Prediction of Financial Distress and Viability of Yes Bank

Smruti Ranjan Sahoo	Ratan Kumar Behera
Assistant Professor	Research scholar
Innovation The Business School	Sambalpur University
e-mail: smruti.ravenshaw@gmail.com	e-mail: ratankb21@gmail.com

Abstract: This Article constitutes a comprehensive examination of financial distress prediction within the context of Yes Bank, a prominent financial institution in India. In light of the crucial role banks play in the economy and the potential systemic implications of their distress, this study delves into the intricacies of predicting such events, aiming to contribute to the existing body of knowledge in risk management, banking regulation, and financial stability.

Key words: Financial Distress, Altman Z Score, Du pont Ratio

1. Introduction:

The banking sector is essential for the functioning of the economy. Banks act as intermediaries between savers and borrowers, channeling funds into productive investments and facilitating economic growth. They create credit by extending loans and provide crucial payment services, ensuring efficient transactions. Banks also play a vital role in managing risks and maintaining financial stability. Central banks use the banking sector to implement monetary policy, influencing economic activity. Moreover, banks promote financial inclusion by providing access to financial services for all segments of society. Overall, the banking sector is indispensable for economic development and stability.

The banking sector serves as the cornerstone of economic stability and growth, playing a pivotal role in facilitating financial intermediation, mobilizing savings, and allocating capital efficiently. However, the inherent complexities and interconnectedness within the banking industry render it susceptible to various risks, including financial distress. Financial distress in banks can have far- reaching consequences, affecting depositors, creditors, shareholders, and the broader economy.

Against this backdrop, this dissertation embarks on a comprehensive exploration of financial distress prediction within the specific context of Yes Bank, a prominent financial institution in India. Yes Bank's significance in the Indian banking landscape, coupled with its recent history of financial turbulence, underscores the relevance and urgency of studying its financial health and vulnerability

to distress events.

Financial analysis is a critical process used by businesses, investors, and analysts to assess the financial health and performance of a company. It involves examining financial statements, ratios, and other financial indicators to gain insights into a company's profitability, liquidity, solvency, and overall efficiency. Through financial analysis, stakeholders can make informed decisions regarding investments, loans, mergers, acquisitions, and other financial transactions.

2. Review of Literature

Mohanasundaram P (2015) has put Altman Z Score model for prediction of financial distress and financial solvency of Shree Renuka Sugars Ltd., Balarampur Chini Mills Ltd, Dhampur Sugar Mills Ltd., Shakti Sugars Ltd, Bannari Amman Sugars Ltd. from 2008-09 to 2012-13. He found that Z Score of Shree Renuka Sugars Ltd. Is more than the benchmark of 2.9 during study period and operated under safe zone. Z Score of Balarampur Chini Mills Ltd. Is more than 2.9 during study period other than 2008-09. He found less than 2.9 Z Score of Dhampur Sugar Mills ltd., Shakti Sugars Ltd, Bannari Amman Sugars Ltd. These firms are under poor financial health.

Panchal Nilam (2017) has put Altman Z score model to study financial distress of HUL, Colgate-Palmolive, ITC limited, Nestle, P&G from 2013 to 2017 and found above companies are under safe zone having a greater Z score of 2.9.

Jagannayaki K, Reddy Anusha (2019) have calculated Altman Z Score of Apollo Pipes ltd, Asian paints ltd, JSW steel ltd, Apollo Tyres Ltd, Bombay Dyeing and Manufacturing Company, Hindustan Unilever Ltd, Aditya Birla Fashion & Retail ltd, Hero MotoCorp ltd, Moser Baer(India) Ltd, Mahindra and Mahindra Ltd. They found that Apollo Pipes Ltd, Asian Paints Ltd, JSW Steel, Bombay Dyeing and Manufacturing Company are under grey zone for Z Score less than 2.99. Hindustan Unilever ltd, Hero MotoCorp ltd, Mahindra and Mahindra ltd are under safe zone for Z score more than 2.9. Aditya Birla Fashion and Retail Ltd, Apollo Tyres Ltd, Moser Baer India Ltd are under distress Zone.

