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Assessing the financial soundness of the Indian banks: a study with reference to selected public sector and private sector banks

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One of the most significant sectors that lead to economic growth is the banking sector. This is because financing is important to all firms and is primarily provided by banking institutions. The Indian banking industry has historically served as a more important pillar of support for the growth of the entire economy, but recent changes in macroeconomic factors like COVID-19, rising inflation, political factors, and economic changes have had a greater impact on the banking industry's performance. Using Altman's Z-score model, the current study aims to comprehend the financial stability of the chosen financial institutions. In terms of their insolvency status, banks' financial stability is being attempted to be understood. The study uncovers that the majority of the selected banks have been impacted drastically due to macroeconomic and structural changes like recent mergers in the public sector banks. The result indicates that the banks are in a distress zone and need to strategize their future operations in order to yield better results. The study also highlights the prominent technological trends impacting the banking sector.

Keywords: banks, bankruptcy, financial performance, financial distress, financial stability

Introduction

Financial performance analysis is an appropriate tool to understand the position of the company in terms of financial aspects. Financial performance analysis can be useful for both identifying growth and making short- and long-term forecasts. In other words, it determines the organization's financial strengths and weaknesses by explaining the strategic connection among the various components of the financial statements. Financial performance indicators are quantitative measures that are utilized to determine, track, and predict a company's economic well-being. It is used at internal as well as external stake holders to evaluate a company's performance. The main agenda behind the analysis is to understand the company's position compared to that of a rival company (1).

If banking sectors are to overcome liabilities and endure in the market for a longer period of time, maintaining financial stability is crucial. The banking sector has a substantial impact on the nation's economic development. In order to stay out of bankruptcy, banks are therefore expected to maintain their performance in the banking industry. According to Venkataramana et al. (2), when a company's liabilities exceed its assets, it is said to be in bankruptcy. Undercapitalization, not keeping enough cash on hand, inappropriate resource utilization, ineffective activity management, declining sales, and worsening market conditions are common causes of bankruptcy. The possibility of anticipating a formal bankruptcy process, followed by undesirable financial repercussions like a loss of resources or anticipated income, is referred to as "bankruptcy risk" (3).

Maintaining financial stability is essential for banking sectors if they are to overcome liabilities and to sustain in the market for a longer duration. The country's economic growth is significantly influenced by the banking industry. As a result, banks are expected to maintain

their performance in the banking sector in order to avoid bankruptcy. Venkataramana et al. (2) explain that "Bankruptcy is a situation where a company's liabilities exceed its assets; it typically results from undercapitalization, failing to keep enough cash on hand, improper resource utilization, ineffective activity management, declining sales, and deteriorating market conditions." The chance of foreseeing a legal bankruptcy procedure, followed by unfavorable financial consequences such as loss of resources or anticipated income, is known as "bankruptcy risk" (3).

To boost up the efficiency rate in the banks, the banking sector is undergoing reform. An increasing degree of competition, a high level of nonperforming assets, and deteriorating asset quality are some of the worrying difficulties the banking sector is currently confronting. To the nation's economy, this might be detrimental (4).

In this study, a bankruptcy model is used to assess the financial stability of the selected public and private banks. Before drawing any financial conclusions about any of the chosen types of banks, it is essential to assess each institution's financial performance because each has unique advantages and disadvantages. The worldwide pandemic COVID-19 had a significant effect on the whole banking industry. It is advised that banks in both the public and commercial sectors examine their financial results. Models for predicting bankruptcy can be applied to this purpose to evaluate performance. They evaluate the bank's financial health using financial data, and they might flag an insolvency risk.

