Financial Statistical Journal 2025, 8(2), 11739.
https://doi.org/10.24294/fsj11739

Article

Evaluating the impact of audit quality and financial indicators on corporate earnings management practices: A case study of Nigerian financial institution

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CITATION

Ogundunmade TP. Evaluating the impact of audit quality and financial indicators on corporate earnings management practices: A case study of Nigerian financial institution. Financial Statistical Journal. 2025; 8(2): 11739. https://doi.org/10.24294/fsj11739

ARTICLE INFO

Received: 6 May 2025
Revised: 22 May 2025
Accepted: 27 May 2025
Available online: 1 July 2025

Abstract: Financial drivers and governance structures are two of the many aspects that affect earnings management. Firms can be encouraged to display consistent financial performance by financial drivers such as net income, total assets, annual revenue, and cash flow volatility. The effectiveness of governance procedures, particularly audit quality, is crucial in preventing earnings manipulation. The trustworthiness of financial accounts is increased by high-quality audits, especially those carried out by Big 4 audit companies. Because of their solid reputations and strict procedures, these companies are linked to less profit manipulation. Moreover, audit effectiveness and objectivity are strongly impacted by auditor independence and audit tenure. This study examines selected Nigerian deposit money banks, including Zenith Bank, Polaris Bank, First Bank, Access Bank, Union Bank, United Bank for Africa (UBA), and Wema Bank, from 2013 to 2023. The study's goal is to close the gap between raw data and strategic decision-making by analyzing financial data from these institutions. This analysis is required to understand how financial measurements and audit characteristics affect the dependability of financial reporting. To assess the connections between their operational efficiency, profitability, and financial sustainability, important variables like Earnings Per Share (EPS), Cash Flow from Operations, Annual Revenue, Total Assets, Net Income, Audit Tenure, Revenue-to-Asset Ratio, and Net Income Margin are examined. The study uses multiple regression analysis as a methodological tool to investigate the relationships between independent variables, such as auditor independence, affiliation with the Big 4 audit firms, and financial metrics, such as cash flow operations and total assets, and dependent variables, such as Discretionary Accruals (DA), Earnings Quality (EQ), and Earnings Per Share (EPS). Bayesian Model Averaging (BMA) emphasized strong predictors and addressed model uncertainty. The accuracy and relevancy of the data were guaranteed by their sourcing from audit firm databases and publicly accessible financial reports. Earnings Per Share was found to be significantly predicted by annual revenue and audit tenure. Longer audit tenures and higher yearly revenues have a favorable impact on EPS. The significance of these variables in explaining variations in EPS was highlighted by the BMA method, which validated the findings' robustness. No significant variables for categorical earnings quality classifications were found using multinomial regression.

Keywords: earnings quality; Earnings Per Share; audit quality; Discretionary Accruals; earnings management practices

1. Introduction

The efficiency and dependability of the auditing process in identifying and disclosing significant financial statement errors is referred to as audit quality. According to Ajekwe and Ibiamke [1], it includes the auditor's proficiency, objectivity, and conformity to professional norms in addition to the

comprehensiveness and precision of their analysis of a business's financial documents. The credibility and utility of financial reporting are increased when high-quality audits give stakeholders the guarantee that financial statements are free from fraud or significant errors [2]. The competency of the auditor, the resources of the audit company, and the regulatory environment in which the audit is carried out are some of the variables that might affect the quality of an audit. The intentional manipulation of financial reporting by business management to fulfill predefined goals or attain particular financial outcomes is known as earnings management practices [3]. These practices can be anything from honest accounting decisions made in accordance with generally accepted accounting principles (GAAP) to dishonest actions that go beyond accounting rules. For a number of reasons, including satisfying analyst expectations, collecting incentives, or avoiding debt covenant violations, managers may manipulate results [4]. Typical methods include altering accruals, postponing expense recognition, or speeding up revenue recognition. Excessive or dishonest methods can deceive investors and compromise the accuracy of financial reporting, even though some types of earnings management may be justified. Earnings management practices and audit quality have a complicated and frequently inverse relationship. Because competent and independent auditors are more likely to identify and stop aggressive or fraudulent reporting techniques, high-quality audits are typically linked to less earnings management [5]. On the other hand, managers have greater options to manipulate earnings covertly when audit quality is poor [6–8]. Because managers are less inclined to try manipulation when they are aware that it will probably be caught and reported, the existence of high-quality audits can act as a deterrent to earnings management. The relationship is not always clear-cut, though, since advanced profits management strategies can occasionally avoid even the best audits, underscoring the continuous difficulties in preserving the integrity of financial reporting [9–11].

Sustaining investor trust and the smooth operation of capital markets depend heavily on the caliber of financial reporting and the accuracy of financial statements. This dependability is seriously threatened by the continued use of profits management techniques, which could mislead stakeholders and skew economic judgment. Although audit quality is widely acknowledged as a crucial tool for identifying and discouraging earnings management, little is known about how successful this relationship is in the case of Nigerian conglomerate firms [12]. This study's significance stems from its ability to address the connection between earnings management and audit quality in a particular Nigerian economic sector. Earnings management has emerged as a critical topic in accounting and financial reporting, focusing on the deliberate manipulation of financial statements to achieve specific outcomes, such as meeting earnings targets or influencing stakeholder perceptions. This practice, while sometimes operating within the bounds of acceptable discretion, can undermine the integrity of financial reporting when excessive. The issue of earnings management, particularly in the banking sector, poses a significant risk to investor confidence, regulatory compliance, and overall financial stability [13].

Accounting standards, such as International Financial Reporting Standards (IFRS) and Generally Accepted Accounting Principles (GAAP), allow for

managerial discretion in areas like revenue recognition, expense allocation, and asset valuation. While these frameworks aim to reflect economic realities, they also open opportunities for earnings manipulation. Discretionary Accruals, a common proxy for earnings management, quantify the extent of managerial judgment applied in financial reporting. By isolating these accruals, researchers can assess the prevalence of earnings management practices.

Several factors influence earnings management, including financial drivers and governance mechanisms. Financial drivers such as cash flow volatility, annual revenue, total assets, and net income can motivate firms to present stable financial results. Governance mechanisms, notably audit quality, play a pivotal role in curbing earnings manipulation. High-quality audits, particularly those conducted by Big 4 audit firms, ensure greater reliability of financial statements. These firms are associated with rigorous methodologies and strong reputations, which help reduce earnings manipulation. Furthermore, auditor independence and audit tenure significantly affect the objectivity and effectiveness of audits.

2. Literature review

Suleiman Ahmed et al. [14] used discretionary loan loss provisions as a stand-in to examine how audit quality affected earnings management in Nigerian listed Deposit Money Banks (DMBs). According to the study, which used the Generalized Method of Moments (GMM) to analyze data from 12 DMBs from 2013 to 2023, audit rotation considerably decreased profits management. Audit independence and audit firm size also had a detrimental effect. The study found that audit quality, particularly independence and the employment of Big 4 firms, helps against manipulation of earnings. Upholding statutory audit standards and implementing audit firm rotation were suggested as ways to improve the integrity of financial reporting. Suleiman Ahmed et al. [15] used a correlational design and panel regression based on agency theory to investigate the impact of audit quality on profits management in Nigerian listed Deposit Money Banks (DMBs) from 2012 to 2019. The study, which examined data from 12 DMBs, discovered that while longer audit tenure dramatically decreased profits management, audit industry specialty greatly enhanced it. In accordance with the 2014 corporate governance legislation, which permits up to 10 consecutive years with a seven-year cooling-off period, the study suggested that the SEC support industry-specialized audit divisions and maintain a minimum three-year auditor tenure. Using data from 2013–2022 and FGLS regression analysis, Maidad and Suleiman [16] investigated the effects of audit committee characteristics on earnings management in Nigerian listed Deposit Money Banks (DMBs). The study discovered that while committee size, skill, and audit firm size had a negative but negligible influence on earnings management, audit committee independence and gender diversity had a positive and significant effect. The results imply that audit committee attributes are crucial in preventing earnings manipulation. To lessen managerial opportunism, the study suggested maintaining an effective committee composition, encouraging gender diversity, and guaranteeing independent audit committees. Babatolu et al. [17] investigated the impact of auditor independence on audit quality across a subset of Nigerian deposit

money institutions. Out of the twenty banks mentioned, seven were particularly selected. Ordinary least squares (OLS) regression, correlation, and descriptive statistics were employed to analyze secondary data from audited annual reports. They found a negative correlation between audit firm tenure and audit quality but a positive correlation between audit fees, audit firm rotation, and audit quality. There is a substantial, statistically significant negative correlation between leverage and audit quality and a strong, statistically significant positive correlation between audit quality and company size.

