Bankruptcy and insolvency code: A study of Indian public sector Banks

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Abstract

The banking sector in India saw significant transformation following the implementation of economic reforms in the 1990s. These reforms facilitated a more accessible entry for foreign players compared to previous regulations. Indian public sector banks have encountered competition from both foreign banks and domestic private banks. The government-owned nationalized banks have also commenced efforts to address the competitive challenges posed by private banks by implementing various measures. The advent of competition in the banking industry has given rise to the issue of bad loans, resulting in significant growth in non-performing assets in banks. Despite the use of many conservative strategies by Indian banks in loan disbursement, the presence of corruption, nepotism, and kickbacks has played a key part in the accumulation of non-performing assets within these financial institutions. The adverse effects of non-performing loans significantly influence the operational efficiency of financial institutions, leading to the erosion of their generated revenue. This phenomenon also resulted in an economic catastrophe, affecting not only the borrowers who defaulted on their debts but also the banking institutions and the respective countries involved. In order to address these difficulties, the Indian government introduced a Bankruptcy and Insolvency Code in 2016. The implementation of the law led to the expeditious liquidation of the assets belonging to individuals who defaulted on their obligations, as well as a subsequent rise in the timely repayment of loans. The current research endeavor aims to examine the concerns pertaining to financial performance and operating performance by analyzing specific operating and financial measures. The study will also examine the relationship between operating and financial ratio variables and the performance of banks. The findings of the study suggest that the implementation of the Bankruptcy and Insolvency Code in India had an impact on the performance of Indian banks. The implementation of the Bankruptcy and Insolvency Code in India has resulted in a significant improvement in the performance of Indian banks.

Key words: Bank Governance, Bank Regulation, Bank Sustainability.

Introduction

Bank frauds and the subsequent bank crisis have emerged as significant components of the Indian financial system. The majority of banking failures in the year 1910 occurred in the region of Punjab. The geographical distribution of banking failures thereafter experienced a notable shift towards the regions of Southern India and West Bengal. Between the years 1913 and 1934, a total of 350 banks across India ceased operations. Several reasons contributed to the emergence and subsequent evolution of the Reserve Bank of India (RBI) as well as the formulation of the banking regulation legislation. Despite the existence of these laws, banks experienced a crisis of bad loans that pushed them towards the brink of collapse. To this day, instances of significant fraudulent activities persist, shown by the cases of Kingfisher Airlines and Gitanjali Gems & Jewellery. These cases are currently through legal proceedings, with banks facing challenges in their efforts to reclaim the outstanding debts.

The alternative scenario pertaining to Indian banks demonstrates their operation within the competitive landscape of the financial sector. The intense competitive environment faced by Indian banks, both domestically and internationally, compels them to extend loans without conducting thorough evaluations of borrowers' financial positions. The potential consequence of this situation is an escalation in non-performing loans, hence exacerbating the risk of banks entering a state of insolvency. Bankruptcy is a financial condition in which banks experience insolvency due to the situation where the value of their assets is lower than their liabilities. Banks may potentially face insolvency if they are unable to meet their financial obligations in a timely manner, despite having a higher value of assets compared to liabilities. This situation arises mostly from challenges related to liquidity.

