as an estimator of firm or company value worth at the end of every financial year. An increase in the amount of EPS shows the likelihood that an investor will willingly pay for more company shares with a positive belief that the entity generates much profit relative to its share prices [11]. The investor will also focus on the book value per share (BVPS) to evaluate the company's stock prices. The willingness of the company's managers to embark on earnings manipulations is attributed to the fact that both shareholders and potential investors are positively moved to pay for more shares in cognizance of the improved financial performance.

The contagious effect of earnings manipulation by corporate managers virtually affects every information content of financial statements of companies, for instance, companies engage in aggressive revenue recognitions, hiding expenses and recording sales prematurely. They do this for many reasons, including reducing their tax liability and smoothing their earnings report.

Our study anchors on the undeniable fact that financial reporting that is of higher quality is inseparable from the quality of the auditor that audited the financial statements. Audit quality guidelines and standards have been established in various countries to mitigate the continued increase in corporate scandals that caused national and international concerns [12]. [2] opined that various users of accounting earnings information rely on the audited financial statement of companies while the signalling theory, which this research is based on implies that the companies' accounting earnings are measured by earnings per share and book value per share numbers in the reported financial statement can give the investor the right new signals on when to invest in the company share it has shown that it is how the market perceives the quality of a company's audit that influence its share price.

This paper is motivated to close the gap in the knowledge by investigating the impact of audit quality on the relationship between accounting earnings and share prices of quoted manufacturing companies in the Nigerian stock exchange by using the moderating effect of Audit firm size to determine the relationship between accounting earnings and share price of quoted manufacturing companies in Nigeria.

The effect of EPS and BVPS on share prices on one hand, and the auditor's role in providing reliable accounting earnings is gaining the interest of many scholars [13,5,10,14]. The most recent issue confronting the auditing profession- "Big Four auditor's work for SVB, Signature, and First Republic comes under scrutiny in aftermath of their collapses". However, many empirical results are inconclusive, and the results documented by previous researchers are contradictory. For instance, [15] reported a significant negative effect between book value per share and market share price. [14], revealed that the EPS during the period of IFRS adoption significantly influenced SP. [16,17] Studies document that BVPS was insignificant in explaining the variations in share price. [14] used audit firm size as the control variable. While [18] used audit experience as moderating variable on the value relevance of only the book value of Nigerian listed firms. Specifically, considering the value relevance of earnings of listed manufacturing firms in Nigeria, the moderating effect of Audit firm size (a proxy for Audit quality) has not been investigated. Hence, this study focused on investigating the impact of audit firm

size on the relationship between accounting earnings and the share price of listed manufacturing companies in Nigeria.

The remainder of this study is structured as follows: Section 2 presents the literature review on accounting earnings, share price, and audit quality in terms of its moderating effect on earnings value relevance. This is followed by the methodology deployed in Section 3 and the discussion of the findings and results of the study in Section 4. The conclusion and recommendations of the study are in Section 5.

2. LITERATURE REVIEW

This section is concerned with a literature review of the previous works as it relates to the study. Also, theories about the criterion and predictor variables were discussed. It also examined the theoretical and conceptual framework of accounting earning information and audit quality on the share price performance.

2.1 Accounting Earnings

Accounting earnings summarizes periodic corporation financial performance and are key explanatory variables of stock prices, most times situations arise where investor appears to misinterpret earning and other accounting information leading to security mispricing [19]. Investors value the report issued by auditors as a contribution towards quality financial information represented by the entities.

The economic and political activities of the business environment highly affect share prices. Investors are mainly interested in the returns from their investments therefore they will always select their investments well as to fulfill their expectations. Past studies, such as [20] documented that firms involve in income smoothing aimed at meeting up with analyst expectations to avoid losses. This acclaimed income smoothing is engaged with preconceived benefits such as a perception of lower risk and a low finance cost and consequently leads to a high market price [21]. Based on these studies, there is a possible significant relationship between the accounting earnings and the share prices of a company. Certain exogenous factors may impact the stock prices including the earnings per share (EPS), and book value per share (BVPS) which are selected for the measurement of accounting earnings in this study.

2.2 Earnings per Share (EPS)

The EPS indicates the monetary value realizes as a result of its shares, and is a widely used metric for estimating corporate value. The value of disclosed EPS in the financial statements can give investors the right new signals [22]. Prior studies have reported that earnings per share have the ability to significantly explain the variations in the stock prices of companies showing that the EPS has a significant effect on the stock price [14,23]. The quality of earnings information made available in the capital market by reporting entities can effectively distinguish it from other companies that have low-quality earnings information. A piece of useful information that can aid in making an informed economic decision can be derived from the changes in the prices and volume of shares containing information provided in the domain of the capital market [24]. [14] argued that the earnings per share is a vital tool in the hands of both investors and potential shareholders of companies, it is a financial key that measures the performance of a firm and it also evaluates the equity of listed companies. A higher EPS shows that the company is performing well and is better off taking cognizance of the profitability of investing in the company. The variations in shareholder valuation of future returns are explained by the information content of the company's earnings [25,14]. In the words of [26], agreed "Earnings affect investors' decisions on resource allocation, and investors prefer earnings stability to abnormal (or surprise) earnings."

EPS can be formulated in Equation 1 [27].

$$\text{EPS} = \frac{\text{Earnings after tax}}{\text{Number of shares outstanding}} \quad (1)$$

The sustainability of an entity is measured by EPS, explaining the value of revenue realized at the end of the financial year that sustains a company from each share of the company [28]. Considering, each share of the company, the earnings-per-share ratio gives verifiable information about the net profit, especially, when the ratio fluctuates. Hence, it associates with the stock price [29,30,31]. The EPS ratio as an important financial tool used to ascertain the overview of a company's information in making decisions cannot be overemphasized. Hence, the likelihood of investors responding to high net income [32]. Thus, we state the first hypothesis.

