Altman's Z-Score and the Prediction of Corporate Failure in Nigeria: Analysis of the Banking Sector

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Abstract

This study investigates the use of financial ratios to predict financial stability, focusing on Nigerian commercial banks from 2011 to 2020. It highlights Altman's Z-score model, which assesses insolvency risk through key indicators such as liquidity, profitability, growth, and valuation ratios. An analysis of twelve banks showed Z-scores below the critical threshold of 1.81, indicating financial distress. While the Z-score model effectively forecasts potential bankruptcy, its applicability in Nigeria is limited by challenges such as regulatory volatility and shifting government policies. The study identifies the working capital to total assets (WCTA) ratio as a significant determinant of Z-scores in these banks. To improve financial soundness assessments, the study recommends adopting the Z-score model as an early warning system for bankruptcy detection. However, it also emphasizes the need to incorporate factors specific to the Nigerian context, such as economic policy changes and industry-specific risks, to enhance prediction accuracy.

Keywords: Altman z-score, Corporate Failure, Banking Sector, Accounting.

Introduction

Forecasting business sustainability is pivotal in mitigating financial losses for stakeholders and investors. Given the growing prevalence of financial uncertainties and the increasing demand for insightful analysis, potential investors require a comprehensive evaluation of an organization's financial health prior to resource commitment (Beaver, 2001). According to Horrigan (2008), one of the predominant concerns for businesses globally irrespective of size or operational nature is the risk of insolvency, operational collapse, or failure.

Empirical evidence and historical trends suggest that the incidence of business failures has escalated markedly over the past two decades, exceeding rates observed since the early 1930s. The determinants of these failures vary significantly across organizations and regions. Economists attribute these occurrences to inherent industry characteristics and external factors, including abrupt regulatory changes, political influences, shifts in oversight bodies, and operational complexities, all of which exacerbate financial distress. The banking sector is particularly vulnerable, grappling with issues such as sudden collapses and liquidation challenges. Studies conducted across jurisdictions such as the U.K., U.S., Canada, and Australia (Star, 1990) highlight that small, private, and newly established firms, often hindered

by inadequate governance practices and suboptimal cash flow management, are disproportionately susceptible to financial failure compared to larger entities. Consequently, the analysis of annual reports for informed decision-making is indispensable across firms of varying scales.

Over the past four decades, substantial advancements have been made in methodologies for forecasting corporate failure and insolvency, building on Beaver's seminal 1966 study, which introduced a robust framework for bankruptcy prediction. Two central approaches have since emerged: the identification of optimal predictive indicators to reduce classification errors and the application of advanced statistical techniques to enhance data classification accuracy. These forecasting models are critical, as corporate collapses incur substantial costs, affecting not only shareholders but also employees, creditors, and the broader economic landscape.

Traditionally, financial statements serve as the foundation for assessing corporate solvency. Beaver (2017) emphasized that financial ratios derived from these statements: such as income statements, balance sheets, and cash flow statements provide a more immediate perspective on financial health. Key metrics, including the debt-to-equity ratio and gross margin, are instrumental in industry comparisons and offer significant predictive value in assessing a company's operational trajectory.

This chapter outlines the study's context, problem statement, objectives, research questions, significance, and limitations, establishing a comprehensive framework for understanding corporate financial assessments. The primary aim is to examine the relationship between financial ratios and corporate failure predictions within the contemporary Nigerian banking sector. Specific objectives include:

- Analysing the influence of the working capital to total assets ratio on corporate failure prediction.

- Evaluating the role of the retained earnings to total assets ratio in forecasting financial distress.

- Investigating the effect of the earnings before interest and taxes to total assets ratio on insolvency predictions.

- Assessing the predictive capacity of the market value of equity to book value of debt ratio.

- Exploring the impact of the sales to total assets ratio on corporate failure outcomes.

These objectives align with research questions aimed at quantifying the predictive strength of these financial ratios within Nigeria's banking sector. The study intends to enhance the understanding of financial ratio analysis as a tool for assessing banking sector stability and identifying insolvency risks. The primary focus is the predictability of financial ratios, specifically those included in Altman's Z-Score model: working capital/total assets, retained earnings/total assets, EBIT/total assets, market value equity/book value debt, and sales/total assets ratios—in identifying distress among Nigerian commercial banks.