A corporation enters a financial crisis when its earnings decline and the debt's worth surpasses the value of its assets. The corporation will begin to struggle when the return on the bonds drops below the market's risk-free interest rate (5). The financial difficulty might be expensive once again if the competitors understand the company's market instability and proceed to act aggressively to capture the market (6). An individual or business that is unable to pay its debts declares bankruptcy. The art of forecasting bankruptcy and other metrics of financial hardship of firms is known as bankruptcy prediction (7). As a result, bankruptcy models will be useful in predicting and assessing the possibility of banks going bankrupt or insolvent. The prediction of a company's insolvency is closely related to credit risk evaluation. When debtors are unable to fulfill their outstanding debts, they declare bankruptcy. While bankruptcy prediction is an important aspect of the credit risk assessment process, banks and businesses must constantly evaluate their credit risk exposure. The two-class paradigm distinguishes between enterprises that go bankrupt and firms that do not. The right analysis will be the guiding lights to the stakeholders to make right decisions to reduce the impact of financial losses, making bankruptcy prediction an important topic in finance (8). Bankruptcies have an impact on management, investors, regulators, investors, and employees. To profit from this phenomenon is an area to understand what causes bankruptcy (9, 10).

Literature review

Ali (11) states that a company can identify the signal of bankruptcy. It is also mentioned that common mistakes for interpreting and assuming financial trouble and bankruptcy are the same things. The financial trouble of the company can be detected before it files for bankruptcy. In case of financial distress, the company can still fix the report of distress so that it will improve its financial condition. But once the company is already in the situation of bankruptcy, it can no longer operate its business unless the company gets a capital injection (12). The financial report is the most crucial tool for evaluating a company's performance and economic situation as well as sharing that with formation to the public (13). Financial ratios are used to track changes appearing in the operating performance and financial stability of a company (21). Financial statement gives a brief peak at the past position of the company and the present day situation (14). The data can be utilized to forecast future revenue and dividends; such financial statements are used in the analysis from the investor's point of view for forecasting future performance and revenue, while from the management perspective, financial statement analysis is used to foresee the future requirements to meet these expectations.

(15–17) state that the Altman Z-score models, one of the more well-known discriminant model types to originate from America, are widely used to forecast a company's likelihood of going bankrupt. According to Huiban and Aleksanyan (18), bankruptcy is a result of being unable to pay off debt. The market selection process frequently results in bankruptcy, which can be seen as the result of the company making an incorrect assessment of the market's level of competitiveness. Bankruptcy can also have a number of negative effects on a larger scale, including the loss of jobs, assets, and the production process.

Internal control is increasingly important for bankruptcy risk prediction. To forecast corporate insolvency, numerous models have been utilized. It is difficult to choose between these strategies for empirical application because each has specific strengths and disadvantages. One of the more important aspects of the investigation into the company's financial health can be used to assess the firm's continuation. The prediction is necessary for management, owners, and investors to prepare for any potential financial issues. Most businesses that go bankrupt do have a substantial impact on their employees, investors, and other stakeholders in their operations, in addition to the firm itself (19, 20).

Research elaboration

Need for the study

Banks in the public and private sectors are both severely impacted by the recent global pandemic. It is important to analyze the financial standings of the banks post COVID

TABLE 1 | Z – scores of private sector banks.

Banks	Year	Ratios						Results
		X₁	X₂	X₃	X₄	X₅	Z-score	
HDFC	2017	−0.0176	0.1023	0.0043	0.00057	0.0914	0.2080	DZ
	2018	−0.0096	0.0989	0.0096	0.00047	0.0919	0.2508	DZ
	2019	−0.006	0.1184	0.0119	0.00042	0.096	0.2940	DZ
	2020	−0.0098	0.1112	0.0125	0.00034	0.093	0.2784	DZ
	2021	−0.0159	0.1162	0.0149	0.00031	0.0866	0.2795	DZ
Axis	2017	0.03107	0.0914	0.00025	0.00078	0.09197	0.2341	DZ
	2018	0.0353	0.0905	0.01434	0.00073	0.0831	0.2999	DZ
	2019	0.0332	0.0827	0.0084	0.00063	0.08628	0.2699	DZ
	2020	0.0467	0.0924	0.0076	0.00061	0.08628	0.2971	DZ
	2021	0.0351	0.1019	0.0079	0.00061	0.08002	0.2912	DZ
ICICI	2017	−0.1006	0.1049	0.0124	0.00118	0.0747	0.1423	DZ
	2018	−0.094	0.0973	−0.0307	0.00123	0.1058	0.0287	DZ
	2019	0.01827	0.0912	−0.0307	0.00112	0.106	0.1549	DZ
	2020	0.00137	0.0883	−0.029	0.00088	0.1088	0.1388	DZ
	2021	−0.0079	0.0993	−0.0198	0.00088	0.1025	0.1671	DZ
IDBI	2017	−0.1006	0.05851	−0.0219	0.00568	0.0876	−0.0205	DZ
	2018	−0.094	0.05361	−0.0383	0.00878	0.0863	−0.0727	DZ
	2019	0.01827	0.09532	−0.0697	0.02409	0.0798	0.2114	DZ
	2020	0.00137	0.08132	0.12909	0.03452	0.0847	0.6469	DZ
	2021	−0.0079	0.08998	−0.1727	0.03600	0.0831	−0.3399	DZ
IDFC First Bank	2017	−0.0042	0.10063	−0.0005	0.0303	0.0852	0.2373	DZ
	2018	0.0147	0.0939	−0.0012	0.0269	0.0809	0.24218	DZ
	2019	0.0209	0.0803	−0.0261	0.0286	0.0787	0.1472	DZ
	2020	0.0126	0.0710	−0.0419	0.0322	0.1204	0.116	DZ
	2021	−0.0035	0.075	−0.0645	0.0348	0.1117	0.0258	DZ