H1: Earnings per share (EPS) significantly relates to the share price of a manufacturing company in Nigeria.

2.3 Book Value per Share (BVPS)

The book value per share is described as the ratio of available equity to common shareholders to the number of shares outstanding [33]. The BVPS metric is often used by stakeholders of an entity to investigate or check if the stock price is undervalued. The BVPS is usually compared to the company's market value per share. A higher book value per share of an entity entails that there is the possibility of the entity's stock is not properly valued (i.e. undervalued). If the BVPS increases, the stock should be perceived as more valuable and the stock price should increase. Hence, we presumed that.

H2: Book value per share (BVPS) significantly relates to the share price of a manufacturing company in Nigeria.

2.4 The Concept of Audit Quality

Audit quality is much debated but little understood. The international auditing and assurance standards board (IAASB), (2011), acknowledges that various efforts to conceptualize audit quality have not yielded any consensus or widely accepted definition of the term. The perception of audit quality is largely dependent on the eyes through which it is looked into it. Stakeholders and other segments of society have different understandings with regard to what constitutes audit quality taking cognizance of the financial reporting processes. [34] provided a classical definition of the concept of audit quality which many scholars have leaned on in terms of defining AQ. [34] states that AQ is the "Market assessed joint probating that a given auditor will

- (a) Discover a breach in the client's accounting system.
- (b) Report the breach".

De Angelo's [34] definition of audit quality is componentized into two as follows:

The probability that an audit will come up with existing misstatements, and

A commensurate response to the discovery. Considering component one, an auditor's competence and level of determination whereas

the other component (no2.) likened it to an auditor's independence, objectivity, and skepticism. However, the business environment or context affects the auditing of financial statements. Such environmental factors include the entity's corporate governance, laws, and regulations. In a situation where these factors are not favourable for the audit work will be affected in terms of quality delivery. The recent pandemic (COVID-19) largely contributed in no little measure to audit work carried out during the period.

Several studies on audit quality associated with higher profit-returns association have provided evidence that supports their argument audit features enhance the credibility of financial reporting quality which in turn supports the relationship between earnings and market share prices [14]. Many investors and other relevant stakeholders have trust in the reputation and quality of external auditors that their company engages. There is a presumed quality effect of the auditor that has quality and reputation being engaged to audit financial statements. Interestingly, many corporate bodies prefer to use the Big Four auditor (i.e. Ernest &Young, Deloitte, PWC, or KPMG). Although the Big Four auditor have earned such trust and confidence, the recent corporate failures of some companies audited by some of the big4 are affecting this trust and confidence [4]. Hence, the likely positive effect is a higher valuation of the stock price is being questioned.

Prior studies have measured audit quality using audit firm size (big 4 and non-big 4) [35, 36]. This is in consideration of the fact that big audit firms have a good reputation compared to none big audit firms and the reason that larger auditors have more grounds to issue clean reports [34]. For about four decades now, accounting studies have tried to define, measure and study various dimensions of audit quality and this position gained quality and this position empirical studies including [37]. Other studies asserted that this notion is logical to include [38,39]. For instance, on one hand, [40] in the context of Portugal, investigated the impact of audit firms and audit quality. The study findings imply that big audit firms carry out quality auditing than smaller audit firms. Also, [38] deployed the accuracy of going concern opinion in distressed companies as a proxy of audit outperforming non-big audit firms. While [41,42] reported no significant association between audit firm size and audit quality. Based on these findings, the research widely recognizes

that the big four firms provide higher quality audits and other greater reliability for the clients' financial statements than the non-big.

H3: There is a significant effect of audit firm size on the relationship between earnings per share and the share price of the listed manufacturing company in Nigeria.

H4: There is a significant effect of Audit firm size on the relationship between book value per share and share price of listed manufacturing companies in Nigeria.

2.5 Theoretical Framework

The following theory has been briefly discussed for the purpose of this study while being anchored on the signaling theory.

2.5.1 Agency theory

The agency theory came to the limelight following its popularization by [43] According to [44], The theory explained the relationship that exists between the principal (owners of the company) and agents (the management of the company). The emphasis of the agency theory lies in the fact that both principals and agents are assumed to have the goal of maximization of their own utility. Hence, an agent may pursue his personal goal against that of the principal [45]. Therefore, the need for an external body (known as an auditor) to scrutinize and come up with an opinion on the financial activities of the managers of the company mitigates information asymmetry and protects the interest of the principal.

2.5.2 Policeman theory

The policeman theory sees the auditor as a detector and preventer of fraud. It believes that auditors are saddled with the responsibility of detecting and preventing fraud by the operator of the entity [46]. The achievement of this enormous task of detection and prevention of fraud by the auditors is far from the honest truth considering the contemporary auditing functions that expect auditors to come up with reasonable assurance and verify the truth and fairness as contained in the auditing standards.

2.6 Theory of Inspired Confidence

The external stakeholder's interest in what goes on in the company necessitated the theory of inspired confidence [45]. The theory was postulated by Limperg Institute in the Netherlands in 1985. The theory states that the

auditor as a confidence agent, derives his broad function in society from the need for expert and independent judgment supported by the examinations. It is quite obvious that accountants and auditors are expected to know and realize that the public continues to accept a low rate of audit failure. To gain the confidence of the stakeholders of the company requires that the auditor must plan and perform their audit in a professional and competent way that will maximize their risk of undented material misstatement. The accountant is under a duty to conduct his work in a manner that does not betray the confidence that he commands [47]. The theory of inspired confidence suggests that an auditor's reasonable assurance and its expression of opinion on audited financial statements help the interested group's confidence in cognizance of the credibility and reliability of the financial statement of companies [45].