Non Banking Sector (Indian Prospective)

Rahman Abdul and Acharya Parmeshwara (2022) have put Altman Z score to predict financial distress of Maruti Suzuki, Mahindra & Mahindra Ltd. Hyundai Motor, General Motor and Ford Motor from 2015-16 to 2019-20 found Maruti Suzuki and Hyundai Motors are under safe zone and General Motor and Ford Motor are under distress Zone. **Sheela Christina , Karthikeyan (2012)** have analyzed financial

performance of pharmaceutical industry by applying Dupont ratio.

Non Banking Sector(Global Context)

Muntari Mahama (2015) studied financial soundness of ten companies listed on Ghana Stock Exchange by using Altman Z Score Model of six companies. The study found that two companies were financially sound; two companies were in financially distress, two others in state of detoriation and like to be financial distress.

Kalathinkal Riyas. and Ahamed Muhammad Imthiyaz (2015) in their study have analyzed financial distress prediction using Altman Z score of Oman cement company. They found the company was operating under safe zone having higher Z score which is more than benchmark 2.99 in between 2009-2013.

Mohammed Shariq (2016) studied Z Scores of cement companies in Oman and found that Raysut Cement Company SAOG and its subsidiaries are financially sound as they have higher Z score than the benchmark 2.99.

Flourien Nurul Ch, Lies Zulfiati (2018) have studied financial distress using Altman Z Score Model on 15 state owned public enterprises consisting of Pharmacy, energy, metal, construction, metal, bank, mining, cement, transportation and telecommunication company listed in Indonesia Stock Exchange. They categories companies in distress Zone, Gray Zone and Safe Zone.

Omary J. Ally and Kembo M. Bawana (2019) have analyzed financial distress prediction of six manufacturing companies listed under Dares Salaam Stock Exchange by Multi Discriminant Analysis and found that five firms were under safe zone because of average score is more than 2.99 while the other two were under distress zone for average score is less than 1.88 for the study period from 2010-2014.

Banking Firms(Indian Context)

Agarwal Soumya(2018) has analyzed financial distress position of Banks through Altman Z Score of State Bank Of India, Bank Of Baroda, Punjab National Bank, Central Bank of India, IDBI Bank from 2012-2016. Z score of SBI, PNB, BOB, Central Bank is comparatively low to IDBI.

Shetty prameela and Shetty Ramaya (2020) have calculated Z score from 2014-19. They have found from the study that the Z- Score formula fails to predict bankruptcy in case of Yes Bank.

Niazi Attaulah and Mulla Nisar Ahmed (2021) have analyzed performance of the J&K Grameen Bank(JKGB) and Ellaquai Dehati Bank(EDB) by applying CAMEL Model approach.

Rani Meena(2022) has put Z Score Model of some Public Sector banks, Private Sector banks and Foreign Banks from 2016-2020 and found their Z Score. She has categorized them safe zone, Grey Zone and Distress Zone.

Kumar Pawan,Verma Poonam,Bhatnagar Mukul,Taneja Sanjay,Seychel Sharon, Todorovic Igor, Grim Simon (2023)have studied twelve (12) public sector Banks and determines performance and insolvency of public sector Banks by putting CAMEL Model and Z Score.

Das Sujit (2020) in his study analyzed solvency position, Efficiency analysis, profitability analysis, Risk analysis by putting Altman Z Score and Balanced Bench Marking Model of State Cooperative Banks region wise.

Banking Firms (Global Prospective)

Nath Subrata Deb, Biswas Prasenjit Kumar, Rashid Aminur, Biswas Munna Rani (2020) have studied financial distress prediction of six state owned commercial Banks of Bangladesh on the basis of Liquidity, Profitability and Z score . These banks are Basic, BDBL, Rupali, Janata, Sonali, Agrani and found that one bank BDBL is under grey zone and others were under distress zone.

Ntawumenyumunsi A. and Maringa E.K.(2022) in their study analyzed financial distress prediction of three Banks listed on Rwanda Stock Exchange name BK Plc, KCB ltd, I&M Bank Plc for study period of 2015-2019 and found that the bankruptcy will occur because of low Z Score.