scenario. The performance can be evaluated for this purpose using bankruptcy prediction models.

Problem statement

Even though all the banks strive for their long-term survival, they face a lot of challenges in terms of increasing competition, rising customer expectations, security breaches, continuous innovation, and other reasons where if banks do not concentrate thoroughly and take necessary measures, it would lead them to bankruptcy. Banks are subject to the many different risks. Risk is the chance that loans and other assets would fail and stop performing. Lack of performance analysis by banks that consider the many important factors, including net profit, total assets, total liabilities, working capital, and others, may lead to ineffective performance from the banks. A bank may experience issues or experience an increase in the risk that they may go bankrupt if they have too many liabilities that are outstanding and are short on cash.

Objective of the study

The study's primary objective was to examine the three crucial components outlined below

- Financial stability
- Likelihood of banks going bankrupt

- Implication of bankruptcy model for the selected samples

Scope of the study

This study is mainly planned for analyzing the financial situation of the private and public sector banks using bankruptcy models. The bankruptcy model helps in predicting the likelihood of the firm going bankrupt or becoming insolvent in the future. This study aims at understanding the financial capabilities of the selected sample banks. It also covers the prediction of the financial performance of the banks based on bankruptcy models.

Sample design

The following banks are taken into account for the analysis:

Public Sector: Bank of Baroda, Punjab National Bank, State Bank of India, Canara Bank, and Union Bank of India.

Private Sector: HDFC Bank, Axis Bank, ICICI Bank, IDBI Bank, and IDFC Bank. Techniques for analysis

Altman's Z-score model

This model is suited to analyze whether the company will go bankrupt in the near future by using mathematical equations. Five financial indicators are used in the model to predict a company's chance of failing during the following

TABLE 2 | Z-scores of public sector banks.