2.7 Lending Credibility Theory

The economic decisions of investors are strengthened when the information content of accounting earnings is credible. Therefore, the lending credibility theory suggests that the major function of auditors is to add value and credence to the presentations of the managers of companies. Thus, the role of the auditor in this regard is important for investment decisions by investors.

2.7.1 Signalling theory

The theory suggests that entities that have higher financial performance uses financial information disclosure to signal to investors in the market. The choice of the auditor can be a channel of communication for the quality of financial information disclosed to investors and potential investors in the market. Interestingly signalling theory provides ratio information signals namely EPS, and BVPS that can describe important information for investors in investment decision-making. If the information contains a positive value, it is expected that the market will react at the time the announcement is received in the market.

2.7.2 Empirical review

Okolie AO and Izedonmi FIO [21] in their research determined if audit quality has a significant relationship with the share price of firms in Nigeria. The study used historical data collected from annual reports of 57 firms listed in

the Nigeria Exchange Group. The data spanned from 2006 to 2011. The study used audit firm size as one of the proxies for measuring audit quality. While the derived Market Price per Share (MPS) directly from CSCS Cash – Craft was the dependent variable. The study deployed a multiple regression methodology for the analyses of the data and revealed a significant relationship between audit quality share prices of listed firms in Nigeria.

Ilaboya OJ and Ohiokha FI [48] examined the impact of audit firms' characteristics on the audit quality of selected beverage companies listed on the Nigerian Exchange Limited for a period that covered 12 years (2007 to 2012). The dependent variable, audit quality was proxied by audit firm size using a dichotomous variable of 1 if big 4 audit firm and 0 if otherwise. The study utilized secondary data, time series, and cross-sectional, collected from the company's financial statements. The study deployed multivariate regression technique (MRT), of logit and probit methods. The results of the study revealed a positive relationship between firm size, board independence, and audit quality. On the other hand, a negative association exists between auditor independence, audit firm size, audit tenure, and audit quality.

Rahimi G and Amini SA [49] investigated the association of audit quality and financial performance of companies listed in Tehran's securities exchange. They used regression analysis and documented a positive but not significant relationship between the auditor size and the auditor's tenure period (independent variables) and the profitability ratios (dependent variables). The study results show that both auditor's size and auditor's tenure have a positive significant relationship with profitability.

On the other hand, [17] in the context of Nigeria, investigated 47 quoted non-financial companies covering a period from 1994 to 2013. The methodology employed by the study was ordinary least square (OLS) estimation and dynamic model (Random and Fixed effects estimators). The study found that cash flow, dividends, and earnings have a significant relationship with share price, however, the variable book value was insignificant.

From the Indonesia context, [32] analysed the effect of accounting earnings (Earning Per Share (EPS), Net Profit Margin (NPM) Price to Book Value (PBV), and Dividend Payout Ratio (DPR)

on the stock price. The study focused on the sub-sector of food and beverage companies quoted on the Indonesia Stock Exchange. The study spanned the period 5 years (2014 to 2018). [32] utilized data from only 12 companies out of 26 companies of food and beverage companies that have met the researchers' criteria. Data analysis with bootstrapping used SEM (statistical equation modelling) in hypothesis testing. Results revealed a significant effect of all accounting earnings variables except net profit margin on stock prices.

Based on oil and gas firms quoted on Nigeria Exchange Stock, [50] examined the relationship between audit quality and share prices using regression and covariance analyses. The reported composition of the audit committee and auditor type has a significant effect on the market prices of the quoted oil and gas firms.

Odoemelam et al. [14] carried out a study, to investigate the IFRS adoption effect on the accounting earnings of the share price 101 quoted in Nigeria. A fixed effect model was used as the appropriate estimator for the analysis of the data. The study found that the accounting earnings were statistically significant and positive regarding the post-IFRS adoption in Nigeria. Their results implied that IFRS adoption moderates the relationship between earnings and share prices of quoted firms in Nigeria. Also, revealed in the study was the significant effect of audit firm size used as a controlled variable in the model of the study.

There are a good number of studies that have provided evidence of the role of audit quality on the value relevance of accounting earnings [3,51,52,53,2]. [54] revealed that EPS significantly impacts the stock price.

3. METHODOLOGY

This section covers the methods and procedures deployed in the sourcing of days that aid in addressing the research problems. This section also highlights the research design, model specification, as well as techniques of data analysis. The research design is ex-post factor design, the data for the analysis already exist and it is not possible to be manipulated.

3.1 Sample

The population of the study comprise 34 companies quoted on the Nigeria Exchange Group (NGX). Industrial goods (13 Companies)

and consumer goods (21 companies). We used the elimination method based on several criteria. The following firms were eliminated BUA Foods Plc and BUA Cement, Notore Chemical Plc was listed in August 2018 i.e. these firms were not in operation which means they were listed after 2010. Finally, the sample comprises 19 quoted manufacturing firms in Nigeria (Table 1).

Table 1. Showing sample size for the study

Stratum	Population size	Sample size
Consumer goods	21	7
Industrial goods	13	12
Total	34	19

Source: Nigeria Exchange Limited (NGX) Website

3.2 Variable

The statistical approach is used as a function of how sets of observations are measured. The study is concerned with two variables and a moderating variable.

3.2.1 Dependent variable

The share price is the criterion (dependent) variable, an efficient stock market is a market in which current market prices reflect all information available to the market.

3.2.2 Independent variable

Accounting earnings is the predictor (independent) variable while the share price is the criterion (dependent) variable. Both EPS and BVPS were proxies for accounting earnings.