The research recommended lowering auditor tenure, boosting auditor independence through frequent rotation, and ensuring audit fees are fair in order to combat risks to auditor independence. Using a binary metric depending on whether a company was audited by a Big 4 firm, Ilaboya [18] investigated how audit firm characteristics affect audit quality. The study used logit and probit models to analyze data from 18 listed food and beverage companies in Nigeria from 2007 to 2012 and discovered that board independence and firm size had a beneficial impact on audit quality. On the other hand, audit tenure, audit firm size, and auditor independence showed adverse consequences. In order to bring the three-year auditor tenure policy into compliance with international norms, the report suggested that Nigerian regulatory organizations evaluate it. Hau [19] used survey data from 267 auditors from 28 audit companies to examine the factors impacting audit fees and audit quality in Vietnam. EFA and SEM analysis revealed that audit fees and audit quality are highly influenced by audit contract type, complexity, firm reputation, size, and risk. While audit tenure has no bearing on either, audit firm expertise raises audit fees without affecting audit quality. Crucially, it was discovered that audit fees had a favorable impact on audit quality. Expanding the firm's size, adjusting audits to risk, taking contract types into account, and acknowledging complexity and specialty in audit planning were all suggested by the study. Loveday A. Nwanyanwu [20] used information gathered from surveys given to auditing companies to examine how audit quality methods affect financial reporting in Nigeria. Stepwise multiple regression, Pearson correlation, descriptive statistics, and other univariate, bivariate, and multivariate methods were used in the analysis. Financial reporting dependability and audit quality criteria (auditor independence, technical training and competency, and engagement performance) were positively correlated in a strong, statistically significant way. The greatest explanatory power for differences in the credibility of financial reports was again found in auditor independence (47.9%). Furthermore, a regression model that solely used auditor independence produced the greatest dependability score, highlighting its significance. To guarantee trustworthy and dependable financial reporting, that study advised accounting professionals to respect independent ethical principles. The impact of audit firms and audit fees on the probability of profits management in Swedish municipalities from 2011 to 2013 was investigated by Donatella et al. [21]. According to their findings, there was a general correlation between greater audit fees and a higher likelihood of earnings management. The selection of the audit company also had an impact, indicating that audit quality influences earnings management strategies. The study also found that audit firms vary in how they strike a balance between business and professional priorities, which affects their clients' propensity to manipulate earnings. Qawqzeh et

al. [22] examined the impact of tenure and auditor rotation on audit quality. The study brought to light divergent opinions: Rotation supporters contended that extended auditor-client relationships undermined independence and decreased audit quality, while detractors said rotation resulted in higher switching costs and the loss of client-specific knowledge, both of which could potentially lower audit quality. Limited evidence that rotation lowers audit quality was found in the literature. However, the study found that long auditor tenure tended to reduce auditor independence and audit quality. With an emphasis on low-quality financial statements that the Jordanian Securities Commission (JSC) had warned about, Mohammad et al. [23] examined the effects of audit fees, audit firm size, and audit opinion on disclosure quality. The study used logistic regression and data from manufacturing and service companies registered on the Amman Stock Exchange between 2009 and 2016. The findings indicated that audit fees significantly and favorably reduced infractions, while audit opinions had a negative correlation with the quality of disclosure. The size of the audit company was found to have no discernible impact. Alzoubi [24] investigated the relationship between audit quality, debt financing, and earnings management in Jordan using data from 72 industrial firms (2006–2012) and Discretionary Accruals as a proxy. The study used Generalized Least Squares regression and discovered that lower debt levels decreased earnings management, which in turn improved the quality of financial reporting, and higher audit quality, as measured by auditor tenure, size, specialization, and independence. In contrast, there was a greater chance of earnings manipulation when debt levels were high. Policymakers should take these aspects into account when creating more robust and dependable audit systems, according to the study. The effect of audit quality on accrual-based earnings management was examined by Soyemi et al. [25] in 30 listed non-financial companies in Nigeria between 2008 and 2018. Descriptive statistics revealed no widespread earnings manipulation, but audit quality characteristics strongly explained 49% of the variation in earnings management, according to the study, which used stratified sampling and panel OLS estimation. Earnings management was adversely affected by total assets, but audit tenure and auditor independence had a favorable and considerable impact. The size of the audit firm was beneficial but not statistically significant. The study suggested that in order to avoid client-auditor interactions becoming too familiar, auditor independence should be increased by frequent rotation. Chukwuemeka's [26] study looked at how audit characteristics affected the caliber of financial reporting in Nigeria's insurance industry. From 2011 to 2020, 22 insurance firms provided secondary data for the study. The findings indicated that audit fees had a statistically significant negative impact on reporting quality, while audit type had a positive but negligible effect. On the other hand, industry-specific audits, collaborative audits, and audit tenure had a detrimental impact. The report suggested that regulatory agencies implement charge systems based on professional benchmarks. Earnings manipulation studies are crucial for shareholders and stakeholders as they impact investment and management decisions. Audit quality is a tool used to measure earning practices in organizations. A study by Umar [27] examined the effect of audit quality on earnings management levels among Nigerian listed firms. The results showed that audit quality was negatively significant with

accrual earnings management, suggesting that increasing audit fees would decrease earnings management. That supported agency theory and could help authorities to make better decisions and policy settings. Isaac Bawuah [28] looked at how Audit Committee Effectiveness (ACE) affected Earnings Management (EM) and whether audit quality (Big4) may mitigate the relationship between ACE and EM in Ghana. The study used two-stage least-squares (2SLS) and fixed-effect (FE) regression techniques on panel data from 25 non-financial companies in Ghana. It demonstrated that EM is constrained by ACE (AC independence, AC size, and AC meetings), with the effect of AC independence being the strongest. As a result, businesses with ACE typically report poorer earnings management. According to the analysis, Big4 and ACE (AC independence and AC meetings) together had a greater impact on EM than ACE alone. It implied that the relationship between ACE and EM was negatively moderated by audit quality. Lastly, EM was impacted by business size, cash flow, profit, and leverage. A study conducted by Emmanuel Oladayo Akindoyin [29] on the profit management strategies of Nigerian listed conglomerate businesses revealed a general trend towards income-increasing strategies. Firm size, fees, tenure, and other audit quality factors all demonstrated strong inverse correlations with earnings management strategies. Lower levels of earnings management were linked to longer auditor-client relationships, higher fees, and the use of Big Four audit firms. Additionally, there was a significant correlation between leverage and earnings management, indicating that enterprises with higher levels of leverage manipulate their earnings more. According to the survey, regulatory agencies should think about enacting laws that support Big Four audit companies and increase audit service spending. The Nigerian banking sector, representing a substantial portion of the nation's financial assets, plays a critical role in economic stability. This study focuses on selected Nigerian Deposit Money Banks, including Zenith Bank, Polaris Bank, First Bank, Access Bank, Union Bank, United Bank for Africa (UBA), and Wema Bank, over the period 2013–2023. By analyzing financial data from these institutions, the study aims to bridge the gap between raw data and strategic decision-making. This analysis is essential for understanding how financial metrics and audit characteristics influence the reliability of financial reporting.

Methodologically, the study employs multiple regression analysis to explore the relationships between dependent variables, such as earnings quality, Earnings Per Share, and Discretionary Accruals, and independent variables, including Big 4 audit firm affiliation, auditor independence, and financial metrics like cash flow operations and total assets. Data were sourced from publicly available financial reports and audit firm databases, ensuring accuracy and relevance.