Molla Simeneh Almaw (2022) has analyzed top six profitable private banks by putting Altman Z Score Model. are CBE Bank, Awash Bank, BOA Bank, Dashen Bank, Coop Bank, NIB Bank. He found that some banks were under safe zone and some banks were under grey zone.

Summary Of Literature Review:

- Literature Suggest Altman Z Score model Researchers put to predict financial distress.
- Dupont Ratio Researchers put to calculate Return on Equity.
- Altman Z Score Model and Dupont Model can be useful to predict financial distress of Bank and also in case of State Cooperative Bank which is not Stock Exchange Listed.

2.1 Research Gap:

i. Most of the studies regarding financial distress prediction are done on different banks but a few studies have been made to predict financial distress of yes bank.

ii. Most of the studies regarding financial distress prediction are done on different banks but a few studies have been made to analyze the current financial performance of yes bank. In this study we do financial performance analysis or financial distress prediction of yes Altman Z's score model.

2.2 Research Objective

i. To predict financial distress of yes bank by using Altman Z score.

ii. To Study Financial viability of Yes Bank in India by using Dupont analysis.

iii. To Suggest any Financial model which can prevent financial Collapse in future.

Sources of Data Collection

a. Secondary source of data collection.

b. Annual reports of Yes bank.

3. Conceptual Framework:

Z-Score Formula

The Z-score formula for predicting bankruptcy was published in 1968 by Edward Altman.

The formula may be used to predict the probability that a firm will go into bankruptcywithin two years.

- X1 = Working Capital / Total assets

(WC=Current Assets-Current Liabilities)

- X2 = Retained Earnings / Total Assets (RE= Total Reserve & Surplus)
- X3 = Earnings Before Interest and Taxes / Total Assets

(EBIT= Net Profit + Interest + Tax)

- X4 = Market Value of Equity / Total Liabilities

(MVE= Paid up Share Capital)

- X5 = Sales / Total Assets

ALATMAN Z SCORE MODEL

Z-score bankruptcy model (Manufacturing Firms):

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1X5$$

Zones of discrimination:

- $Z > 2.99$ – "Safe" zone
- $1.81 < Z < 2.99$ "Grey" zone
- $Z < 1.81$ – "Distress" zone

Z-score bankruptcy model (Non manufacturers/Service Sector):

$$Z = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$$

Zones of discrimination:

- $Z > 2.6$ – "Safe" zone
- $1.1 < Z < 2.6$ – "Grey" zone
- $Z < 1.1$ – "Distress" zone.

4. Data Analysis

Altman Z score model have been applied to predict financial distress and solvency of Yes bank.

Z score of Yes Bank for year 2016-17

Code	Formula	Ratio	weight	Result
X1	Working capital/Total asset	0.16	6.65	1.064
X2	Retain Earning/Total asset	-0.22	3.26	-0.7172
X3	EBIT/Total asset	0.14	6.72	0.9408
X4	MVE /Total liabilities	0.756	1.05	0.7938
Z score				2.0814

Explanation

The calculated Z-Score of 2.0814 falls within a specific range that indicates the bankruptcy risk of the company. Generally, a Z-Score above 2.99 is considered safe, between 1.81 and 2.99 is a gray zone, and below 1.81 suggests a high risk of bankruptcy. In this case, the Z- Score of 2.0814 suggests that Yes Bank is in the gray zone, warranting caution and proactive measures to mitigate bankruptcy risk.

Z score of Yes Bank for year 2017-18

Code	Formula	Ratio	weight	Result
X1	Working capital/Total asset	0.35	6.65	2.331531596
X2	Retain Earning/Total asset	-0.009160014	3.26	-0.029861646
X3	EBIT/Total asset	0.120760479	6.72	0.811510416
X4	MVE /Total liabilities	0.673301832	1.05	0.706966923
Z score				3.820147289

Explanation

The calculated Z-Score of 3.820147289 is above the safe threshold of 2.6, indicating that Yes Bank is currently in a safe zone in terms of bankruptcy risk. This suggests that the bank's financial health is relatively stable and less susceptible to bankruptcy based on the Altman Z-Score model.