3.2.3 Moderator variable

The moderator variable is Audit Quality and is measured by the Audit type.

The study revealed a better insight into the relationship between the measurement and dimensions employed. Table 2 describes the measurements of all the variables used in this study.

3.3 Regression Model

This section considers the models used to deal with the effect and relationships between the dependent, independent, and moderating variables contained in the hypotheses. Linear

regression analysis was used to test the relationship between the dependent variable share price (SP) and the identified independent accounting earnings measurement variable earnings per share (EP) and book value per share (BVPS) with Audit type (AuditQ) as the moderating variable.

3.4 Price Regression Model

Equation 1 for this study is the standard price regression model for testing the relationship between share price and accounting earnings [14].

$$SP = \beta_0 + \beta_1 EPS + BVPS + \epsilon_{jt} \dots \dots \dots (1)$$

Where

- Sp_{jt} = Stock price per share of firms at the financial year ended
- EPS_{jt} = Earnings per share for the firm at time t
- ε_{jt} = error term
- β₁ = constant term
- β₁ ∞ β₀ = regression coefficient for all the explanatory variables.

The above model is being used in the [55] valuation framework. Following [14,56], the modified Ohlson's [55] price regression Model (2) included the proxy for Audit quality in order to ascertain the effect of audit quality on the [55] price regression Model. Thus equation 2:

$$Sp_{jt} = \beta_0 + \beta_1 EPS_{jt} + \beta_2 BVps_{jt} + \gamma AuditQ_{jt} + \gamma_1 EPS_{jt} \times AuditQ_{jt} + \gamma_2 BVps_{jt} \times AuditQ_{jt} + \epsilon_{jt} \dots \dots \dots (2)$$

Where

Sp_{jt} = the stock price and it is measured at the end of December at year t. EPS_{jt} is earnings per

share for year t for firm j. AuditQ_{jt} is the Audit quality dummy variable for firm j at time t. It takes a value of 1 the year Big 4 firm audited the account of the firm j in time t (e.g. when the firm j is audited by any of the BIG4- Deloitte, PwC, Ernest & Young, or KPMG and 0 otherwise). While β₁ ∞ β₂ are coefficient that shows the value relevance of earnings per share and book value per share respectively. The switching on and off of the BIG4 is explained by γ₁ (the coefficient) which provided the explanatory power.

Where

- sp = share prices companies per share
- BVPS = book value per share.

4. RESULTS AND DISCUSSION

This section dealt with the results and the discussion of the findings of the study. The regression models were used to empirically establish the moderating role of audit quality on the relationship between accounting earnings and share prices. The descriptive statistics and regression assumption tests (for the variables) were conducted using the Pooled Least Square method with the aid of a statistical package for social sciences and E-view V.12. The analysis and results are presented below.

4.1 Descriptive Statistics

Table 3 below displays the summary of descriptive results with the mean, standard deviation, minimum, and maximum, of variables used in the statistical model.

Table 3 shows descriptive statistics for the period 2006-2021. Variables include SP, EPS, and BVPS. AFS is a moderating variable that measures Audit quality that is scored, as one of the Big 4 and zero if NBig 4.

Table 2. Measurement of variables

Variables	ABBR	Type	Measurement
Share price	Sp	Dependent	Measured by the market value of the firm's share price at the end of each fiscal year.
Audit quality	AuditQ	Moderating variable	Score "1" if the company is audited by Big 4 and "0" otherwise
Earnings per share	EPS	Independent	Earnings (Net income)/ Market value of equity per share.
Book value per share	BVPS	Independent	Measured by the ratio of available equity to common shareholders to the number of shares outstanding

Source: Author's Compilation.

Table 3. Descriptive statistics

Descriptive Statistics				
	N	Minimum	Maximum	Mean
Sp	304	.20	1487.00	50.9674
Eps	304	-6.16	57.63	3.0111
Bvps	304	-5.03	245.80	13.2416
AFS	304	0.00	1.00	0.7960

STATA OUTPUT (2023)

The statistics show that the dependent variable SP has mean values of 50.96, with a standard deviation of (156.80). The descriptive statistics show that EPS has a mean value of (3.677) and a maximum value of (57.630). On the other hand, the 7.592 record for standard deviation indicates a lower value and it implies that audit quality across the sample size exhibits considerable clustering around the mean. On the other hand, BVPS has 245.80 and -5.030 respectively as maximum and minimum values with a mean value of (4.60). Whereas, a significant deviation (28.515) from the mean was observed. Of course, AFS dichotomous dummy variable has maximum and minimum values (1.00) and (0.00) respectively with a standard deviation of (0.403) which means a variation or dispersion from the mean value of (0.79).

4.2 Correlations Analysis

Table 4 shows the correlation matrix between dependent, independent, and moderating variables. Share price (SP) significantly and positively correlates with EPS, BVPS, and AFS with values of 0.547, 0.203, and 0.246, respectively. On the other hand, earnings per share are significantly associated with both book value per share (BVPS), and AFS with Pearson correlation values of 0.301 and 0.172, respectively. Whereas, audit firm size negatively correlates with book value per share. However, the relationship is not significant. The effect size of the variables is strong and the correlation is significant at 0.05 level.

4.3 Collinearity Analysis

The performed test of multicollinearity using the VIF and TV is shown in Table 5. indicates that there is no multicollinearity as all the factors are below 5 and tolerance values are below 1.0 [14,21].