This research contributes to the literature by evaluating the impact of audit quality and financial metrics on earnings management in Nigerian banks. It also provides practical insights for regulators, policymakers, and stakeholders on strengthening audit practices and corporate governance. Ultimately, the study underscores the importance of robust governance structures and high-quality audits in fostering financial transparency and accountability in the banking sector.

3. Materials and methods

3.1. Data

In this context, we focus on the financial metrics of six major Nigerian banks: Zenith Bank, First Bank, Polaris Bank, Access Bank, Wema Bank, and Union Bank. These banks are integral to Nigeria's financial sector and play pivotal roles in driving economic growth. Key variables such as Earnings Per Share (EPS), Cash Flow from Operations, Annual Revenue, Total Assets, Net Income, Audit Tenure, Revenue-to-Asset Ratio, and Net Income Margin are analyzed to evaluate the relationships between their operational efficiency, profitability, and financial sustainability. The data span from 2013 to 2023, obtained from the banks' annual reports.

3.2. Methods

The study employs statistical models to analyze relationships between audit-related factors and financial metrics, focusing on Earnings Quality (EQ), Earnings Per Share (EPS), and Discretionary Accruals (DA). The key methods used are Multinomial regression explained categorical variations in EQ and DA. Linear regression quantified the impact of predictors on EPS. BMA addressed model uncertainty and highlighted robust predictors.

3.2.1. Multinomial logistic regression

For a dependent variable Y with k categories, the probability of observing category j is:

$$\boldsymbol{log}[\frac{P(Y=k)}{P(Y=j)}] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p \quad (1)$$

This model is used to model EQ and DA (ordinal variables). The model examined predictors like cash flow, revenue, assets, audit tenure, and firm type. Identified significant relationships through coefficient testing. Effective for analyzing categorical outcomes and understanding ordinal relationships.

3.2.2. Linear regression

Model Formulation:

The general linear regression model is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p + \epsilon \quad (2)$$

where Y is the dependent variable, $X_1, X_2, \ldots, X_p$ are predictors, $\beta_0, \beta_1, \ldots, \beta_p$ are coefficients, and ϵ is the error term. The model used EPS (continuous variable) predictors such as revenue, assets, and audit characteristics.

The model is evaluated using R^2, adjusted R^2, and residual diagnostics.

3.2.3. Bayesian Model Averaging (BMA)

BMA assigns posterior probabilities to models Mk using:

$$P(M_K|D) = [\frac{P(D|M_K)P(M_K)}{\sum_j P(D|M_J)P(M_j)}] \quad (3)$$

where $P(D|M_K)$ is the likelihood of the data under model M_K, and $P(M_K)$ is the prior probability of M_K.

Integrated multiple models to account for uncertainty in variable selection.

Used posterior probabilities and metrics like R^2 and BIC for evaluation. A probabilistic framework mitigates overfitting and identifies robust predictors. Techniques included stepwise selection and correlation analysis to address multicollinearity. Interaction terms, such as audit firm type and tenure, were tested for joint effects.

3.2.4. Model diagnostics and validation

This is to ensure reliability through residual analysis, goodness-of-fit tests, cross-validation, and comparison metrics (e.g., AIC, BIC).

4. Results and discussion

In this section, a comprehensive overview of the dataset through descriptive statistics offering an initial understanding of the data's characteristics will be presented. Descriptive statistics serves as the foundation for subsequent analysis by summarizing the central tendencies, dispersions, and overall distribution of the variable under study. **Table 1** shows the descriptive statistics of the variables used in the study.

Table 1. Descriptive statistics for the selected banks.

Variable	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
Earnings_Per_Share	0.100	0.485	0.960	2.051	2.195	15.070
Cash_Flow_Operations	1,070,000	35,060,000	215,900,000	6,249,000,000	7,195,000,000	111,600,000,000
Annual_Revenue	21,900,000	223,400,000	1,540,000,000	166,400,000,000	161,500,000,000	2,132,000, 000,000
Total_Assets	1,071,000,000	2,128,000,000	875,900,000,000	2,662,000,000,000	4,145,000,000,000	20,370,000,000,000
Net_Income	2,700,000	260,200,000	1,570,000,000	21,480,000,000	8,595,000,000	362,200,000 ,000
Audit_Tenure	1.000	4.000	10.000	8.905	11.000	20.000
Revenue to Asset Ratio	0.07696	0.09324	0.10580	0.10201	0.10769	0.13318
Discretionary Accruals	164,500,000	275,300,000	366,100,000	708,100,000	1,111,000,000	2,132,000,000

Source: Author's Computation, 2025.

Earnings Per Share (EPS)

The range of Earnings Per Share (EPS) among the banks is significant, from a low of 0.10 to a high of 15.07. The median EPS is 0.96, while the mean is 2.05, indicating that most banks have relatively low EPS values, but the mean is skewed upward by a few banks with exceptionally high EPS. A higher EPS generally reflects greater profitability for shareholders, suggesting that banks with higher EPS are likely performing better financially. However, the presence of outliers highlights disparities in profitability across the industry.

Cash Flow Operations

Cash flow operations among the banks range from 1.07 million to a staggering 111.6 billion. The median cash flow is 215.9 million, while the mean stands at 6.25 billion. This wide gap between the mean and the median indicates the influence of a few banks with extremely high cash flow, which pulls the average upward. High

Cash Flow from Operations reflects the banks' ability to generate cash efficiently from their core banking activities. Banks with larger cash flows are likely better equipped to manage operational expenses and sustain profitability over time.

Annual Revenue

Annual revenue varies dramatically across the banks, ranging from 21.9 million to 2.132 trillion. The median revenue is 1.54 billion, with a mean of 166.4 billion. This significant disparity indicates that while a few banks generate extraordinarily high revenues, the majority fall in the lower revenue range. High-revenue banks likely dominate the market, benefiting from a larger customer base and broader operational reach, while smaller banks may have limited market penetration and operational capacity.

Total Assets

The total assets of the banks show a striking range, from 1.071 billion to 20.37 trillion. The median asset value is 875.9 billion, with a mean of 2.662 trillion, reflecting the stark contrast in asset size among the banks. Larger banks, such as Zenith Bank or Access Bank, are better capitalized, allowing them to lend more and invest in larger projects compared to smaller banks. This disparity in total assets also highlights the concentration of resources and market influence in a few leading banks.

Net Income

Net income ranges from as low as 2.7 million to as high as 362.2 billion, with a median of 1.57 billion and a mean of 21.48 billion. The large difference between the mean and the median suggests that a few highly profitable banks drive the average upward. Net income reflects the banks' ability to manage expenses and achieve profitability. Banks with higher net income demonstrate better cost management and stronger overall performance, distinguishing them from their less profitable peers.

Audit Tenure

Audit tenure, which measures the duration of the auditor's relationship with a bank, ranges from 1 to 20 years. The median audit tenure is 10 years, and the mean is 8.91 years. A median tenure of 10 years suggests that most banks maintain long-term relationships with their auditors, fostering familiarity. However, extended audit tenure raises concerns about reduced auditor independence, particularly if it exceeds best-practice recommendations. Long audit tenures can benefit banks through increased understanding of operations but must be balanced with periodic rotation to ensure objectivity.

Revenue to Asset Ratio:

This ratio measures how effectively the bank generates revenue from its assets. The values range from 0.07696 to 0.13318, with a mean of 0.10201, indicating that the bank earns approximately 10.2 cents for every dollar of assets.

Discretionary Accruals:

Discretionary Accruals capture management-influenced accounting adjustments, often associated with earnings management. These accruals range from ₦164.5 million to ₦2.132 billion, illustrating considerable variability. The median value of ₦366.1 million points to a central tendency in discretionary accounting practices across the years.