Z score of Yes Bank for year 2018-19

Code	Formula	Ratio	weight	Result
X1	Working capital/Total asset	0.35	6.65	2.311606487
X2	Retain Earning/Total asset	0.205420693	3.26	0.669671458
X3	EBIT/Total asset	0.022123297	6.72	0.148668554
X4	MVE /Total liabilities	0.394787619	1.05	0.414527
Z score				3.544473499

Explanation

The table presents the components and calculations for the Altman Z-Score model, assessing Yes Bank's bankruptcy risk. Key components include liquidity (X1: Working Capital/Total Assets), profitability (X2: Retained Earnings/Total Assets and X3: EBIT/Total Assets), and market valuation (X4: Market Value of Equity/Total Liabilities). Notably, the Z-Score of 3.544473499 is above the safe threshold of 2.99, indicating that Yes Bank is currently in a safe financial position in terms of bankruptcy risk. Improvements in liquidity and profitability, particularly a positive retained earnings ratio, contribute to the bank's overall financial stability.

Z score of Yes Bank for year 2019- 20

Code	Formula	Ratio	weight	Result
X1	Working capital/Total asset	0.44	6.65	2.947405493
X2	Retain Earning/Total asset	0.161048119	3.26	0.525016868
X3	EBIT/Total asset	-0.14867572	6.72	-0.99910084
X4	MVE /Total liabilities	0.715806804	1.05	0.751597144
Z score				3.224918665

Explanation

The table outlines the Altman Z-Score components assessing Yes Bank's bankruptcy risk. Key ratios considered include liquidity (X1: Working Capital/Total Assets), profitability (X2: Retained Earnings/Total Assets and X3: EBIT/Total Assets), and market valuation (X4: Market Value of Equity/Total Liabilities). The resulting Z-Score is 2.224918664, falling below the safe threshold of 2.99. While the bank maintains a strong market valuation relative to liabilities, challenges in operational profitability and a negative EBIT/Total Assets ratio contribute to a higher bankruptcy risk compared to the previous assessment.

Z score of Yes Bank for year 2020- 21

Code	Formula	Ratio	weight	Result
X1	Working capital/Total asset	0.93	6.65	6.161544962
X2	Retain Earning/Total asset	-0.886182283	3.26	-2.888954244
X3	EBIT/Total asset	-0.223321992	6.72	-1.500723786
X4	MVE /Total liabilities	0.396064672	1.05	0.415867906
Z score				2.187734838

Explanation

The table presents the Altman Z-Score components assessing Yes Bank's bankruptcy risk. The key ratios considered are liquidity (X1: Working Capital/Total Assets), profitability (X2: Retained Earnings/Total Assets and X3: EBIT/Total Assets), and market valuation (X4: Market Value of Equity/Total Liabilities). The resulting Z-Score is 2.187734838, which is below the safe threshold of 2.99. Despite strong liquidity and a positive market valuation relative to liabilities, significant challenges in profitability and negative retained earnings contribute to an increased bankruptcy risk compared to previous assessments.

Zscore of Yes Bank for year 2021- 22

Code	Formula	Ratio	weight	Result

X1	Working capital/Total asset	0.03	6.65	0.16765164
X2	Retain Earning/Total asset	0.035650356	3.26	0.11622016
X3	EBIT/Total asset	0.007187462	6.72	0.048299742
X4	MVE /Total liabilities	0.127848627	1.05	0.134241059
Z score				0.466412601

Explanation

The table outlines the Altman Z-Score components assessing Yes Bank's bankruptcy risk. The key ratios considered include liquidity (X1: Working Capital/Total Assets), profitability (X2: Retained Earnings/Total Assets and X3: EBIT/Total Assets), and market valuation (X4: Market Value of Equity/Total Liabilities). The resulting Z-Score is 0.466412601, which is well below the safe threshold of 2.99, indicating a high bankruptcy risk. The bank's low liquidity, minimal profitability, and modest market valuation relative to liabilities are significant contributors to this elevated risk level.