4.4 Regression Results

The regression results for this study are presented in this section. First, Table 6 presents

the shows the regression result of model 1, the SP association with EPS, and BVPS. The results revealed that EPS was significant at a 1% (p-value = 0000) level. This implies that EPS significantly and positively affect the share price of quoted manufacturing firms in Nigeria. Also, the results of model 1 presented in Table 6, indicates BVPS was not significant at 5% (p-value =0 1477), this suggests that BVPS does not have a significant effect on the share price of quoted manufacturing companies in Nigeria for the period under consideration in this study. The model 1 regression result, further revealed that the combined effect of the EPS and BVPS on the SP was significant. This assertion is confirmed by the values of F_Statistic (195.10), and the Probability value of F-statistics (0.0000). In the same vein, the R-Squared and Adjusted R² with values of 30% and 29% respectively, explain the extent of variations in share prices as a result of the EPS and BVPS information available to investors.

4.5 Test of Hypothesis

H1: Earnings per share (EPS) significantly relates to the share price of quoted manufacturing companies in Nigeria.

The decision is taken into consideration by the t-value and p-value. If the p-value is less than a 5% significance level (p-value < 0.05), we accept the hypothesis; otherwise, we reject and accept the null hypothesis. The computed results of the first model (Model 1) in Table 6 shows that EPS has a significant relationship with the share price of quoted manufacturing companies in Nigeria. The probability of EPS (p-value = 0.0000) < 0.05 and (T-value =18.137), which is significant at a 1% significance level (P=value 0.0000 < 0.01). We accept the hypothesis if the p-value is less than the significance value. Reject the hypothesis if the p-value is greater than the significance value. Since the p-value (0.0000) > 0.01, the alternative hypothesis is accepted at a 0.01 (1%) level of significance implying that, earnings per share significantly affect the share

price of quoted manufacturing firms in Nigeria. We accept the alternative hypothesis as the p-value is less than 5% of the significance level ($P < 0.05$).

H2: Book value per share (BVPS) significantly relates to the share price of quoted manufacturing firms in Nigeria.

The decision is taken into consideration by the t-value and p-value. If the p-value is less than a 5% significance level ($p\text{-value} < 0.05$), we accept the hypothesis; otherwise, we reject and accept the null hypothesis. The computed results of the first model (Model 1) in Table 6 show a significant effect of book value per share (BVPS) on the share price (SP) of quoted manufacturing companies in Nigeria. The probability of BVPS ($p\text{-value} = 0.1477$) > 0.05 and ($T\text{-value} = 1.4490$), which is insignificant at a 5% significance level ($P\text{-value} = 0.1477 > 0.05$). We accept the hypothesis if the p-value is less than the significance value. Reject the hypothesis if the p-value is greater than the significance value. Since the p-value ($0.1477 > 0.05$), the alternative hypothesis is rejected at 0.05 (5%) level of significance implying that, book value per share does not significantly affect the share price of quoted manufacturing firms in Nigeria. We accept the null hypothesis as the p-value is greater than 5% of the significance level ($P > 0.05$).

H3: Audit firm size has a significant effect on the relationship between earnings per share and the price of the listed manufacturing company in Nigeria.

Audit firm size has a significant effect on the relationship between earnings per share and the

share price of the listed manufacturing companies in Nigeria. The decision is taken into consideration by the t-value and p-value. If the p-value is less than a 5% significance level ($p\text{-value} < 0.05$), we accept the hypothesis; otherwise, we reject and accept the null hypothesis. The computed results of the first model (Model 2) in Table 6 show an insignificant moderating effect on the relationship between earnings per share (EPS) and the share price (SP) of quoted manufacturing companies in Nigeria. The probability of $EPS \times AuditQ$ ($p\text{-value} = 0.3383$) > 0.05 and ($T\text{-value} = 0.9578$), which is insignificant at a 5% significance level ($P\text{-value} = 0.3383 > 0.05$). We accept the hypothesis if the p-value is less than the significance value. Reject the hypothesis if the p-value is greater than the significance value. Since the p-value ($0.3383 > 0.05$), the alternative hypothesis is rejected at 0.05 (5%) level of significance implying that, audit quality does not significantly moderate the relationship between earnings per share and the share price of quoted manufacturing firms in Nigeria. We accept the null hypothesis as the p-value is greater than 5% of the significance level ($P > 0.05$).

H4: Audit firm size has a significant effect on the relationship between book value per share and share price of the listed manufacturing company in Nigeria.

The decision is taken into consideration by the t-value and p-value. If the p-value is less than a 5% significance level ($p\text{-value} < 0.05$), we accept the hypothesis; otherwise, we reject and accept the null hypothesis. The computed results of the first model (Model 2) in Table 6 show a significant effect of audit firm size on the

Table 4. Correlations matrix

		SP	EPS	BVPS	AFS
SP	Pearson Correlation Sig.(2-tailed)	1	*	.	*
EPS	Pearson Correlation Sig.(2-tailed)	.547** .000	1	.	.
BVPS	Pearson Correlation Sig.(2-tailed)	.203** .000	.301** .000	1	-
AFS	Pearson Correlation Sig.(2-tailed)	.146* .011	.172** .003	-.059 .307	1
	N	304	304	304	304

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 5. Multicollinearity analysis

Model		Coefficients	
		Tolerance	VIF
1	(Constant)	.	
	EPS	.873	1.146
	BVPS	.897	1.115
	AuditQ	.957	1.045
MVIF			1.102

Table 6. Regression results of models 1&2 (Equation 1&2 ($Sp_{jt}=\beta_0+\beta_1 Eps_{jt}+ Bvps_{jt}+\epsilon_{jt}$; $Sp_{jt}=\beta_0+\beta_1Eps_{jt}+b_2BVps_{jt}+\gamma AuditQ_{jt}+\gamma_1Eps_{jt} * AuditQ_{jt} + \gamma_2BVps_{jt} * AuditQ_{jt} + \epsilon_{jt}$))