The histogram in **Figure 1** represents the distribution of Earnings Per Share (EPS) for the banks. The distribution of Earnings Per Share (EPS) among the banks is highly right-skewed, with most values concentrated in the lower range, particularly between 0 and 5. This indicates that a majority of the banks have low EPS, reflecting moderate profitability levels across the sector. However, a few banks stand out as outliers in the higher range, with EPS values exceeding 10. These banks likely represent a small number of highly profitable institutions, driving the average EPS upward and highlighting significant disparities in financial performance across the industry. The most frequent EPS values fall within the range of 0 to 2, as indicated by the tallest bar in the distribution. This suggests that many banks demonstrate similar profitability per share within this range, reinforcing the notion of moderate sector-wide performance. Meanwhile, a small number of banks with EPS values significantly higher than 15 emerge as top performers, showcasing their ability to deliver superior shareholder returns.

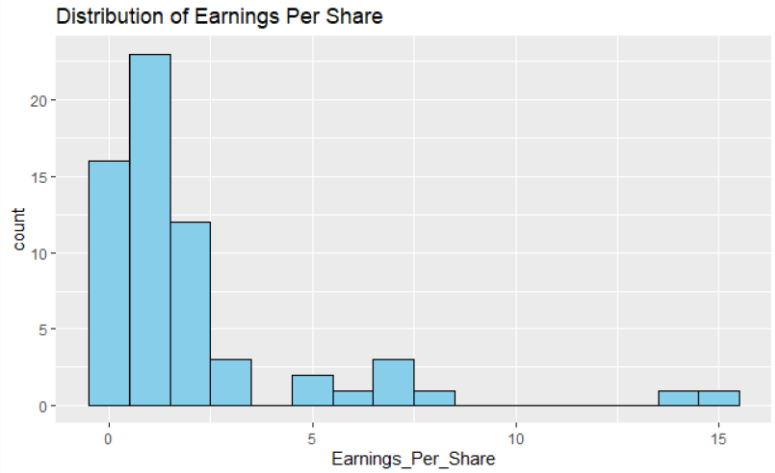

Figure 1. Distribution of Earnings Per Share (EPS) for the banks.

Notably, the analysis includes a warning about three rows being removed due to their EPS values falling outside the scale range. These rows may represent extreme outliers not captured in the visualization. Their exclusion ensures the graph remains focused on the bulk of the data, providing a clearer depiction of the overall distribution.

In summary, the data reveals that most banks have relatively low EPS values, reflecting moderate profitability. However, a few outliers with very high EPS values are driving the mean upwards, as highlighted in the earlier statistical summary. The right-skewed distribution underscores the performance disparity among banks, with a handful of standout performers dominating the sector in terms of profitability.

The distribution of operational cash flows in **Figure 2** among banks is highly right-skewed, with the majority of values concentrated near the lower end. Most banks operate with relatively low cash flows, as indicated by the peak of the density curve close to zero. This suggests that operational liquidity is constrained or operations are less robust for the majority of banks. A long tail to the right, created by a few banks with exceptionally high cash flows, reflects significant disparities in performance across the sector.

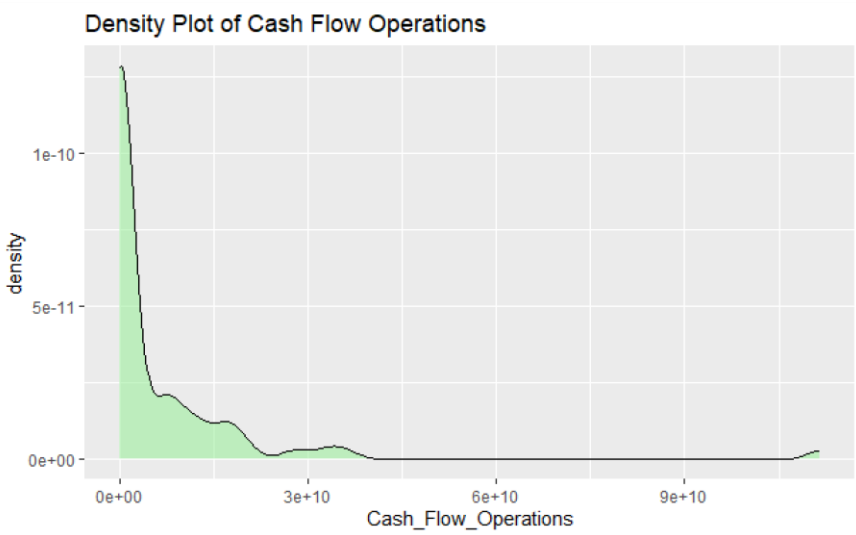

Figure 2. Density plot for cash flow operations for the banks.

The highest density occurs at cash flow values under ₦30 billion, illustrating that a large number of banks fall within this range. Beyond ₦30 billion, the density curve flattens significantly, with only a slight uptick at very high cash flow values exceeding ₦60 billion. These outliers likely represent larger or more efficiently managed institutions with substantial operational cash flow.

The wide range of operational cash flow values, spanning from close to zero to over ₦90 billion, underscores the variability within the sector. While most banks exhibit low operational cash flows, a few dominate the upper range, highlighting their stronger financial management and operational efficiency. This extreme right skew aligns with trends observed in earnings, where a small number of highly successful banks outperform the majority.

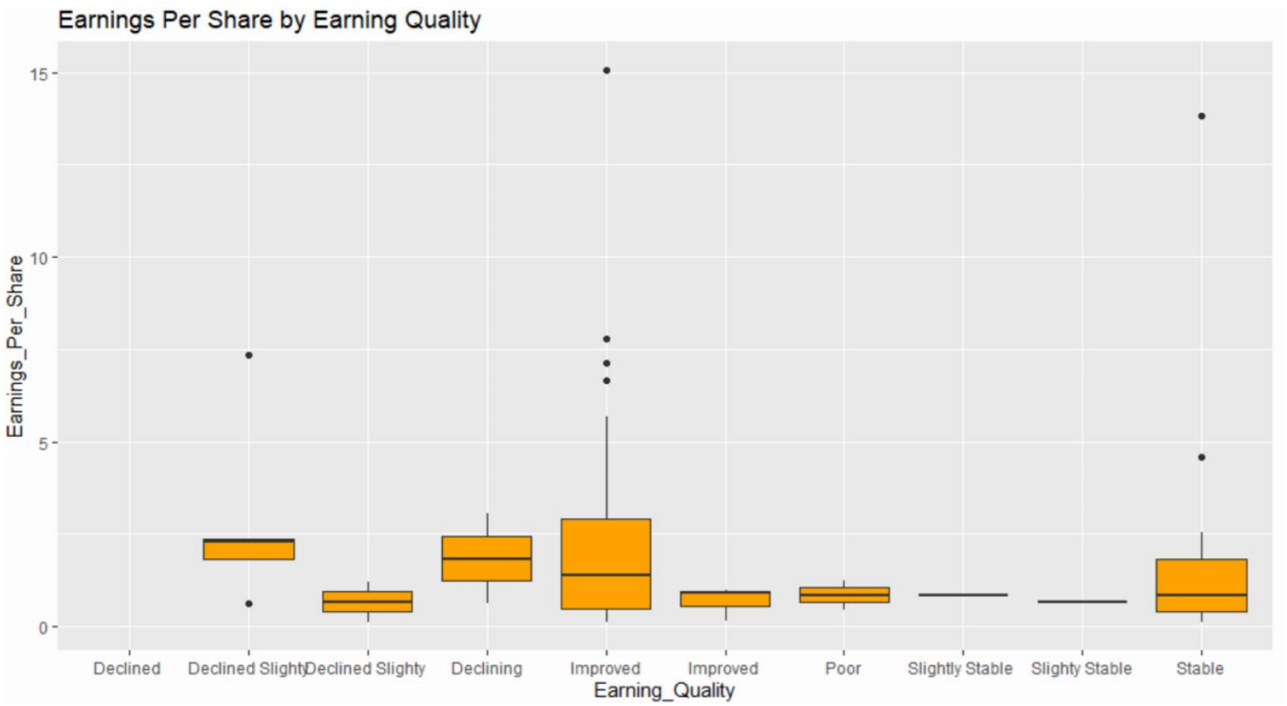

Figure 3. Boxplot for earnings per share of the banks.