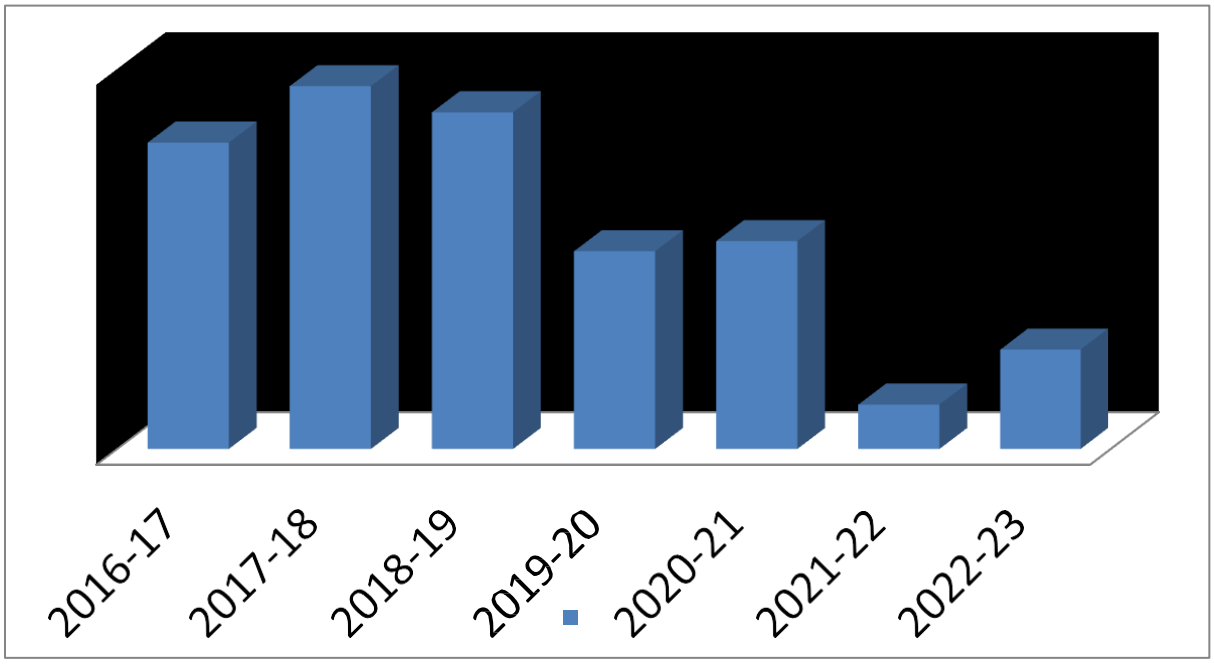
Z score of Yes Bank for year 2022- 23

Code	Formula	Ratio	weight	Result
X1	Working capital/Total asset	0.08	6.65	0.537536434
X2	Retain Earning/Total asset	0.061195725	3.26	0.199498064
X3	EBIT/Total asset	0.025192605	6.72	0.169294306
X4	MVE /Total liabilities	0.13200231	1.05	0.138602426
Z score				1.044931229

Explanation

The table presents the Altman Z-Score components assessing Yes Bank's bankruptcy risk. Key ratios considered are liquidity (X1: Working Capital/Total Assets), profitability (X2: Retained Earnings/Total Assets and X3: EBIT/Total Assets), and market valuation (X4: Market Value of Equity/Total Liabilities). The resulting Z-Score is 1.044931229, falling below the safe threshold of 2.99 but indicating a less severe bankruptcy risk compared to the previous assessment. While liquidity and profitability show slight improvements, the bank's market valuation relative to liabilities remains modest, contributing to the elevated risk level.

Graphically Presentation



The column diagram plots Yes Bank's Z-Score values on the y-axis against the corresponding years on the x-axis. Starting from 2016-17 and 2017-18, the Z-Score was robust at 3.22 and 3.82 respectively, indicating a low bankruptcy risk. This stability continued into 2018-19 with a Z-Score of 3.54. However, a significant decline began in 2019-20, dropping to 2.08, signaling an increased bankruptcy risk. This trend persisted in 2020-21 with a Z-Score of 2.19. The most drastic drop was observed in 2021-22, plummeting to 0.47, pointing to a high bankruptcy risk. While there was a minor recovery in 2022-23 with a Z-Score of 1.04, the bank remains in a high-risk zone compared to previous years.