Literature Review

Conceptual Review

This section explains the concepts associated with this study by examining the definitions, types, uses and limitations of the concepts. The two major concepts for this study are prediction of corporate failure and Altman's Z-score.
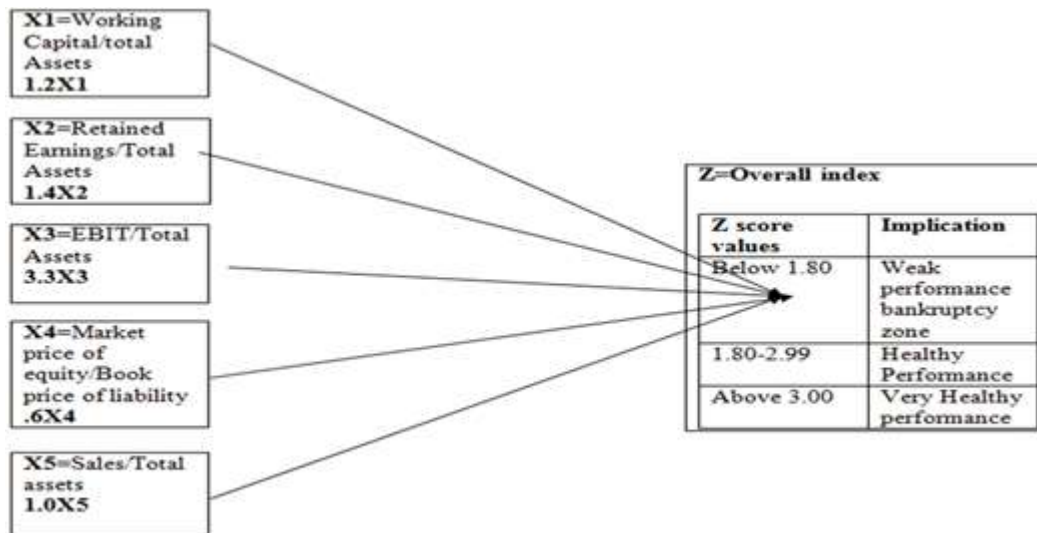

Figure 1 Conceptual Framework
Adapted from Kiyayo & Olweny (2014)

Financial Ratios

Financial ratios are widely utilized by researchers and practitioners to assess a firm's trajectory, whether toward growth or insolvency. The activities of a firm influence various stakeholders, including shareholders, management, employees, customers, suppliers, competitors, regulatory authorities, and academicians. Therefore, financial ratio analysis serves as a critical tool in determining a firm's financial health and sustainability. Recent scholarship (e.g., Kotane & Kuzmina-Merlino, 2012; Beaver et al., 2010) has emphasized the importance of ratio analysis in evaluating performance and predicting financial distress.

Altman's Z-Score Model

Altman's Z-Score Model, introduced by Edward Altman in 1968, employs Multiple Discriminant Analysis (MDA) to classify firms based on financial stability using published financial data. This quantitative model predicts financial distress and differentiates between solvent and insolvent firms. The model is based on five key financial ratios: Market Value of Equity to Book Value of Debt (MVEBV), Working Capital to Total Assets (WCTA), Retained Earnings to Total Assets (RETA), Earnings Before Interest and Tax to Total Assets (PBITTA), and Sales to Total Assets (STA). These metrics evaluate profitability, leverage, liquidity, solvency, and activity, providing insights into bankruptcy risk.

Significance of Financial Ratio Analysis

Financial ratio analysis facilitates the evaluation of a firm's financial condition, aiding stakeholders like creditors, investors, and management in decision-making (Jooste, 2016).

Ratios provide a clear perspective on liquidity, profitability, and solvency. However, their reliability hinges on accurate financial data, as distorted accounting figures lead to misleading ratios (Ross, 2009).

Limitations of Ratio Analysis

Despite its utility, ratio analysis is limited by dependency on historical data, variations in accounting practices, and the potential for inaccuracies in financial statements. For instance, overvaluation of assets can inflate profitability metrics, rendering ratio-derived insights unreliable.

Corporate Failure and Governance Challenges

The collapse of firms like Enron and WorldCom underscores the implications of weak corporate governance. Poor governance practices, particularly in developing nations, hinder firms' ability to attract capital and sustain operations (Okpara, 2011). Mismanagement, inadequate planning, and the absence of a clear organizational structure exacerbate corporate failures (Mbat & Eyo, 2013). Effective governance, including the separation of ownership and management roles, is critical for organizational resilience.

Remedies for Corporate Failure

Addressing corporate distress requires robust management practices. Key strategies include:

1. **Employee Development:** Training to enhance job performance and leadership capabilities.

2. **Market and Product Management:** Prioritizing customer satisfaction and market alignment (Beaver, 2001).

3. **Process Re-engineering:** Optimizing productivity and competitive positioning through effective financial structures and strategic planning.