The boxplot in **Figure 3** shows the distribution of Earnings Per Share (EPS) across various Earning Quality categories. The analysis of Earnings Per Share (EPS) across various performance categories reveals notable trends in financial performance. The "Declined" and "Poor" categories are characterized by very low EPS values with minimal spread, indicating consistent underperformance and poor financial results. These groups lack significant outliers, suggesting a uniform pattern of low profitability among the companies. Similarly, the "Declining" and "Declined Slightly" categories show marginal improvement over the "Declined" group but still reflect narrow ranges of low EPS, signifying limited progress in earnings quality. In contrast, the "Improved" category exhibits the largest variability in EPS, with a wide range of values and several outliers. This variability suggests a mix of companies achieving exceptionally high EPS while others remain relatively underperforming, leading to non-uniform improvement within this group. The "Stable" category also demonstrates moderate spread in EPS, with a few outliers on the higher end. These companies show decent financial performance, with some significantly outperforming others.

Key insights indicate that the "Improved" and "Stable" categories generally achieve higher EPS values compared to other groups, highlighting better financial performance. On the other hand, companies in the "Poor," "Declined," and "Declining" categories consistently report low EPS, reflecting weak financial health. The presence of outliers in the "Improved" and "Stable" groups further emphasizes that some companies excel beyond the norm within these categories. This analysis provides a clear understanding of how earning quality and financial performance are reflected in EPS across different performance levels.

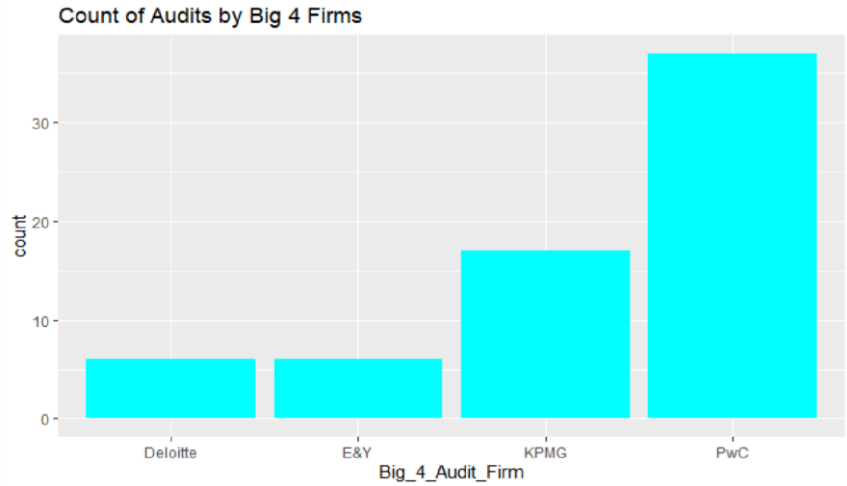

Figure 4. Bar plot showing audits counts of the Big_4_Audit_Firm.

The bar chart in **Figure 4** represents the count of audits conducted by the Big 4 audit firms (Deloitte, EY, KPMG, and PwC).

The analysis of audit activity among the Big 4 firms reveals significant differences in their levels of engagement. PwC emerges as the dominant player, conducting the highest number of audits, with over 30 recorded audits in the dataset. This positions PwC as the most active firm by a substantial margin. KPMG follows

as the second most active firm, performing slightly above 20 audits, showcasing notable activity but still falling significantly behind PwC.

In contrast, Deloitte and Ernst & Young (EY) conducted a relatively small number of audits, each with counts close to 10, making them the least active firms in the dataset. Their low representation suggests either less involvement in the market or limited activity captured in this dataset.

Key insights highlight the uneven distribution of audit counts among the Big 4 firms. PwC and KPMG dominate, accounting for the majority of the audits, while Deloitte and EY contribute far fewer. This distribution emphasizes PwC's significant role in the audit landscape, potentially reflecting its market share or client demand. Understanding this distribution helps stakeholders evaluate the concentration of audit work among the Big 4 and recognize the varying levels of engagement across firms.

The analysis of financial performance across companies audited by the Big 4 firms in **Table 2** reveals distinct patterns in earnings and profitability. KPMG leads in terms of per-share profitability, with the highest mean Earnings Per Share (EPS) of 3.119. This indicates that companies audited by KPMG deliver strong earnings relative to their shares. In contrast, Deloitte has the lowest Mean EPS of 0.6405, suggesting lower per-share profitability for the companies under its audit portfolio.

Table 2. The big 4 audit firms.

Big 4 Audit Firm	Mean EPS	Mean Net Income	Total Revenue
Deloitte	0.6405	19,054,500,000	677.16 billion
E&Y	0.8220	2,880,666,667	1.03 trillion
KPMG	3.1193	2,296,730,000	4.43 trillion
PwC	2.0119	33,707,257,838	4.51 trillion

Source: Author's Computation, 2025.

When examining absolute profitability, PwC emerges as the leader, with the highest Mean Net Income of ₦33.71 billion. This highlights that PwC audits the most profitable companies in absolute terms. E and Y, however, records the lowest Mean Net Income of ₦2.88 billion, indicating that the companies it audits generate relatively modest profits compared to their peers.

In terms of Total Revenue, PwC and KPMG dominate, auditing companies with the highest Total Revenues of ₦4.51 trillion and ₦4.43 trillion, respectively. This underscores their focus on large-scale corporations. Deloitte, on the other hand, audits companies with the smallest Total Revenue of ₦677.16 billion, indicating a preference for smaller firms relative to its peers.

Key insights from the analysis reveal that KPMG excels in per-share profitability, but PwC leads in both absolute profitability and scale, reflecting its dominance in auditing the largest and most profitable companies. Deloitte, with the lowest EPS and Total Revenue, appears to cater to smaller companies. Meanwhile, E&Y audits companies with moderate EPS but comparatively lower Net Income and Total Revenue, suggesting a focus on firms of intermediate size and profitability. This distribution highlights varying strategic focuses among the Big 4 firms in their audit portfolios.

The Earnings Per Share (EPS) trend reveals significant patterns in financial performance over the observed period in **Figure 5**, characterized by phases of stability, growth, fluctuations, and recovery. From 2013 to 2016, EPS remained relatively low and stable, indicating consistent but modest profitability during the early years. This phase reflects financial steadiness without notable growth.

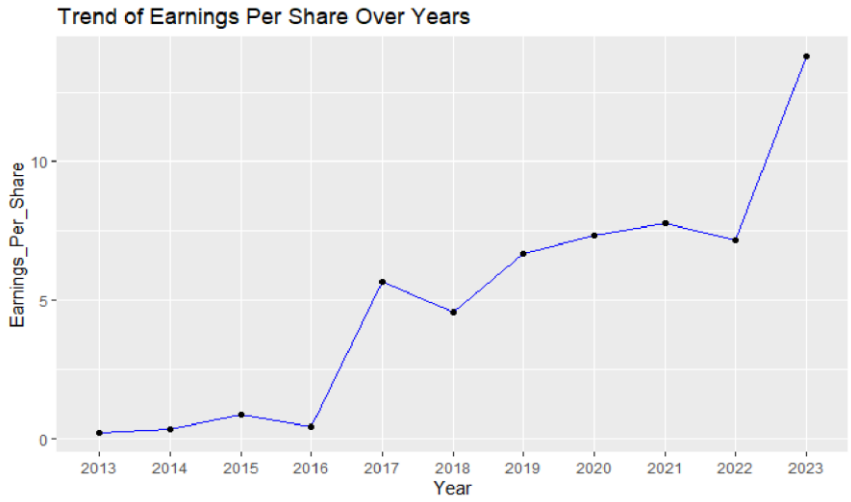

Figure 5. Trend of Earnings Per Share of the banks.

In 2017, a sharp increase in EPS marks a pivotal improvement, suggesting strategic shifts, enhanced operational efficiency, or favorable market conditions driving profitability. This spike highlights a key turning point in the company's financial performance.

Between 2018 and 2021, EPS experienced fluctuations. A slight decline in 2018 may reflect temporary challenges, but the subsequent years show moderate growth, indicating a gradual recovery and steady improvement in earnings.

The period from 2022 to 2023 stands out for its substantial growth in EPS, with a dramatic increase during this time. This surge likely reflects transformative operational changes, robust market demand, or the successful implementation of strategic initiatives, marking a high point in the company's earnings trajectory.