The occurrence of a bank failure is a significant source of apprehension for the global economy due to the substantial financial burdens and extensive losses it imposes on both individual institutions and society at large. According to Huljuan (2015), the insolvency of a bank frequently results in unfavourable outcomes for numerous stakeholders. The impact on individual banks is manifested through both direct and indirect charges. The direct costs of bankruptcy procedures encompass the legal and administrative expenses incurred. Conversely, the indirect costs pertain to the erosion of depositor confidence, withdrawal of funds from the bank, and customer avoidance of investment opportunities. Likewise, it exerts an influence on the global economy under many situations. The potential collapse of large financial institutions has the potential to not only significantly impact the home economy, but also pose a significant risk to the global economy (Mayanka and Sharma, 2013). The repercussions of a single bank's failure extend beyond its immediate sphere, impacting other banks and reverberating across the global economy. Lawrence (2015) asserts that the economic repercussions of corporate organisations' failures extend to their owners, creditors, and society at large. Therefore, the anticipation of insolvency might yield significant advantages for the respective bank, government, and other relevant parties. The anticipation of insolvency continues to be a source of apprehension for the diverse range of individuals and entities invested in a corporation, encompassing proprietors, executives, financiers, debtors, commercial associates, and governmental bodies (Martin et al., 2011). If it were possible to accurately foresee bankruptcy in advance, financial institutions would be able to enhance their risk management strategies and implement measures to mitigate potential losses and safeguard their operations. In fact, such proactive measures may even enable banks to avert bankruptcy altogether (Ramage and Pongstal, 2004). The examination of bankruptcy is of significance to auditors, as it involves the assessment of the likelihood of the bank Jouzbarkartol's capacity to continue its operations as a going concern (Jouzbarkartol, 2013). The financial distress model can be employed by government officials to predict the financial condition of certain industries. Moreover, bankruptcy research aims to examine the various elements that may impact the overall financial stability and well-being of the bank, as highlighted by Stingar and Warstuti (2014). Accurately forecasting a company's potential bankruptcy holds significant importance for the pertinent financial stakeholders. The recent economic situation has necessitated the implementation of early warning systems to detect and mitigate financial trouble. In order to mitigate the potential occurrence of bank failure, financial institutions should endeavour to identify dependable methodologies for forecasting insolvency.

Bankruptcy

Bankruptcy is a formal legal process that pertains to individuals or entities who are unable to fulfil their financial obligations by repaying their existing debts. When an individual files for bankruptcy, they make a legal declaration stating their inability to fulfil their financial responsibilities. The state of bankruptcy absolves the debtor from the legal responsibility of repaying debts to creditors. The legal process of liquidating a corporation or an individual's property that is unable to satisfy its debts using its existing assets. The initiation of the bankruptcy procedure often involves the submission of a petition by the debtor, which is the more prevalent scenario, or alternatively, by the creditors, which is less frequently observed. The entirety of the debtor's assets are assessed and appraised, with the potential for utilising these assets to partially satisfy the outstanding debt. Bankruptcy is a financial state characterised by a situation in which the aggregate liabilities surpass the aggregate assets.

Bankruptcy is a legally sanctioned process that grants individuals or organisations relief from their financial obligations, while also affording creditors the chance to recover their outstanding debts. Bankruptcy proceedings are

conducted within the jurisdiction of federal courts, with specific guidelines and regulations delineated in the United States Bankruptcy Code.There exist multiple categories of bankruptcy, generally denoted by their respective chapter in the U.S. Bankruptcy Code.

Bankruptcy provides individuals with an opportunity for a new beginning; yet, it has the consequence of remaining on one's credit reports for an extended period, so posing challenges in obtaining future loans.The Indian Insolvency and Bankruptcy Code of 2016 defines bankruptcy as a legal condition that is typically imposed by a court upon a company or someone who is incapable of fulfilling their financial obligations. Following the satisfactory conclusion of the bankruptcy proceedings, the debtor is absolved of the financial liabilities that were accrued prior to initiating the bankruptcy file.

Bankruptcy refers to the state in which a firm is unable to sustain its ongoing operations as a result of significant financial commitments (Pongsatat et al., 2004). Bankruptcy is commonly defined as a situation in which a firm experience either a lack of sufficient operating cash flow to fulfil its current obligations, resulting in an inability to service its debts, or a negative net worth where the value of its assets is lower than the value of its external liabilities (Knox et al., 2008). The present bankruptcy code in India refers to the existing legislation governing bankruptcy and insolvency proceedings in the country.

Bankruptcy law pertains to the legal framework that regulates the entitlements of creditors and debtors who are financially insolvent and unable to fulfil their outstanding debts. In a more expansive context, bankruptcy pertains to the confiscation of the debtor's assets and their distribution among the debtor's diverse creditors. The origin of the term can be traced back to the Renaissance period, where Italian traders engaged in their commercial activities while seated on benches located in local marketplaces. The merchant's creditors metaphorically "broke the bench" as a means of expressing their dissatisfaction with his failure to fulfil his financial obligations. Consequently, the term "bancorotta" (derived from the Italian words "banco" meaning bench and "rotta" meaning broken) began to be utilised to denote instances of commercial failures. According to the works of Daniel Warner, George Siedel, and Don Mayer, it has been observed that Prior to the enactment of the Insolvency and Bankruptcy Code of 2016, the prevailing legal framework for addressing bankruptcy cases consisted of the following laws: The Companies Act of 1956, the Sick Industrial Companies (Special Provisions) Act of 1985, and the Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest Act of 2002 (SARFAESI).