Regression Results of Models 1 and 2					
Dependent Variable: SP					
Estimator	POLS	Model (1)	POLS	Model (2)	
Variable	Coef	Prob	Coef		Prob
EPS	11.025** (18.137)	0.000	0.3410 (0.0395)		0.9685
BVPS	0.2318 (1.4490)	0.1477	-0.0292 (-0.1303)		0.9663
AuditQ			-7.1233 (-0.7121)		0.4765
EPS*AuditQ			8.2857 (0.9578)		0.3383
BVPS*AuditQ			2.6012** (6.6934)		0.0000
Cons	14.6978** (2.9806)	0.0030	6.1089 (0.7184)		0.4726
R ²	0.3003		0.3396		
Adj R ²	0.2988		0.3410		
F-statistics	195.10		124.48		
Prob. F	0.0000**		0.0000**		
No of obser.	1216				

Note: ** significant at the 1% level, * significant at the 5% Numbers in parenthesis are t-values
 SP= Share Price; EPS =Earnings Per Share; BVPS=Book Value Per Share; AFS = Audit Firm Size
 Source: STATA OUTPUT (2023)

relationship between book value per share (BVPS) and the share price (SP) of quoted manufacturing companies in Nigeria. The probability of BVPS*AuditQ (p-value = 0.000) <0.01 and (T-value =6.6934), which is insignificant at a 5% significance level (P=value 0.0000 > 0.01). We accept the hypothesis if the p-value is less than the significance value. Reject the hypothesis if the p-value is greater than the significance value. Since the p-value (0.0000) < 0.01, the alternative hypothesis is accepted at 0.01 (1%) level of significance implying that, audit firm size significantly moderates the book relationship between the book value per share and the share price of quoted manufacturing firms in Nigeria. The direction is positive. We

accept the alternative hypothesis as the p-value (0.000) is less than the 1% significance value (P. = 0.01).

4.6 Discussion of Findings

The descriptive statistics revealed that on average, 79 % of sampled quoted manufacturing companies in Nigeria engage the BIG4 audit firms for over a decade. This study reveals a considerable experience of a substantial number of audit firms in this distribution. In distinct to [17] which reported an insignificant relationship between the book value per share and share price, this research clearly revealed a positive relationship between BVPS and share price.

In tandem with [32], the earnings per share of the companies in the context of our study is significant at 1% (i.e. P-value = 0.000) and has a positive relationship with the share price. Likewise, [50,57] all reported a significant effect of audit quality on the share prices of companies.

Detailed analysis of the impact of audit quality on the relationship between accounting earnings and share prices of quoted manufacturing companies in Nigeria shows that audit quality has a significant and positive effect on the relationship between the book value per share and the share price of quoted manufacturing companies. The implication of our study hinges on the fact that EPS is still used as a yardstick for investors' economic decisions. Our results are consistent with the conclusion by [14] that there is a relationship between accounting earnings and the share prices of quoted firms in Nigeria. In this present study, manufacturing companies in our study context emphasis centers on the significant effect of audit quality on the relationship between accounting earnings and share price. The result of descriptive statistics implies that the majority (about 80%) of the company's financial statements for the period under consideration in this study were audited by the BIG4 audit firms which reflects a belief that audit quality is related to earnings-returns of quoted manufacturing companies in Nigeria, and the results of the regression analyses revealed that AFS exerts significant influence on the book value per share in Nigeria. The result agrees with the view of [58] a quality financial reports can be achieved by a reputed audit firm such as any of the BIG4 auditors.

5. CONCLUSION

The work of [24] motivated many past empirical studies on the importance of audit quality. Our study aimed at providing evidence of the moderating effect of audit quality on the relationship between accounting earnings and share prices of quoted manufacturing firms in Nigeria. This particular study is important as it gives an insight into the impact of audit quality on the relationship between accounting earnings and share prices of quoted manufacturing companies in a developing economy like Nigeria.

6. POLICY IMPLICATIONS OF RESULTS

The implication of this study's findings is that practitioners, investors, and policymakers alike, should aware that the quality of audit processes

and their implications for financial reporting and market valuations are critical aspects of corporate governance and decision-making. Hence, there is the need to always engage quality auditors. The enhancement of audit framework for quality audit exercises that are geared towards building stakeholders' trust in earnings being reported in the financial statements of companies cannot be overemphasized.

7. LIMITATION AND FUTURE RESEARCH

The exclusion of other sectors such as oil and gas, and financial sectors limited the generalization of the results of this study. Further studies should focus on other sectors of the economy by considering firm specifics (Leverage, firm size, and others) as control variables.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Peter S, Rasanjani PMD. Peter Explaining the Price Gap between Voting Shares and Non-Voting Shares. Proceedings of the 5th NA International Conference on Industrial Engineering and Operations Management Detroit, Michigan, USA. 2020;10–14.
2. Okoli AO, Audit firm size and market prices of quoted companies in Nigeria. *International Journal of Business and Social Research*. 2014; 4(8):100 –117.
3. Ugwunta DO, Ugwuanyi BU, Ngwa CO. Effect of audit quality on market price of firms listed on the Nigeria Stock market. *Journal of Accounting and Taxation*. 2018;10(6):61-70.