Key insights from the analysis underscore a clear turnaround in earnings growth post-2016, culminating in a remarkable peak in 2023. The sharp rise in 2022–2023 points to factors such as improved market conditions, strategic enhancements, or heightened operational efficiency. Overall, this analysis highlights critical phases of growth, decline, and recovery, offering a comprehensive view of the company's evolving financial health.

The line chart in **Figure 6** illustrates the Cash Flow from Operations from 2013 to 2023, highlighting distinct phases in the banks' operational performance and financial health. From 2013 to 2017, the cash flow exhibits steady growth, reflecting consistent operational efficiency and stable revenue streams likely driven by effective management practices. This period marks a phase of gradual and reliable improvement in operational performance.

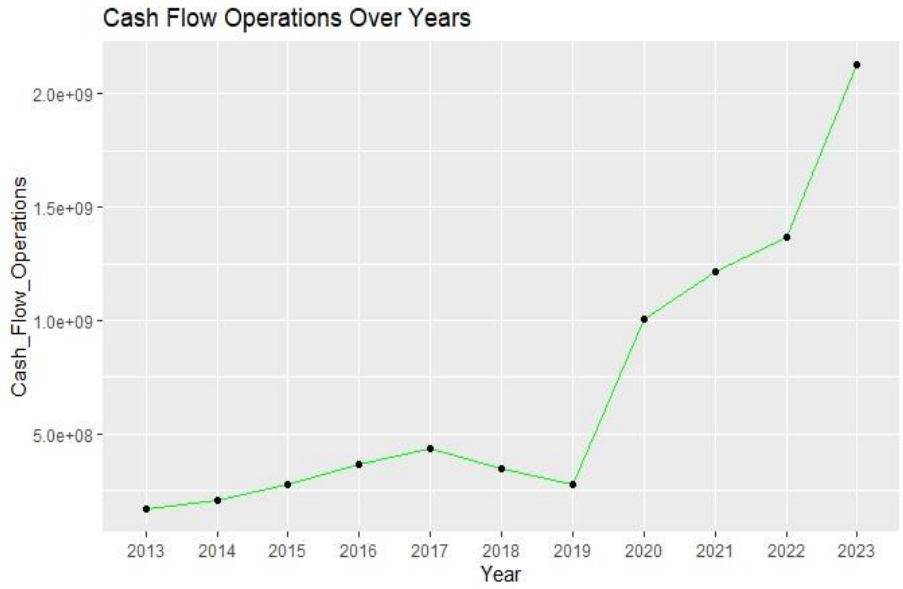

Figure 6. Trend of cash flow operations of the banks.

However, from 2018 to 2019, the cash flow stagnates and experiences a slight decline, indicating potential operational challenges, rising costs, or external economic pressures that hindered growth. This phase represents a period of struggle for the banks in maintaining their previous momentum.

A significant shift occurs starting in 2020, with cash flow entering a phase of notable and consistent upward growth. The most dramatic increase is observed between 2022 and 2023, where cash flow peaks at its highest point. This period of exceptional growth likely results from enhanced operational efficiency, revenue expansion, or strategic cost management initiatives.

Key insights reveal that the sharp increase in cash flow from 2020 to 2023 may reflect the banks' proactive responses to evolving market conditions, implementing strategic measures to optimize operations and boost cash flow. The remarkable growth between 2022 and 2023 suggests a particularly favorable business environment or effective targeted initiatives. Overall, the analysis underscores the banks' journey toward improving operational performance, culminating in recent years with a clear upward trajectory in cash flow.

The correlation results in **Table 3** and **Figure 7** highlight key relationships among financial indicators, providing insights into the factors driving bank performance and efficiency. Strong positive correlations are observed among several metrics, underscoring their interdependence. For instance, cash flow operations show a robust positive relationship with Annual Revenue, Total Assets, and Net Income, emphasizing the role of operational efficiency in driving revenue growth, asset accumulation, and profitability. Similarly, Earnings Per Share (EPS) is strongly correlated with Net Income, indicating that higher profitability directly enhances shareholder returns.

Table 3. Correlation table for the variables.

	Earnings Per Share	Cash Flow Operations	Annual Revenue	Total Assets	Net Income	Audit Tenure
Earnings Per Share	1.0000	−0.1394	0.6416	0.4838	−0.1012	0.2116
Cash Flow Operations	−0.1394	1.0000	−0.1478	0.1796	0.3589	0.1550
Annual Revenue	0.6416	−0.1478	1.0000	0.6884	−0.1749	0.0026
Total Assets	0.4838	0.1796	0.6884	1.0000	0.5107	0.4783
Net Income	−0.1012	0.3589	−0.1749	0.5107	1.0000	0.5163
Audit Tenure	0.2116	0.1550	0.0026	0.4783	0.5163	1.0000

Source. Author's Computation, 2025.

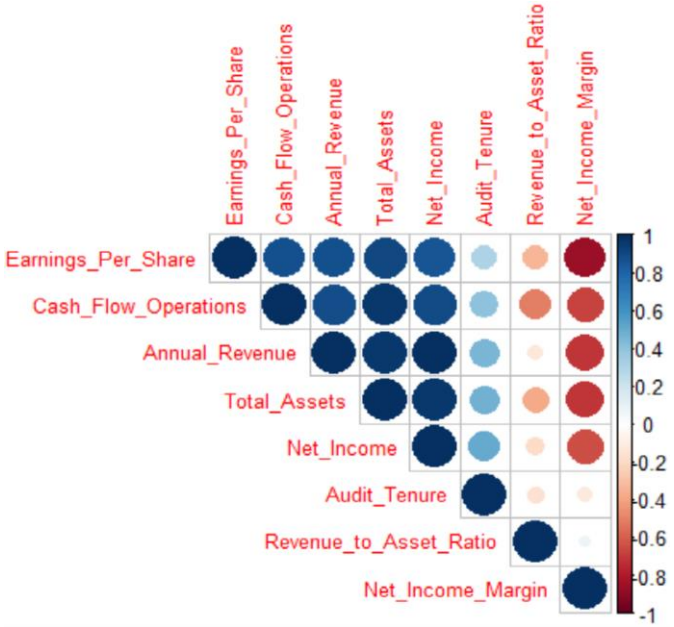

Figure 7. Correlation of the variables.

Additionally, Annual Revenue demonstrates a high correlation with Total Assets and Net Income, reflecting the interconnected nature of revenue generation, asset management, and profitability.

Conversely, some metrics reveal weak or inverse relationships. Audit tenure shows weak correlations with most variables, suggesting limited impact on financial performance. Meanwhile, the negative correlation between the Revenue to Asset Ratio and Total Assets implies that as banks scale, the efficiency of generating revenue per unit of asset declines, pointing to potential scaling inefficiencies.

Net Income Margin exhibits moderate to strong positive correlations with EPS, Net Income, and Cash Flow Operations, highlighting that profitability margins are closely tied to operational performance and income generation. Key insights from the matrix include the strong linkage between operational performance metrics like Cash Flow Operations, Annual Revenue, and Total Assets, the mutual dependence of Net Income and EPS on profitability, and the efficiency challenges associated with asset scaling. These relationships underscore critical areas influencing bank performance, offering a detailed framework for understanding and optimizing financial efficiency.

4.1. Modelling

The analysis focused on examining the factors influencing earnings quality, as measured by Earnings Per Share (EPS) and Discretionary Accruals (DA). Multiple regression techniques, including traditional linear regression and Bayesian Model Averaging (BMA), were employed to assess the relationship between various financial indicators (such as Annual Revenue, Cash Flow from Operations, Net Income, Total Assets, and Audit Tenure) and earnings quality. The results from the linear regression indicated significant predictors of earnings quality, notably Annual Revenue and Audit Tenure, while BMA provided a more nuanced view by selecting a variety of models with different variables, highlighting the complexity of the relationship. Both models emphasize the importance of certain financial metrics in determining earnings quality, but the Bayesian approach offers additional insights into the variable importance and model uncertainty, suggesting that a more flexible approach may better capture the underlying factors affecting earnings quality.