Banks	Year	Ratios						Results
		X_1	X_2	X_3	X_4	X_5	Z-score	
Bank of Baroda	2017	−0.0017	0.0592	−0.011	0.00064	0.0681	0.1130	DZ
	2018	0.0042	0.0615	−0.0141	0.00071	0.0723	0.1173	DZ
	2019	0.0056	0.0603	−0.0144	0.00065	0.0742	0.1182	DZ
	2020	0.0074	0.0627	−0.0162	0.00077	0.0759	0.1196	DZ
	2021	0.0065	0.0676	−0.0276	0.00086	0.074	0.0858	DZ
PNB	2017	0.0048	0.0583	−0.011	0.00058	0.0767	0.1281	DZ
	2018	0.0109	0.0538	−0.0161	0.00071	0.074	0.1097	DZ
	2019	0.0235	0.0565	−0.0145	0.00117	0.0754	0.1355	DZ
	2020	0.0251	0.0734	−0.0242	0.00158	0.0755	0.2093	DZ
	2021	0.0398	0.0707	−0.0149	0.00164	0.0742	0.1727	DZ
SBI	2017	−0.0257	0.0628	−0.0104	0.00023	0.0612	0.0841	DZ
	2018	−0.015	0.0634	−0.0278	0.00025	0.0848	0.064	DZ
	2019	−0.0045	0.0601	−0.0321	0.00023	0.085	0.0687	DZ
	2020	−0.0074	0.0596	−0.0334	0.0002	0.0877	0.0699	DZ
	2021	−0.0102	0.0567	−0.0313	0.0001	0.0795	0.0434	DZ
Canara Bank	2017	−0.0008	0.05718	−0.0124	0.001	0.0821	0.1217	DZ
	2018	0.00491	0.05727	−0.0238	0.0011	0.0772	0.0854	DZ
	2019	0.0095	0.0519	8.5981	0.0010	0.0762	28.533	SZ
	2020	0.01098	0.05419	−0.0243	0.0013	0.083	0.09272	DZ
	2021	0.00728	0.05151	−0.0215	0.0014	0.0794	0.0901	DZ
Union Bank	2017	0.015	0.0502	−0.0129	0.0015	0.0826	0.1292	DZ
	2018	0.024	0.049	−0.0256	0.0024	0.0782	0.0925	DZ
	2019	0.0271	0.0501	−0.0325	0.0035	0.0789	0.0764	DZ
	2020	0.0129	0.0548	−0.0355	0.0062	0.0779	0.0566	DZ
	2021	0.0165	0.0538	−0.0156	0.0059	0.0769	0.1240	DZ

2 years. The formula for the same is as follows:

$$Z = 1.2x_1 + 1.4x_2 + 3.3x_3 + 0.6x_4 + 1.05x_5$$

Expected outcome

The study provides details regarding the financial situation of the private and public sector banks based on bankruptcy models, **Figure 1**. It provides details about which bank outperforms others based on financial results. It also provides details about which bank is likely to become insolvent in the future and indicates the financial stability of the banks.

Results and discussion

DZ – Distress Zone (Z less than 1.23), GZ – Gray Zone (Z between 1.23 and 2.9), SZ – Safe Zone (Z more than 2.9)
Private sector banks
    Interpretation:
    From **Table 1**, it is observed that the majority of the private sector banks are in a distress zone. IDBI is on the greater threat level as the score is −0.3399. The result is an indication that the banking sector faces the heat of macro environment factors like COVID-19 and ever-falling economic conditions