The implementation of the Insolvency and Bankruptcy Code 2016, which commenced on August 5, 2016, was intended to revamp the antiquated and intricate corporate insolvency legislation in India. Its primary objective was to tackle the pervasive issue of non-performing loans, which had a detrimental effect on the banking industry and hindered the availability of credit across the economy. However, the unprecedented and surprising actions taken by the Reserve Bank of India, the central bank of India, to identify delinquent creditors and instruct banks to commence insolvency procedures, demonstrate a remarkable level of speed and determination. One notable illustration pertains to Essar Steel, a company that has encountered a default on debts amounting to around $6.9 billion. Consequently, the company is currently undergoing a sale in a distressed state, in accordance with the relevant Code. The comprehension of the Code and its associated problems and opportunities is crucial for foreign debt and equity investors due to the proactive implementation of the Code by Indian banks under the guidance of the Reserve Bank, as well as the calibre of assets being made available.

The Code has had a significant effect on the rates of default in loan repayments. According to the Insolvency and Bankruptcy Board of India, the implementation of the Code has resulted in the return of approximately USD 14.2 billion in previously unpaid loans during the past two years. To put it another, the improvement in repayment rates can be attributed to the apprehension felt by controlling shareholders of Indian debtors regarding the potential loss of control over their predominantly family-owned enterprises in the event of insolvency. Hence, it is of equal significance for current creditors and shareholders to acknowledge the alteration in the relationship between debtors and creditors brought about by the Code. This is because creditors now have the ability to effectively assert their entitlements, even in manners that lead to a transfer of ownership of debtors. This article examines the notable characteristics of the Code, as well as the current judicial and market practises, and provides insights into future expectations. Additionally, we

provide a comparative analysis of Chapter 11 of the U.S. Bankruptcy Code and several restructuring procedures in the United Kingdom, specifically administration and schemes of arrangement, when applicable.

Review of Literature

(Gurˇau, 2013) According to the author, early warning of financial distress is vital for bankruptcy prediction and the study of bankruptcy risk became of main interest for the various stakeholders of the financially distressed firms. This paper is a follow up of Altman (1968) Z-score, and more precisely a calibration for the Japanese setting. In the development of the model, the same methodology as in the original model is followed. Firstly, the model is calibrated for a Japanese setting. Secondly, validation tests are performed to assess the reliability and predictability of the model. Finally, the empirical evidence shows support for the calibrated model. Furthermore, it is recommended that the model has to be used only under the financial and accounting conditions of Japan. This paper aimed to calibrate the Altman Z-score model with respect to publicly held Japanese manufacturing companies. This model transforms individual variables values to a single discriminant score, which is then used to classify the object. Third, three validation tests were performed to prove the reliability and predictive power of the model. Last but not the least, the calibrated model turned out to be highly significant and it is recommended to be used by companies operating in or working under the financial and accounting conditions of Japan. The idea behind the model is that the bankrupt and non-bankrupt public Japanese manufacturing companies are discriminated against.

(GOPALAKRISHNAN et al., 2019) In this article, the researchers have attempted to predict the bankruptcy of the Indian Steel Industry by considering two objectives. They are to identify the company's degree of closeness to bankruptcy and to deduce the various parameters involved in influencing the inferred values to a large extent. This study has been undertaken for ten sample companies from the Indian steel industry by applying the Altman Z score model. It was found that only two of ten companies were in the safe zone that too they just entered the safe zone during the FY 2017-18. The two large scale companies which are the oldest in the industry are also in the distress zone but one can see the rise of JSW steel which will soon overtake the two big giants. S.A.L Steel and Hisar Metal Industries are the two safe companies, though they don't work at a scale as large as others still it is able to look after its liquidity and profitability which drives the company towards growth. The study talks about the financial health of the sample companies belonging to the steel industry. The application of the Altman Z score reveals the true position of the companies and also give a glimpse of the areas of default for each company. But, along with the financial aspects, there are certain qualitative aspects connected which also influence the financial health of the company. The study gives insights on the financial information needed to make judgements about the company's performance and is an alarm for the companies which are found to be in distress zone according to the Z score analysis. Based on the solvency test, each company's management can take charge and design strategies specific for its users to build up the business which somehow had taken a downturn.