Conceptual frame work about dupont analysis

The DuPont analysis model, also known as the DuPont identity or DuPont equation, is a financial analysis framework that breaks down a company's return on equity (ROE) into its component parts to assess the factors driving profitability and efficiency. Developed by the DuPont Corporation in the early 20th century, the DuPont analysis model provides valuable insights into a company's financial performance and helps identify areas for improvement. The model is based on the premise that ROE is influenced by three key components: profitability, asset efficiency, and financial leverage.

The DuPont analysis model is expressed as follows:

ROE = Net Profit Margin (NPM) * Asset Turnover (AT) * Equity Multiplier (EM) Where:

Net Profit Margin (NPM) = Net Income / Total Revenue Asset

Turnover (AT) = Total Revenue / Average Total Assets

Equity Multiplier (EM) = Average Total Assets / Average Shareholders' Equity

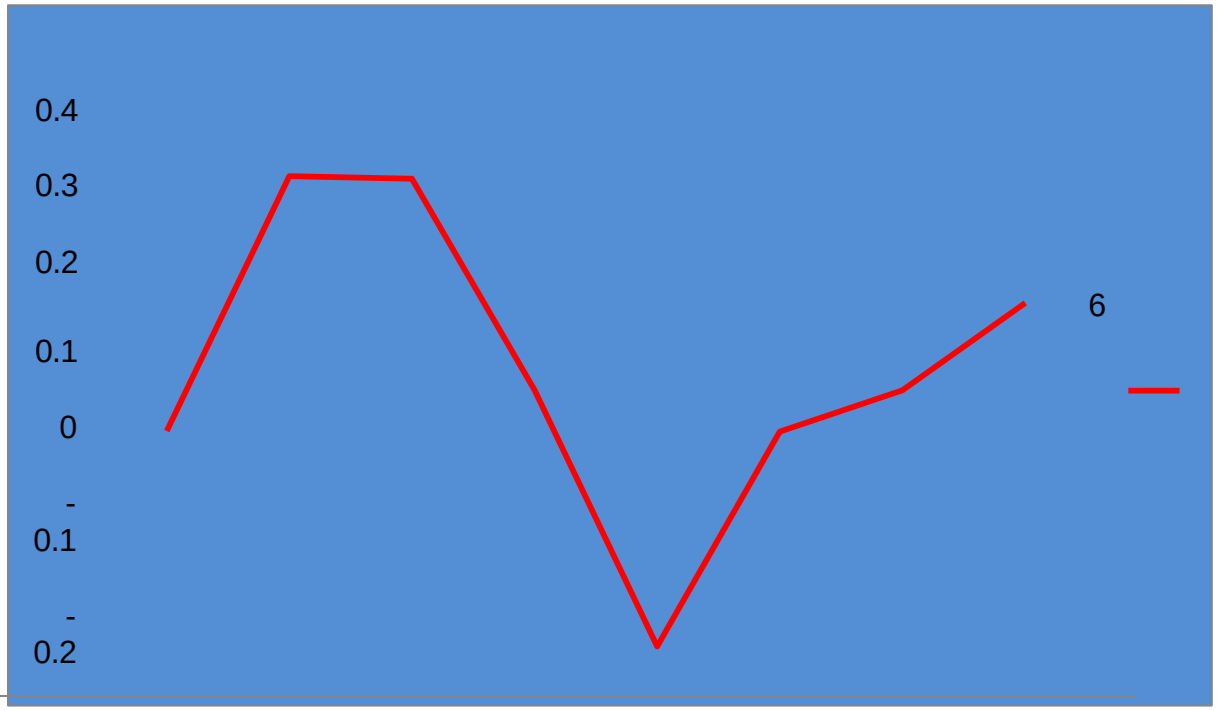
Each component of the DuPont analysis model represents a distinct aspect of a company's operations and financial structure:.