Theoretical Framework

The study draws on four key theories to contextualize the relevance of financial ratios:

1. **Signalling Theory:** Originating from Spence (1973), this theory explains how firms convey financial health signals through ratios to mitigate information asymmetry. The theory addresses a key communication challenge: how can the receiver determine whether the signaller is truthfully conveying information about a situation or event, especially when the signaller may have a biased interest? Similarly, how can the signaller prove to the receiver that their message is truthful, whether it is or not? This dilemma often arises when the interests of the signaller and the receiver diverge, creating an imbalance of information, where the signaller is typically in a better position to know the truth than the receiver.

2. **Decision-Usefulness Theory:** Proposed by Staubus (1954/1980), it highlights the role of financial statements and ratios in addressing diverse stakeholder information needs. It prompts the need for additional economic evaluations, such as financial ratios, to aid

more sophisticated decision-making by the users of accounting information (Ormin & Tijjani, 2020)

3. **Stakeholder Theory:** Introduced by Freeman (1984), this theory emphasizes the importance of considering all stakeholders in corporate strategies, especially in governance and financial reporting.

4. **Agency Theory:** Developed by Jensen and Meckling (1976), this theory examines the principal-agent relationship, highlighting potential conflicts and risk-sharing dynamics.

By integrating these frameworks, the study underscores the critical role of financial ratio analysis in evaluating corporate health, addressing governance challenges, and supporting decision-making.

Empirical Review

A substantial body of empirical research has explored the efficacy of financial ratios in forecasting corporate outcomes, particularly their utility in predicting corporate bond ratings. These studies typically employ accounting and financial ratios as dependent variables, drawing on financial statement data from sampled firms. Analytical methodologies such as regression analysis and discriminant analysis are commonly utilized to assess the predictive relevance of these ratios. As noted by Van (2002), the most robust financial ratios for predictive purposes include the debt-to-equity ratio, cash flow-to-debt ratio, net operating profit margin, debt coverage and its consistency, return on investment, firm size, and earnings stability.

Author(s)	Year	Title	Key Focus	Methodology	Findings
Azhar et al	2021	Factors determining Z-score and corporate failure in Malaysian companies	Analyzes factors affecting Z-score and corporate failure in Malaysia.	Empirical analysis using financial data.	Identified key financial ratios significantly influencing Z-scores and failure predictions.
Edwin, M	2021	Corporate governance reform and corporate failure in the UK	Analyzes the effects of governance reforms on corporate failure.	Case study Analysis	eform measures positively impacted governance, reducing corporate failures.
Wales & Ajibike	2021	Corporate failure in Nigeria: A resultant effect of creative accounting	Links corporate failures to creative accounting practices.	Qualitative Analysis of Case study	Highlighted the prevalence of creative accounting as a significant factor in

					corporate failures.
Geisel et ai	2021	Corporate failure prediction of construction companies in Poland: Evidence from logit model	Studies corporate failure prediction in the construction sector.	Logit Regression Analysis	The model effectively predicted failures, identifying critical risk factors in the construction sector.
Saha and Navalia	2018	Bankruptcy risk prediction using Altman z-score model: an empirical study on private commercial banks of Bangladesh	Empirical study on bankruptcy risk in Bangladeshi banks.	Application of Altman's Z-score model	Found Altman's Z-score to be a reliable predictor of bankruptcy risk in the banking sector.
Sajjan, R	2016	Predicting bankruptcy of selected firms by applying Altman's Z-score model	Applies Z-score model for bankruptcy prediction.	Statistical analysis using Z-score methodology.	Confirmed the Z-score's effectiveness in predicting bankruptcy across selected firms.
Dadepo, I	2017	Financial ratios as a measure of performance of deposit money banks in Nigeria	Investigates financial ratios in Nigerian banks post-consolidation	Financial ratio analysis and performance benchmarking	Identified key ratios that correlate with financial health and performance in Nigerian banks.
Maccarthy, J.	2017	Using Altman Z-score and Beneish M-score Models to detect financial fraud and corporate failure: A Case study of Enron Corporation	Examines financial fraud detection using Z-score and M-score models.	Case study analysis with model application.	Demonstrated the models' effectiveness in identifying financial fraud and potential failures in Enron.