4. Financial Times. The Big Flaw: Auditing in Crisis. Available: <https://www.ft.com/content/bdaf51da-9ae6-11e8-ab77-f854c65a4465>. 2023.
5. Harber M. An analysis of the primary IRBA arguments with regards to mandatory audit firm rotation: A case of faulty reasoning? *Accounting Perspectives in Southern Africa*. 2018;6(1):3–12.
6. Zgarni A, Chikhaoui M. Audit quality and real earnings management Evidence from Tunisian Banks. *Indian journal of finance and banking*. 2022; 9(1):71-82. Available: <https://doi.org/10.46281/ijfbv9il.1562>.
7. Choi A, Choi JH, Sohn BC. The joint effect of audit quality and legal regime on the use of real earnings management. *International evidence. Contemporary Accounting Research*. 2018; Sq. Available: https://doi.org/10.1080/10.1111/1911_3846.12370.
8. Chen B. Do investor's value audit quality of complex estimates? *Advances in Accounting*. 2022; 57. 100595, Available: <https://doi.org/10.1016/j.diac.2022.100595>.
9. Badawi IM. Motives and consequences of fraudulent financial reporting paper presented on the 17th annual convention of the global awareness society international, San Francisco USA. May 2008.
10. Dikuua MB, Maroun W, Van Zijl W, Ram AJ. Audit regulation and its relevance for audit quality in Namibia. *South African Journal of Economic and Management Sciences*. 2023; 26(1):a4866. Available: <https://doi.org/10.4102/sajems.v26i1.4866>
11. Dang M, Puwanethien P, Trwng C, Henry D, Vinhvo X. Audit quality and seasoned equity offerings methods. *International Review of Financial Analysts*. 2022;83:102227.
12. Feng Z, Li L Z, Wong HY, Wong J. Regulatory intervention and audit quality: new evidence from audit firm suspension. *Mediatan Accounting Research*. 2022. Vol. ahead of print no. ahead. of. print. Available: https://doi.org/10.1108/median_07_2021_1372.
13. Tran QT, Nguyen TP, Tran KL. The value relevance of earnings and book value at Vietnamese listed enterprises *Investment Management and Financial Innovations*. 2013;20(2):182-192. DOI: 10.21511/imfi.20(2).2023.16.
14. Odoemelam N, Okafor RG, Ofoegbu GN. Effect of international financial reporting standard (IFRS) adoption on earnings value relevance of quoted Nigerian firms, *Cogent Business & Management*. 2019; 6:1: 1643520. Available: <https://doi.org/10.1080/23311975.2019.1643520>.
15. Bataha IE, Ilat V, Kalalo MYB. The effect of dividend policy and market to book value of equity on firm value in energy sector companies listed on indonesia stock exchange. *Jurnal Ekonomi dan Bisnis Digital (MINISTAL)*. 2023;2(1):29-42.
16. Ewereoke VN. Value relevance of accounting information in a transitional economy: The case of Nigeria stock market. *Global Journal of Applied, Management and Social Science (GOJAMSS)*. 2018;15:124–139.
17. Omokhudu OO, Ibadin PO. The value relevance of accounting information: Evidence from Nigeria. *Accounting and Finance Research*. 2015;4(3):20–30. DOI: 10.5430/afr.v4n3p20.
18. Kiran B, Bomi CN. Audit quality and corporate governance as determinants of banks' performance in Ghana. *Acta Universitatis Danubius*. 2019;15(7):228-242H.
19. Patricia MD, Richard GS, Jenny Z. *Annu. Rev. Finance, Economics*. 2014;6(1):343 – 363.
20. Burgstahler D, Dichev I. Earnings management to avoid earnings decreases and losses. *Journal of Accounting and Economics*. 1997;24(1):99-126.
21. Okolie AO, Izedonmi FIO. The impact of audit quality on the share prices of quoted companies in Nigeria. *Research Journal of Finance and Accounting*. 2014;5(8):150-166.
22. Khairudin K, Wandita W. Analisis Pengaruh Rasio profitabilitas, Debt to Equity Ratio (DER) dan Price to Book Value (PBV) terhadap Harga Saham perusahaan pertanian di Indonesia, *Aluntansi & Keuangan*. 2017;8(1):68 – 84.
23. Ariyani L, Andini R, Santoso EB. Pengaruh EPS, CR, DER dan PBV terhadap Harga Saham dengan Kebijakan Dividen sebagai variabel intervening studi pada perusahaan manufaktur yang terdaftar di BEI Tahun 2011 – 2015). *Journal of Accounting*. 2018;4(4):1–20.