Data analysis

Year	Net Profit Margin	Asset Turnover	Financial leverage	Dupont Ratio
2016-17	0.153460271	1.123843646	1.836084625	0.316660978
2017-18	0.18510246	0.754402346	2.244933873	0.313486449
2018-19	0.057839341	0.37125828	2.371189819	0.050917352
2019-20	-0.358121288	0.345143623	2.164964501	-0.267596711
2020-21	-3.294994888	0.000255204	1.051219067	-0.000883964
2021-22	0.03317984	0.278543699	5.486173103	0.050703405
2022-23	0.084060089	0.299001778	6.33681383	0.159270213

The table provides a snapshot of Yes Bank's financial performance metrics over the years, including Net Profit Margin, Asset Turnover, Financial Leverage, and DuPont Ratio. From 2016-17 to 2017-18, the bank saw a rise in Net Profit Margin, but a decline in Asset Turnover and an increase in Financial Leverage, leading to a stable DuPont Ratio. However, 2018-19 marked a significant drop in profitability with negative Net Profit Margin and reduced Asset Turnover, coupled with increased Financial Leverage, resulting in a much lower Dupont Ratio. The following year, 2019-20, was particularly challenging with a sharp decline in Net Profit Margin to negative values and minimal Asset Turnover, though Financial Leverage reduced slightly. 2020-21 saw a drastic negative swing in profitability and a nearly negligible Asset Turnover. By 2021-22 and 2022-23, there were signs of recovery in profitability and Asset Turnover, but Financial Leverage increased substantially, impacting the DuPont Ratio. Overall, the bank experienced fluctuations in profitability and efficiency metrics, with 2019-20 being the most challenging year, while recent years show some recovery but with increased financial leverage.

Graphically Presentation



0.32 0.31

0.1

0.05 0.05

0 0.00

2016-17 2017-18 2018-19 2019-20 2020-21 2021-22 2022-23

year

-0.27

The column diagram plots Yes Bank's Dupont Ratio values on the y-axis against the corresponding years on the x-axis. From 2016-17 to 2017-18, the Dupont Ratio remained fairly consistent around 0.31 to 0.32, indicating a stable return on equity. However, a significant decline was observed in 2018-19, dropping to 0.05, suggesting decreased profitability, asset turnover, or increased financial leverage affecting ROE. This negative trend continued into 2019-20 with a ratio of -0.27, indicating a loss on equity. While 2020-21 and 2021-22 showed slight improvements with ratios of 0.00 and 0.05 respectively, a more notable recovery was seen in 2022-23, reaching 0.16, signaling a return to positive ROE.

5. Findings

- The Altman Z-Score indicates a higher risk of bankruptcy especially in the mid to later years While there's some imThere's a notable decline in the Z-Score starting from 2018-19, with the lowest point in 2020-21, indicating increased bankruptcy risk during these years.
- Improvement in the Z-Score in the latest years still the values remain in the risk zone.
- **Profitability**: The company experienced challenges, especially in 2019-20 and 2020-21, with negative Net Profit Margins. However, there's a recovery trend starting from 2021-22.
- **Asset Efficiency**: There was a decline in asset turnover until 2020-21, indicating less efficient use of assets. The recent years show signs of improvement.
- **Financial Leverage**: The company's leverage increased significantly in the last two years, which means it's taking on more debt or using more financial leverage to finance its assets.
- **DuPont Ratio**:The ratio declined sharply during the loss-making years but has shown improvement recently, indicating a better integrated performance.
- In summary, while there are signs of recovery in certain financial metrics, the company remains in a vulnerable financial position. It's essential to address the underlying issues to improve financial stability and reduce bankruptcy risk effectively.

Recommendations

- **Monitor Leverage**: Given the increased financial leverage in recent years, it's crucial to monitor and manage debt levels to avoid excessive financial risk.
- **Improve Profitability and Efficiency:** Focus on strategies to improve profitability and asset turnover to enhance overall financial health and reduce bankruptcy risk.
- **Strengthen Working Capital:** Maintain a healthy working capital position to meet

short-term obligations and improve the Z-Score.

- **Continuous Monitoring:** Regularly review both DuPont and Altman Z-Score metrics to assess financial health and take timely corrective actions.

In summary, while there are signs of recovery in certain financial metrics, the company remains in a vulnerable financial position. It's essential to address the underlying issues to improve financial stability and reduce bankruptcy risk effectively.

Limitations of the study

Data Limitations:

The analysis relies on the accuracy and completeness of the financial data provided. Any inaccuracies or missing information in the dataset could affect the reliability of the findings.