Salami, A. Y	2015	Validity of Altman's z-score model in predicting bankruptcy in recent years	Assesses Z-score model validity in recent years.	Comparative analysis of bankruptcy cases.	Supported the Z-score model's continued relevance in predicting bankruptcy despite changing market conditions.
Amadasu, D. E	2012	Bank Failure Prediction	Highlights financial analysis's role in preventing bank failures.	Financial ratio analysis	Emphasized the importance of regular financial health assessments in preventing bank failures.
Anyum, S.	2012	Business bankruptcy prediction models: a significant study of the Altman's z-score model	Focuses on the significance of Altman's Z-score model.	Application of Altman's Z-score	Reinforced the Z-score model's utility in predicting business bankruptcy effectively
Leathy,	2010	The determinants of profitability in the pharmaceutical industry	Analyzes factors affecting profitability in the pharmaceutical sector.	Econometric Modelling	Found that R&D investment and market share significantly impact profitability in the pharmaceutical sector.
Kiyota,	2009	Found that R&D investment and market share significantly impact profitability in the pharmaceutical sector.	Compares domestic and foreign bank efficiency in Sub-Saharan Africa.	Comparative analysis using efficiency ratios.	Identified efficiency gaps between domestic and foreign banks, highlighting areas for improvement.

Inman, L. L	2001	Towards identifying a meaningful discriminatory ratio	Attempts to identify effective discriminatory ratios.	Ratio analysis and statistical testing.	Identified specific ratios that significantly differentiate between solvent and insolvent firms.
Altman, et al	1995	Emerging market corporate bonds: A scoring system	Discusses scoring for emerging market corporate bonds.	Development of a scoring model based on financial indicators.	Proposed a scoring system that effectively assesses corporate bond risk in emerging markets.
Beaver, W	1996	Financial ratios as predictors of failure	Establishes financial ratios as predictors of corporate failure.	Ratio analysis and predictive modelling	Demonstrated the effectiveness of financial ratios in predicting corporate insolvency.

Methodology

Research Paradigm

This study adheres to the positivist paradigm, grounded in the theories of Auguste Comte, which emphasizes observation and experimentation as tools for understanding human behaviour. The research centres on two primary objectives: examining the factors that drive behavioural changes and utilizing quantitative data for statistical analysis, particularly through an ex-post facto research design.

Research Design

This study employs a descriptive survey methodology to analyse the impact of ratio analysis on the performance of Nigerian commercial banks during the period 2011–2020, including those that ceased operations between 2007 and 2011. The study highlights the crucial role of banks in maintaining economic stability and examines the adverse repercussions of bank failures.

Population and Sampling

The research targets 12 out of 22 commercial banks listed on the Nigerian Exchange Group, selected using judgmental sampling based on data availability over the ten-year period. Altman's Z-score model is utilized to predict the likelihood of bank failure, with key accounting ratios providing a basis for financial performance evaluation.

Data Collection

Secondary data was sourced from annual reports of banks, publications from the Nigerian Exchange Group, and other relevant literature.

Data Analysis

Data analysis was conducted using descriptive statistics, correlation, and regression analysis with E-Views software. Altman's Z-score model was the principal tool for assessing bankruptcy risk, relying on five financial variables: working capital, retained earnings, earnings before interest and taxes, market value of equity, and sales relative to total assets.

Key Findings

- **Working Capital/Total Assets (WCTA):** A 13% increase in WCTA enhances Z-scores significantly.

- **Retained Earnings/Total Assets (RETA):** Positively correlated with Z-scores; a 1% change reduces bankruptcy likelihood by 83%.

- **Earnings Before Interest and Taxes/Total Assets (EBITTA):** Shows a modest positive impact, with a 1% increase improving Z-scores by 12.5%.

- **Market Value Equity/Book Value Debt (MVEBV):** Drives Z-scores significantly, with a 47% increase per 1% rise in MVEBV.

- **Sales/Total Assets (STA):** Negatively correlated, with higher sales leading to a 29% Z-score increase, indicating sales volume alone does not ensure financial health.

The study confirms growth trends in these ratios over the observation period, reflecting active economic engagement among banks.

Model Relevance and Limitations

Altman's Z-score model demonstrates a strong predictive capability (correlation coefficient of 0.99) but fails to fully account for unique Nigerian challenges, including regulatory instability. The Granger causality test revealed no interdependencies among the Z-score ratios. Limitations include the small sample size, variations in accounting practices, and a relatively short observation period, which may affect generalizability.

Recommendations

1. Monitor the WCTA ratio to ensure sufficient liquidity.

2. Adapt Altman's Z-score model to reflect Nigeria-specific factors.

3. Incorporate regulatory and economic variables into predictive models.

4. Develop a localized model, "Pretty's Z-score," to address unique banking sector dynamics.

Contribution to Knowledge

This study validates Altman's Z-score as a useful tool for bankruptcy prediction in Nigeria's banking sector while emphasizing the necessity of integrating localized factors to improve accuracy. Future research should broaden the scope to other sectors and develop tailored prediction models.

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