(Agarwal & Taffler, 2008) Their perspective recently developed corporate bankruptcy prediction models adopt a contingent claims valuation approach. However, despite their theoretical appeal, tests of their performance compared with traditional simple accounting-ratio-based approaches are limited in the literature. They find the two approaches capture different aspects of bankruptcy risk, and while there is little difference in their predictive ability in the UK, the

z-score approach leads to significantly greater bank profitability in conditions of differential decision error costs and competitive pricing regime.

(Mohammed, 2016) From their point of view, this paper attempts to study the financial health is of great concern for a business firm. For measuring the financial health of a business firm, there are lots of techniques available. But Altman's Z-score has been proven to be a reliable tool. This model envisages predicting the possibilities of bankruptcy of manufacturing organizations. Multiple discriminate analyses (MDA) are useful tools in such situations. The use of MDA helps to consolidate the effect of all ratios. Keeping the above view in mind, the "Z score" analysis has been adopted to monitor the financial health of the company. The current study has been conducted to assess the financial health of a firm namely Raysut Cement Company SAOG and its subsidiaries in Oman. This study was based on the secondary data which was obtained from the published sources i.e. Annual report for the period of 8 years (2007 to 2014). The study revealed that the Company Raysut Cement Company SAOG and its subsidiaries are financially sound as they have a higher Z score than the benchmark (2.99) except in some years of study. The findings of the study may be useful for the managers to take a financial decision, the stockholder.

SCOPE OF RESEARCH:

Present research covers the study period from 2011 to 2020. Which cover up all financial and operating performance indicators like Working capital, Total Assets, Retained Earnings, Earning before Interest and Taxes, Book Value of Equity, Book Value of Total Liabilities.

The study attempts to address the issues related to financial performance and operating performance based on selected operating and financial ratios. An attempt is also made find the correlation between these variables.

RESEARCH OBJECTIVE:

The research objectives for addressing the issues described above are as follows:

- To estimate the differences in the Altman's Z-score values of the select public sector banks individually as well as jointly.
- To determine the relationship between Altman's Z-Score, GNPAs and Net Profits.

Hypothesis for the study

The following hypothesis has been developed for the study

H1: GNPAs are not a significant predictor of Altman's Z-Score

H2: There is no influence of independent variable i.e., Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), Earning Before Interest and Taxes to Total Assets (X3), Book Value of Equity to Book Value Of Total Liabilities (X4) on the Z-Score.

DATA SET:

The Model used in the study tried to predict the Bankruptcy of selected Indian banks. Therefore, the study used an empirical research design. In this study, secondary data was collected from various websites. The data were collected from Annual reports, the Reserve Bank of India (RBI) website, the Money Control website, the Capital Line website and the Bombay Stock Exchange (BSE) website. Excel and IBM SPSS STATISTICS were used to handle the data and

perform econometric analyses. The data was taken for ten years period from the year 2010-11 to 2019-20. The sample of the study comprises 16 Indian banks, out of which 11 banks are public sector banks, and 5 are private banks. The type and the number of banks are selected based on the availability of data and the consequences of time limitations.

The present study applied the Altman Z-score bankruptcy model to assess the aforementioned banks. The rationale behind choosing these models from a range of accessible options for assessing the financial performance of banks is supported by a review of relevant literature which indicates that a significant number of international research on predicting bank failures have utilized this particular model

Research Methodology

The present research study is a combination of both theoretical as well as analytical works. In the research work, the procured data have been analyzed in as many ways as possible by using various statistical tools and techniques with a view to evaluating the comparative financial performance of selected Public and Private Sector Banks operating in India during the period of 2011-2020. To analyze the data, various arithmetical and statistical tools like Percentage, Mean, Standard Deviation, etc. have been used to have an idea of the general profile of the variables. Besides these, depending on the need of the study Regression and Z-Score Model have been conducted.