Historical financial data is used for the analysis, which may not fully capture the current or future financial condition of Yes Bank. External factors such as changes in market conditions, regulatory environment, or macroeconomic factors may influence the bank's performance differently over time.

6. Conclusion

Yes Bank's financial health, as assessed through the DuPont analysis and the Altman Z-Score model, presents a mixed picture over the years. The bank is going to be bankrupt in coming years if government will not take appropriate steps to recover the situation. Dupont analysis/ratio also shows that it may be risky to invest in Yes Bank.

References

1. P. Mohanasundaram (2015) “Financial Health Of Selected Sugar Companies in India : Altman Z Score Model”, Intercontinental Journal of Banking, Insurance and Finance.

2. Dr Nilam panchal (2017) “Predicting Bankruptcy of selected firms by applying Altman’s Z Score Model”,Journal of Management Research and Analysis.

3. Mohsin Khan (2017) “Z- Score Analysis on Efficiency of Working Capital Management: An Evidence of Selected Indian Food Processing companies Listed in NSE”, Pacific Business Review International.

4. Dr K. Jagannayaki and G. Anoosha Reddy (2019) “Altman Z Score Model- A tool for financial distress”, The international journal of analytical and experimental modal analysis.

5. Abdul Rahman and Dr. Parmeshwara Acharya (2022) “An Examination of Five

Financial Ratios", International Journal of Multidisciplinary Research and Explorer.

6. Soumya Agarwal(2018) "Altman Z Score With Reference To Public Sector Banks in India", International Journal of Research and Analytical Reviews.

7. Dr. Prameela S. Shetty and Ms. Ramya Shetty (2020) "Prediction Of Bankruptcy of a Bank through Z Score Model- A case study of Yes Bank", Journal of Applied Management and Advanced Research.

8. Dr Sujit Das (2020) "Balanced Benchmarking Using Z scores Model of The Cooperative Banking Units in India".

9. Attaulah Niazi and Prof. Nisar Ahmed Mulla (2021) "Financial Performance of Selected RRBs in Jammu and Kashmir-An empirical study", Turkish Journal of Computer and Mathematical Education.

10. Meena Rani (2022) " A comparative Study on Analyzing the Solvency of The Indian Public, Private and Foreign Sector Commercial Banks Using Modified Altman Z- Score", OPJU Business Review.

11. Muntari Mahama (2015) " Assessing the state of Financial Distress in Listed companies in Ghana : Signs, Sources, Detection and Elimination- A Test of Altman's Z- Score", European Journal of Business and Management.

12. Dr Riyas. Kalathinkal and Muhammad Imthiyaz Ahamed (2015) "A study of Application of Altman Z Score model for Oman Cement Company",Intercontinental Journal of Finance Research Review.

13. Shariq Mohammed (2016) " Bankruptcy Prediction Using the Altman Z-Score Model in Oman: A case study of Raysut Cement company SAOG and its subsidiaries".Australasian Accounting, Business and Finance Journal.

14. Flourien Nurul Ch. Lies Zulfiati (2018) " Financial Distress Analysis With Altman Z Score Method and Value of SoEs (state owned Enterprises) Listed on BEI", Advances in Economics, Business and Management Research.

15. Omary J. Ally and Kembo M. Bawana (2019) "Testing Financial Distress of

Manufacturing Firms In Tanzania : An Application Of Altman Z Score Model",Business Education Journal.

16. Subrata Deb Nath, Prasenjit Kumar Biswas, Md. Aminur Rashid, Munna Rani Biswas(2020) " Financial Distress Prediction through Altman Z Score Model: A case study of State owned Commercial Banks of Bangladesh", Indian Journal of Commerce and Management Studies.

17. Ntawumenyumunsi A. and Maringa E.K.(2022) " Application of Edward Altman Z Score Model on Measuring Financial Distress Of Commercial Banks Listed on Rwanda Stock Exchange", The strategic journal of Business and change management.

18. Simeneh Almaw Molla(2022)"Financial Distress Condition of commercial Banks in Ethiopia: Assessment of Trends Using Altman's Z Score Model", Research journal of finance and Accounting.