The range of residuals suggests some variability in how well the model explains EPS across observations, with a few larger residuals. Annual Revenue (p = 0.0480), with a positive coefficient (6.174×10^{-12}), suggest that higher annual revenue is associated with increased EPS in **Table 4**, though the impact is numerically small due to scaling. Audit Tenure Years shows a significance (p = 0.0291), with a positive coefficient (0.2274), indicating that longer audit tenure is positively associated with EPS. All other predictors, including Cash Flow Operations, Total Assets, and Net Income, have $p > 0.05$ suggesting they are not significantly associated with EPS in this model.

Table 4. Linear regression results for Earnings Per Share (EPS).

Variable	Sum of Squares	df	Mean Square	*F* Value	Pr(>*F*)
(Intercept)	0.4637	1	0.4637	0.216	0.5265
Cash Flow Operations	0.0142	1	0.0142	0.080	0.3737
Annual Revenue	0.0664	1	0.0664	4.111	0.0480*
Total Assets	0.0175	1	0.0175	1.784	0.1880
Net Income	0.0269	1	0.0269	0.255	0.6157
AUDIT Tenure years	0.0732	1	0.0732	5.046	0.0291*
Big 4 Audit Firm PwC	0.0005	1	0.0005	0.004	0.9472
Big 4 Audit Firm KPMG	0.0658	1	0.0658	1.537	0.2209
Audit independence high	0.0001	1	0.0001	0.002	0.9646

Source: Author's Computation, 2025.
Note: '*' signifies p value < 0.05

Audit Independence and Audit Independence Moderate were dropped due to singularities, likely because of multicollinearity or perfect correlation with other variables. The multiple R^2 value of 0.6695, meaning approximately 66.95% of the variability in EPS is explained by the predictors. The adjusted R^2 value of 0.6166, accounting for the number of predictors. This indicates a reasonable fit. The *F*-statistic value of 12.66 (p value = 9.0924×10^{-10}), indicating the model overall is statistically significant in **Table 5**.

Table 5. ANOVA results for Earnings Per Share (EPS).

Source of Variation	Sum of squares	df	Mean Square	*P* Value	Pr(>*F*)
Regression	109.464	1	13.662	12.66	9092×10^{-10}***
Residuals	106.153	1	2.123		
Total	215.617	1			

Source: Author's Computation, 2025.
Note:'***' signifies p value less than 1%

Key Insights

As annual revenue increases, EPS tends to increase slightly. However, the numerical impact is very small due to the scale of the revenue variable. Audit Tenure: Longer auditor tenure is positively associated with EPS, potentially reflecting the benefits of auditor familiarity with the company's financial processes.

Cash Flow Operations, Total Assets, Net Income, and audit firm indicators did not show a statistically significant relationship with EPS. The dropped variables due to singularities suggest potential multicollinearity, especially among audit-related predictors. The residuals have a wide range, and the high maximum residual suggests the presence of outliers or non-linearity in the data.

Economic Interpretation:

The positive association of audit tenure with EPS may align with literature that associates longer auditor relationships with financial stability. The significant impact of revenue on EPS reflects the fundamental relationship between revenue generation and Earnings Per Share.

Statistical Significance:

The overall model is statistically significant, with meaningful contributions from revenue and audit tenure.

However, the lack of significance for other financial metrics like Net Income and Total Assets warrants further investigation.

Table 6. BMA result of Earnings Per Share.

Variable	Model 1 Estimate	Model 2 Estimate	Model 3 Estimate	Model 4 Estimate	Model 5 Estimate
Intercept	−0.1718	−0.6238	1.168	−0.4575	−0.9325
Cash Flow operations	.	.	.	.	.
Annual Revenue	7.415×10^{-12}	8.897×10^{-12}	7.1416×10^{-12}	7.133×10^{-12}	8.644×10^{-12}
Total Assets	.	-2.095×10^{-13}	.	.	-2.151×10^{-13}
Net Income	.	.	.	.	.
Audit Tenure Years	1.429×10^{-1}	2.277×10^{-1}	.	1.565×10^{-1}	2.441×10^{-1}
Big 4 Audit Firm PwC	.	.	.	.	.
Big 4 Audit Firm KPMG	.	.	.	.	1.051
Audit independence	.	.	.	.	.
Audit Independence HIGH	.	.	.	.	.

Source. Author's Computation, 2025.

Linear regression shows Annual Revenue and Audit Tenure Years as statistically significant at a 0.05 significance level, indicated by p-values below 0.05 (*) as shown in **Table 6**. BMA presents models where Annual Revenue is included

with significant posterior probabilities in all models, while Audit Tenure Years also appears significant with relatively high probabilities in models 2, 4, and 5. Linear regression has a multiple *R*-squared of 0.6695, indicating a moderate fit. BMA presents models with *R*-squared values ranging from 0.588 to 0.661, suggesting a similar or slightly lower fit. Linear regression uses all variables but has significant collinearity, indicated by the warnings about singularities. BMA selects 32 models and provides an indication of which variables are most relevant, showing that simpler models (e.g., Models 3 and 4) can still perform well.

BIC values in BMA range from −50.06 to −47.52, with lower values suggesting better fitting models considering model complexity. The lower BICs in BMA indicate that a simpler model could potentially be more parsimonious.

In summary, BMA provides a more flexible approach by selecting several models based on posterior probabilities and penalizing for model complexity, while the linear regression gives a single model with a moderate fit and a more straightforward interpretation of coefficients.

4.2. Multinomial logistic regression results for earnings quality and Discretionary Accruals

The categories for these variables as represented in the analysis are as follows, Earning Quality: Declined slightly—category 1, Stable—category 2 and Improved—category 3. For Discretionary Accruals: Low—category 1, Moderate—category 2 and High—category 3.

Table 7. Multinomial logistic regression results for earnings quality.

Variable	Estimate (category 2)	Std. Errors (category 2)	Estimate (Category 3)	Estimate (Category 3)
Intercept	8.7488×10^{-10}	1.1763×10^{-22}	-1.2598×10^{-10}	1.4255×10^{-22}
Cash flow operations	9.608×10^{-13}	4.8797×10^{-12}	-1.21163×10^{-12}	4.8587×10^{-12}
Annual Revenue	4.4972×10^{-12}	4.4977×10^{-12}	5.6685×10^{-12}	3.5701×10^{-12}
Total Assets	-3.9099×10^{-13}	4.1112×10^{-13}	5.0408×10^{-13}	2.5955×10^{-13}
Net Income	4.0289×10^{-12}	1.4892×10^{-11}	-1.7318×10^{-11}	1.1881×10^{-11}
Audit Tenure Years	6.8726×10^{-9}	9.1535×10^{-23}	-2.6444×10^{-9}	9.5533×10^{-22}
Big 4 Audit Firm Deloitte	-6.73155×10^{-11}	7.5158×10^{-23}	3.1878×10^{-10}	5.3362×10^{-23}
Big 4 Audit Firm KPMG	-4.1207×10^{-10}	8.8769×10^{-24}	4.4019×10^{-10}	3.3912×10^{-23}
Audit Independence High	1.0086×10^{-10}	1.2125×10^{-22}	4.4982×10^{-10}	9.7180×10^{-23}
Audit Independence Moderate	-1.3368×10^{-10}	9.4659×10^{-24}	-5.7580×10^{-10}	5.0143×10^{-23}
Residual Deviance	108.8151		AIC	144.8151

Note: Category 1 was used as the reference category. Source: Author's Computation, 2025.

Table 7 shows that the Annual Revenue (Estimate = 5.6685×10^{-12}) and Audit Tenure Years (Estimate = 2.6444×10^{-9}) seem to have relatively larger coefficients for Category 3, suggesting that these variables have a more significant effect on being classified in Category 3 of Earning Quality compared to Category 1. Similar to Category 2, the coefficients for Big_4_Audit_Firm_KPMG, Audit Independence High, and Audit Independence Moderate are small and close to zero. The Residual Deviance (108.8151) indicates the lack of fit in the model, with lower values

suggesting better fit. The AIC (144.8151) is a model selection criterion, with lower values indicating a better-fitting model. It can be compared to other models to evaluate relative fit. The results suggest that many of the predictors have negligible impacts on the probability of belonging to Categories 2 or 3. Only a few variables, such as Annual Revenue and Audit Tenure years, might have a more meaningful effect on the outcome variable.