24. Suwardjono S. *Teori Akuntansi perkaysaan Keuanyan*. Edisi ketiga effakan. Yogyakarta BPFE yogyakara; 2011.
25. Blessing IN. Value relevance of accounting information on share prices of listed firms. *Social and Basic Sciences Research Review*. 2015;10(3):328-344.
26. Ozili PK, Outa ER (2019). Bank earnings smoothing during mandatory IFRS adoption in Nigeria. *African Journal of Economic and Management Studies*. 2019;10(1):32–47. DOI:10.1108/AJEMS-10-2017-0266.
27. Dewi PDA, Suaryana IGNA. Pengaruh EPS, DER, Dan PBV Terhadap Harga Saham. *E-Jurnal Akuntansi*.2013;4(1):215–229. Available:<https://doi.org/https://ojs.unud.ac.id/index.php/Akuntansi/article/download/5924/4804>.
28. Ratih D, Apriatmi A, Saryadi S (2016). Pengaruh Earning per Share dan Price Earnings Ratio terhadap Debt to Equity Ratio dan Harga Saham pada Perusahaan Sektor Makanan dan Minuman di Bursa Efek Indonesia. *Eksis: Jurnal Riset Ekonomi dan Bisnis*. 2016;11(1):1–12. Available:<https://doi.org/10.26533/eksis.v11i1.36>.
29. Idahsafirni PN, Wahono B, Khoiril ABS. Pengaruh (ROE), (NPM) (GPM dan (EPS) terhadap Harga sahan (studi empris pada pemsanan yan tercaffar dalam lous BET periode 2013 – 2016) *Journal Riset Manajemen*. 2015;11(1):77– 97.
30. Lestan AP, Susetyo A, Pengaruh NPM, EPS, DER dan PBV terhadap Harga Saham pada perusahaan Terdaffar IDX HIDV 20 dengan DPR Sebagai Variabel intervening. *Jurnal Ilmiah mahasiswa manajemen bisnis dan akuntansi*. 2021;2(4):184 –196.
31. Watung R, Ilat V. Pengaruh Return on Asset (ROA), Net Profit Margin (NPM), dan Earning per Share (EPS) terhadap Harga Saham pada Perusahaan Perbankan di Bursa Efek Indonesia Periode 2011-2015. *Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi*. 2016;4(2):518–529.
32. Bustan, Kurniaty ew. The effect of earnings per share, price to book value, duld and payout ratio and net profit margin on the stock prices Indonesia stock exchange. *Jurnal maksipreneur*. 2021;1 – 18.
33. Adam H. Book value per share (BVPS)' definition, formula, how to calculate, and example. *Investopedia.com*; 2022.
34. De Agenlo LE. Auditor size and audit quality. *Journal of Accounting and Economics*. 1981;3(3):183 – 199.
35. Nurlita SA, Pebrika AP. Audit committees, political connections, and audit quality on tax avoidance. *Journal of Management Science (JMAS)*. 2023;6 (2):211-216.
36. Eneisik GE, Akani FN. Audit quality and market value of quoted banks in Nigeria. *International Journal of Innovative Finance and Economics Research*. 2021;9(4):18-41.
37. Houge M, Ahmed K, Ziji T. Audit quality, earnings management, and cost of equity capital evidence from India *International Journal of Auditing*. 2017;21:177 – 189.
38. Berglund N, Eshiemann J, Guo P. Auditor size and going concern reporting, auditing: *A Journal of Practice & Theory*. 2018;37(2):1–25.
39. Eshleman J, Guo P. Do big 4 auditors provide higher audit quality after controlling for the endogenous choice of auditor? *Auditing and Journal of Practice and Theory*. 2014;33(4):197 – 219.
40. Lopes A. Audit quality and earnings management: Evidence from Portugal. *Athens Journal of Business & Economics*. 2018;4(2):179 – 192.
41. Yasser S, Soliman M. The effect of audit quality on earnings management in developing countries: The care of Egypt. *International Research Journal of Applied Finance IX*. 2018;40:216 – 231.
42. EL – Dyasty MM. Audit market in Egypt an empirical analysis 2017. Available at SSRN: <http://dx.doi.org/10.2139/ssrn3002783>.
43. Jensen MC, Meckling WH (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*. 1976;3(4):305–360. Doi:10.1016/0304-405X (76)90026-X.
44. Nwachukwu JN, Ogundiwin AO, Nwaobia AN, *Theories in Accounting Research in Anthology of Theories and their Applications in Social & Management Sciences*. Lagos: Jamiro Press Link. 2015.
45. Owolabi SA, Jayeoba OO, Ajibade AT. Evolution and development of auditing. *Unique Journal of Business Management Research*. 2016;3(1):032-040.
46. Hayes R, Dassen R, Schilder A, Wallage P. *Principles of Auditing. An Introduction to International Standards of Auditing*, (2nd Ed). London: Pearson Education; 2005.
47. Limpeng.

48. Ilaboya OJ, Ohiokha FI. Audit Firm Characteristics and Audit Quality in Nigeria. *International Journal of Business and Economics Research*. 2014;3(5):187-195. Doi: 10.11648/j.ijber.20140305.14.
49. Rahimi G, Amini SA. The survey of the relationship between auditing quality and the profitability in the companies accepted in Tehran"s Exchange market. *International Journal of Academic Research in Accounting, Finance and Management Sciences*. 2015; 5(2):100-115.
50. Egiyi MA, Okafor VI. Analysis of Audit Quality and Investors Perception: The Case of Listed Non-Financial Companies in Nigeria. *GOUi Journal of Faculty of Management and Social Sciences*. 2023;11(1)108-118.
51. Felix AN, Chinyere OR. Effect of audit quality on shareholders' earnings of listed industrial goods firms in Nigeria 2012-2018. *International Journal of Development and Management Review* .2020;1(15):12-19.
52. Abba HI, Sadah AA. Audit quality and firm value of listed deposit money banks in Nigeria. *International Journal of Economics and Financial Issues*. 2020;1(4):269-282.
53. Morufu OO, Oluwaseun Y. Impact of forensic accounting on fraud reduction in the Nigerian banking sector. *International Journal of Empirical Finance*. 2020; 4(9):250-25.
54. Abubakar A, Nasiru Y, Saidu BM, Luka CI. (2021). Moderating Role of audit quality on the value relevance of accounting information of listed firms in Nigeria. *Gusau Journal of Accounting and Finance*. 2021; 2(3): 19. Available:<https://doi.org/10.57233/gujaf.v2i3.83>.
55. Ohlson JA. Earnings, book values and dividends in equity valuation. *Contemporary Accounting Research*. 1995;11(2):661–687.
56. Elbakry AE, Nwachukwu JC, Abdou HA, Elshandidy T. Comparative evidence on the value relevance of IFRS-based accounting information in Germany and the UK. *Journal of International Accounting, Auditing, and Taxation*. 2017; 28:10–30. DOI: 10.1016/j.intaccudtax.2016.12.002
57. Farouk MA, Hassan SU. Impact of audit quality and financial performance of quoted cement firms in Nigeria. *International Journal of Accounting and Taxation*. 2014; 2(2):1-22.
58. Okpara E, Okotume EN, Odubuasi AC. Impact of audit quality on earnings management of money deposit banks in Nigeria. 2023;7(1):26-40.

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