Internal Parameter for evaluating the profitability

Gross Non-Performing Assets:

Gross NPA stands for the Gross Non-Performing Assets. Gross NPA is the term used by commercial banks that refer to the sum of any unpaid debt, which is classified as non-performing loans. Gross NPA refers to the entire amount of debts that an organization has not collected or the individuals owing the organization have not fulfilled their contractual obligations to pay both the amount of principal and interest.

Net Profit:

A company's net profit is also known as its net income, net earnings or bottom line. It represents the financial standing of a company after all its expenses have been paid off from its total revenue.

The net profit formula is expressed as:

Net Profit = Total Revenue – Total Expenses

Table 1: Results of GNPAs, Net Profit and Total Asset

Bank Name	GNPAs (Rs. In crore) (as on 31/03/2020)	Average Gross NPAs (Rs. IN Crore)		Average Net Profits (Rs. In Crore)		Average Total Assets (Rs. In Crore)	
PUBLIC SECTOR BANK							
		2011-2015	2016-2020	2011-2015	2016-2020	2011-2015	2016-2020
ALLAHABAD BANK	27846.87	5053.98	23837.37	1253.61	-3892.25	197224.98	247231.09
BANK OF BARODA	69381.43	8747.43	51466.86	4333.77	-1092.90	545469.43	805030.92
BANK OF INDIA	61549.93	11132.72	57292.63	2470.75	-4439.00	476039.74	625603.27
CANARA BANK	37041.15	6807.89	37914.72	3064.30	-1560.37	432474.02	634401.55
CENTRAL BANK OF INDIA	32589.08	8299.20	30609.63	428.80	-3145.00	261824.67	330449.37
INDIAN BANK	14150.84	3277.84	11637.32	1441.26	890.27	161204.46	252838.56

STATE BANK OF INDIA	149091.85	46904.57	151157.09	11613.91	5847.53	1593258.96	3230128.80
PUNJAB NATIONAL BANK	73478.76	14227.94	69952.06	4093.91	-4914.34	493843.77	751833.30
SYNDICATE BANK		4431.98	20470.11	1520.03	-2139.48	221825.18	313805.26
UCO BANK	19281.95	6250.61	23164.30	1056.35	-3168.84	205517.98	231734.13
UNION BANK OF INDIA	49085.30	6196.22	37881.89	1900.97	-1837.16	309145.30	477900.51

The provided Table presents the mean values of Gross Non-Performing Assets (GNPAs), net profits, and total assets during two distinct periods of analysis: the first half spanning from 2011 to 2015, and the second half encompassing the years 2016 to 2020. It is evident that there was a significant increase in the average values of Gross Non-Performing Assets (GNPAs) across all banks throughout the latter half of the study period, in comparison to the initial half. During the latter half of the study period, it was observed that the average net profits of all banks, excluding the State Bank of India and Indian Bank, exhibited a negative trend. There has been a notable surge in non-performing assets (NPAs) subsequent to the fiscal year 2016-17, which serves as an adverse indicator of economic expansion. An elevated level of Gross Non-Performing Assets (GNPA) signifies the accumulation of problematic assets, which is expected to have a detrimental impact on the profitability of the bank. The aforementioned observation signifies a lack of asset quality and subpar profitability.

Liquidity ratios:

Liquidity ratios are an important class of financial metrics used to determine a debtor's ability to pay off current debt obligations without raising external capital. Liquidity ratios measure a company's ability to pay debt obligations and its margin of safety through the calculation of metrics including the current ratio, quick ratio, and operating cash flow ratio.

Profitability ratios

Profitability ratios assess a company's ability to earn profits from its sales or operations, balance sheet assets, or shareholders' equity. Profitability ratios indicate how efficiently a company generates profit and value for shareholders. Higher ratio results are often more favorable, but these ratios provide much more information when compared to results of similar companies, the company's own historical performance, or the industry average.

Operating ratio

The operating ratio shows the efficiency of a company's management by comparing the total operating expense of a company to net sales. An operating ratio that is decreasing is viewed as a positive sign, as it indicates that operating expenses are becoming an increasingly smaller percentage of net sales. A limitation of the operating ratio is that it doesn't include debt.