Table 8. Multinomial logistic regression results for Discretionary Accruals.

Variable	Estimate (category 2)	Std. Errors (category 2)	Estimate (Category 3)	Estimate (Category 3)
Intercept	4.9410×10^{-10}	7.7996×10^{-23}	2.3023×10^{-10}	1.1178×10^{-22}
Cash flow operations	1.2357×10^{-12}	3.6678×10^{-12}	2.4126×10^{-12}	3.7874×10^{-12}
Annual Revenue	3.7002×10^{-12}	3.0800×10^{-12}	5.4298×10^{-12}	3.7563×10^{-12}
Total Assets	2.0958×10^{-13}	2.0595×10^{-13}	-4.7389×10^{-14}	2.6541×10^{-13}
Net Income	-1.2627×10^{-11}	1.0437×10^{-11}	-1.3505×10^{-11}	1.2722×10^{-11}
Audit Tenure Years	4.8975×10^{-9}	4.4668×10^{-22}	3.5275×10^{-9}	1.4874×10^{-22}
Big 4 Audit Firm Deloitte	4.8229×10^{-10}	1.7592×10^{-23}	2.8454×10^{-10}	2.1204×10^{-23}
Big 4 Audit Firm KPMG	9.8477×10^{-11}	2.6564×10^{-23}	-5.8371×10^{-11}	8.1392×10^{-24}
Audit Independence High	6.0440×10^{-10}	6.4093×10^{-23}	-6.7893×10^{-11}	1.1601×10^{-22}
Audit Independence Moderate	-1.1030×10^{-10}	1.7349×10^{-23}	2.9812×10^{-10}	4.4840×10^{-24}
Residual Deviance	121.6872		AIC	157.6872

Note: Relative to Reference Category 1. Source: Author's Computation, 2025.

The result in **Table 8** shows that the intercept value for Category 2 is very small (4.9410×10^{-10}), suggesting a near-zero baseline log-odds of being in Category 2 compared to Category 1. For Cash Flow Operations, the small coefficient (1.2357×10^{-12}) indicates a negligible effect of this variable on the likelihood of being in Category 2. Annual Revenue shows the coefficient (3.7002×10^{-12}) that is also small but positive, indicating a slight increase in the likelihood of being in Category 2 as Annual Revenue increases. For Total Assets, the positive coefficient (2.0958×10^{-13}) suggests a slight increase in the likelihood of being in Category 2 as Total Assets increases. Net Income shows a negative coefficient (-1.2627×10^{-11}), indicating a very small negative effect of Net Income on being in Category 2. Audit tenure years also shows a coefficient (4.8975×10^{-9}) for this variable that is very small, suggesting a negligible effect on the likelihood of being in Category 2. Big4 Audit Firm (PwC) has a small positive coefficient (4.8229×10^{-10}), showing a very minor increase in the likelihood of being in Category 2 for firms audited by PwC. Big4 Audit Firm (KPMG) has a small positive coefficient (9.8477×10^{-11}), indicating a slight increase in the likelihood of being in Category 2 for firms audited by KPMG. Audit Independence shows a positive coefficient (6.0440×10^{-10}), indicating a very minor increase in the likelihood of being in Category 2 when Audit Independence is high. Audit Independence Moderate shows a negative coefficient (-1.1030×10^{-10}), suggesting a negligible negative effect for firms with moderate audit independence on being in Category 2.

The Residual Deviance, 121.6872 suggests the fit of the model, with lower values indicating better model fit.

The AIC (157.6872) shows a lower AIC indicates a better-fitting model. Comparing this with other models can help assess its performance relative to alternatives.

The coefficients for most variables are very small in magnitude, suggesting minimal or negligible effects of these predictors on the outcome variable, Discretionary Accruals. However, the interpretation indicates that Annual Revenue, Audit Tenure Years, and Big4 Audit Firm (PwC) may have slightly more influence on the likelihood of being in Category 2 or 3 of Discretionary Accruals.

5. Conclusion

This study investigated the determinants of earnings quality, Earnings Per Share, and Discretionary Accruals in the banking sector, using financial and audit-related variables. Through the application of advanced modeling techniques, including linear regression, multinomial regression, and Bayesian Model Averaging (BMA), the study provided valuable insights into how various factors, such as cash flow operations, annual revenue, total assets, net income, audit tenure, and audit independence, influence these financial outcomes. Despite the inherent challenges in data collection and modeling, the findings contribute to the understanding of financial reporting quality and its relationship with key organizational and audit characteristics.

Annual revenue and audit tenure were identified as significant predictors of Earnings Per Share. Higher annual revenues and longer audit tenures positively influenced EPS. The BMA approach confirmed the robustness of these findings, emphasizing the importance of these variables in explaining variations in EPS. Multinomial regression revealed no strong predictors for categorical earnings quality classifications. This suggests potential limitations in the model or data constraints, warranting further exploration. Multinomial regression similarly did not produce definitive relationships, indicating the need for alternative approaches or additional variables to better capture this financial metric. BMA identified annual revenue and audit tenure as the most consistent predictors across the tested models. This approach also highlighted the uncertainty in selecting the most appropriate predictors, reinforcing the value of probabilistic modeling.

To enhance audit independence, banks should prioritize policies that promote auditor independence and transparency, as this can enhance the reliability of financial reporting. To invest in revenue growth strategies given the significant impact of annual revenue on financial outcomes, banks should focus on expanding revenue streams through innovation and improved customer engagement. While longer audit tenures have shown positive effects, banks should ensure that extended auditor relationships do not compromise independence.

Develop standardized reporting guidelines to improve data quality and consistency across financial institutions, facilitating more robust comparative analyses. Encourage disclosure of additional audit and financial metrics to support comprehensive evaluations of financial reporting quality.

One of the primary limitations of this study was the difficulty in obtaining precise financial figures for all the variables of interest. As a result, certain financial

metrics had to be approximated, which may have introduced a degree of estimation error into the analysis. Additionally, the study faced constraints in the availability of longitudinal financial reports for banks, limiting the temporal scope of the analysis and potentially impacting the robustness of longitudinal insights [30]. Variations in the reporting standards and formats of financial statements across banks made it challenging to harmonize the data. Discrepancies in data presentation may have influenced the accuracy of the analysis. The study was constrained by the relatively small sample size due to limited access to financial reports and audit data, which could restrict the generalizability of the findings.

High correlations among certain independent variables, such as total assets, revenue, and net income, posed challenges in isolating the unique contributions of individual predictors to the dependent variables.

The selection of the most appropriate models, particularly in Bayesian Model Averaging (BMA), involved dealing with inherent model uncertainty and computational complexity. The scope of the study was limited by the timeline for completion, which restricted further exploration of alternative modeling techniques or deeper sensitivity analyses. Macroeconomic conditions, regulatory changes, and other external factors influencing bank performance were not explicitly controlled for in this study, which may have impacted the interpretation of the results. While efforts were made to base variable selection on theoretical and empirical justifications, there remains an element of subjectivity in determining which predictors to include in the models.

Future studies should consider other sectors beyond banking to determine whether the identified relationships are consistent across industries. Analyzing the role of macroeconomic factors, such as inflation and interest rates, could provide additional context to the findings. Investigating longer timeframes would allow for better understanding of trends and temporal effects on earnings quality and financial performance. Incorporating additional predictors, such as corporate governance variables or sector-specific metrics, could enhance model accuracy. Applying advanced machine learning techniques, such as random forests or neural networks, may uncover hidden patterns in the data. Future research could examine the impact of managerial decisions, corporate culture, and other qualitative factors on financial performance and reporting quality.

By addressing these recommendations and research directions, future efforts can build upon the findings of this study, fostering a deeper understanding of the complex dynamics influencing financial reporting and performance in the banking sector.

Conflict of interest: The author declares no conflict of interest.

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