in terms of inflation and GDP. The increase in the amount of NPA and lending can also be considered a contributing factor to the current situation of private sector banks.
    Interpretation
    From **Table 2** with public sector banks' performances, we can observe that the majority of the banks are in the distress zone. In the year 2019, Canara bank attained a safe zone position, but in the later period, the performance dropped. The main factor contributing to the falling financial conditions is the recent merger that the public banks underwent. In the case of mergers, it is observed that the burden on the acquiring bank increases in terms of NPA and other liabilities are considered.
    According to the working capital ratio (X_1), it is found that under the private sector, the working capital of Axis Bank and IDBI Bank is positive for the last 5 years, thereby indicating that Axis bank and IDBI bank are able to facilitate their short-term liquidation requirement as the current ratio is higher. According to the working capital ratio, it is found that under the public sector, the UBI and PNB have had positive working capital for the last five, indicating that it is able to satisfy their short-term obligations. Based on X_2 ratio of the Z-score model, it is found that all the selected banks
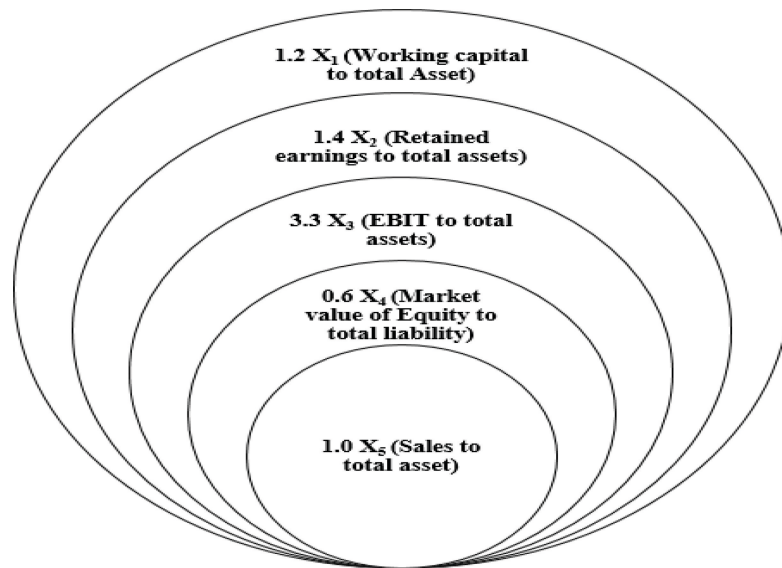
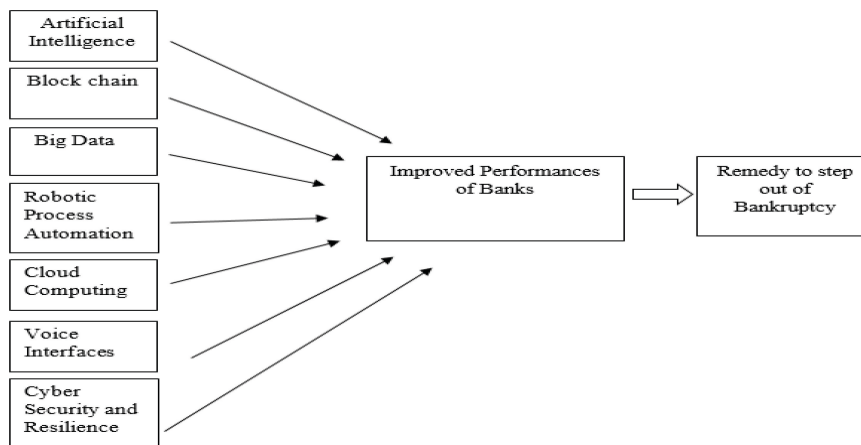**FIGURE 1 |** Ratios used in the bankruptcy model. authors.

FIGURE 2 | Impact of technologies in improving bank performance. authors.

under public and private sector banks have positive ratios, but the value differs year by year. According to the sales to total asset ratio, it is found that all the selected banks under the private and public sector have a positive value, indicating that the banks use their resources efficiently to create income, thereby increasing profitability, but in some years, the value differs from high to low, thereby lowering the profitability. On the basis of the results of the study, it is advisable for both public and private sector banks to take necessary measures in order to prevent from going bankrupt.

The recent technological trends disrupting the banking and financial services

Though the pace of the adaption of technology in the banking sectors has been comparatively slower than that of other industries, in the recent times, there have been a shift of pattern as the banks have considered to equip their operations in alignment with the recent technological innovations. Concepts like artificial intelligence (AI) and block chain are the common tools

used by the financial organizations to cater the needs of their customers/stakeholders in the pursuit of improving their efficiency level in the competitive era.

AI, robotic process automation, block chains, big data, cloud computing, voice interfaces, cyber security, and resilience are some of the important disruptive technologies utilized to control risk by making the best loan decisions. We may comprehend the flow of these technologies to improve security and lower insolvency by looking at **Figure 2**.

Conclusion

Based on the bankruptcy model, the analysis reveals the financial status and performance of the chosen institutions. For the purpose of anticipating bankruptcy and the long-term survival of the company in the market, conducting a performance analysis based on bankruptcy models is essential. The Altman's z-score model, which aids banks

in understanding their financial situation and possibility of bankruptcy, is essential in predicting the likelihood of bankruptcy. The bank can use this model to monitor its financial performance. The outcomes of this model might not, however, always be reliable. In this study, the financial stability and failure risk of five banks—five from the public and private sectors—were analyzed. The different sizes of their assets could be the cause of the variation in the Altman Z-score model. The bad performance of the banks may have been influenced by recent changes to macroeconomic factors including COVID-19, mergers, and economic conditions.

Author contributions

Roopesh: conceptualization of the study, formulation of research questions, design of the methodology, data collection and curation as well as implementation. AG: extensive literature review and synthesis, providing a comprehensive theoretical framework for the study, and responsible for analyzing interpreting results and contributing to the discussion section. Both authors made a contribution by gathering information for preparing this manuscript.

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