The capital adequacy ratio:

The capital adequacy ratio (CAR) is a measurement of a bank's available capital expressed as a percentage of a bank's risk-weighted credit exposures. The capital adequacy ratio, also known as capital-to-risk weighted assets ratio (CRAR), is used to protect depositors and promote the stability and efficiency of financial systems around the world. Two types of capital are measured: tier-1 capital, which can absorb losses without a bank being required to cease

trading, and tier-2 capital, which can absorb losses in the event of a winding-up and so provides a lesser degree of protection to depositors.

Based on the findings shown in Table 2, it can be observed that the liquidity position of all public sector banks had a decline subsequent to May 2016. This decline may perhaps be attributed to the implementation of long-term lending programmes aimed at revitalising the economy.

Among the public sector banks, Allahabad Bank exhibited a significant decrease in its profitability ratio, suggesting a relatively poor performance compared to other banks. On the other hand, Indian Bank experienced a relatively smaller decrease in profitability compared to all other public sector banks, indicating a relatively favourable performance in comparison.

A reduction in operating expenses signifies that the bank has effectively managed its operational expenditures. A reduction in operational profit is expected to yield a favourable effect on net profit. In the aforementioned table, it is observed that Allahabad Bank, a public sector bank, exhibits lower operating expenses. This finding suggests that the bank has effectively managed its operational expenditures.

Computation Of Increase/Decrease In Financial Ratio Of Public Sector

PUBLIC SECTOR BANK

IN % Bank Name	Liquidity Ratio			Profitability Ratio			Operational Ratio			Capital Adequacy Ratio		
	Avg 2011-2015	Avg 2016-2020	Increase/ Decrease	Avg 2011-2015	Avg 2016-2020	Increase/ Decrease	Avg 2011-2015	Avg 2016-2020	Increase/ Decrease	Avg 2011-2015	Avg 2016-2020	Increase/ Decrease
ALLAHABAD BANK	72.58	70.14	-2.44	0.73	-1.62	-2.35	0.10	-0.18	-0.29	11.45	11.14	-0.31
BANK OF BARODA	71.58	69.84	-1.74	0.94	-0.16	-1.10	0.16	-0.03	-0.19	13.48	12.85	-0.62
BANK OF INDIA	75.72	67.06	-8.66	0.59	-0.30	-0.89	0.09	-0.14	-0.23	11.17	12.88	1.71
CANARA BANK	70.47	70.00	-0.47	0.85	-0.16	-1.00	0.11	-0.05	-0.16	12.55	12.54	0.00
CENTRAL BANK OF INDIA	74.24	52.95	-21.29	0.23	-0.99	-1.22	0.04	-0.18	-0.21	11.26	10.34	-0.92
INDIAN BANK	74.00	73.69	-0.31	1.01	0.39	-0.63	0.14	0.05	-0.09	13.12	13.34	0.22
STATE BANK OF INDIA	84.06	75.94	-8.12	0.78	0.22	-0.56	0.13	0.03	-0.10	12.64	12.92	0.28
PUNJAB NATIONAL BANK	77.38	68.88	-8.50	0.94	-0.65	-1.59	0.14	-0.13	-0.27	12.30	11.20	-1.10
SYNDICATE BANK	79.58	72.45	-7.13	0.80	-0.71	-1.51	0.09	-0.06	-0.15	12.00	12.25	0.25
UCO BANK	72.18	56.38	-15.80	0.57	-1.34	-1.91	0.07	-0.19	-0.26	13.00	10.94	-2.06
UNION BANK OF INDIA	78.19	73.24	-4.95	0.73	-0.34	-1.07	0.11	-0.06	-0.17	11.40	11.90	0.50

Among the public sector banks Union Bank of India Capital adequacy ratio is more which indicates that bank can manage its risk better compare to other public sector bank.

Variables used for the calculation of components of Z-Score

Working capital / Total asset:

Working capital is a common measure of a company's liquidity, efficiency, and overall health. Total assets show the overall assets of banks including both short and long-term. The WC/TA ratio is a sign of a bank's liquidity and ability to meet creditors' short-term obligations.

Retained earnings / Total assets:

Retained earnings are the amount carried out to the coming years from net earnings. Accumulated Retained Earnings to Total Asset (TA) is the ratio that measures the accumulated profitability of the banks.

Operating earnings / Total assets:

Earnings before Interest and Taxes (EBIT) show the operating profit of banks. EBIT to Total Asset measures the operating efficiency of an organization. The value of this ratio indicates the capacity of the firm to generate satisfactory earnings to pay off its fixed obligation like interest.

Book value of equity / Total liabilities:

This is the ratio of the Book value of shareholder's Equity to total liabilities. This ratio indicates the long-term financial soundness of the banks. Having a 1:1 equity debt mix is considered quite good, whereas excessive debt represents the danger of insolvency

Table 2 Summary of Financial Figures of Public Sector Bank

Bank Name	Criteria	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	
							Public Sector Bank					
ALLAHABAD BANK	Total Assets	258002	248576	252714	237038	239825	227096	220434	204373	182935	151286	$Y=-8.208+6.560X1+3.260X2+6.720X3+1.048X4$
	Total Liabilities	258002	249311	252714	237038	239825	227096	220434	204373	182935	151286	
	Working Capital		660796	641074	614453	676409	626185	520275	423355	340401	734437	
	Retained Earnings		7033	9424	13553	13450	12071	11256	10852	10007	8031	
	EBIT		-9131	-6591	-605	-1119	1603	1637	1553	2163	1931	
	Book Value Of Equity		2097	844	744	614	571	545	500	500	476	
BANK OF BARODA	Total Assets	1157916	780987	720000	694875	671376	714989	659505	547135	447321	358397	$Y=-2.184+6.560X1+3.261X2+6.720X3+1.03$
	Total Liabilities	1157916	780987	720000	694875	671376	714989	659505	547135	447321	358397	
	Working Capital	720859	707824	678534	627521	570546	523180	450738	431708	354632	701758	
	Retained Earnings	70931	45411	42864	39841	39737	39392	35555	31547	27064	20651	
	EBIT	-1802	698	-2791	2473	-6698	5421	5497	4831	6026	5650	

Bank	Metric											Equation
	Book Value Of Equity	924	529	529	461	462	442	429	421	411	392	
BANK OF INDIA	Total Assets	656995	625223	609575	626309	609914	618698	573190	452603	384535	351173	$Y = -2.968 + 6.560X_1 + 3.260X_2 + 6.720X_3 + 1.055X_4$
	Total Liabilities	656995	625223	609575	626309	609914	618698	573190	452603	384535	351173	
	Working Capital	595991	569656	564783	575812	563670	582934	528403	427339	357055	323304	
	Retained Earnings	231115	220021	218236	187489	143498	127692	117536	98200	83280	64351	
	EBIT	-4603	-8713	-8634	-2373	-7791	1795	3545	3008	3578	3495	
	Book Value Of Equity	3277	2759	1743	1055	817	666	642	596	574	546	
CANARA BANK	Total Assets	723875	694767	616886	583519	552961	548001	491922	412343	374160	335945	$Y = -4.718 + 6.560X_1 + 3.262X_2 + 6.720X_3 + 1.060X_4$
	Total Liabilities	723875	694767	616886	583519	552961	548001	491922	412343	374160	335945	
	Working Capital	836824	769362	667207	620818	584687	522499	470927	431940	369156	772039	
	Retained Earnings	38263	35424	34872	33088	31060	31384	29159	24435	22247	19597	
	EBIT	-1756	-2327	-6561	1642	-3186	3498	3063	3672	4083	5026	
	Book Value Of Equity	1030	753	733	597	543	475	461	443	443	443	
CENTRAL BANK OF INDIA	Total Assets	356436	330718	326225	333402	305466	311940	289496	268130	229800	209757	$Y = 3.250 + 6.560X_1 + 3.260X_2 + 6.720X_3 + 1.049X_4$
	Total Liabilities	356436	330718	326225	333402	305466	311940	289496	268130	229800	209757	
	Working Capital	314201	296548	290707	300763	272558	285825	264269	250159	212627	192873	
	Retained Earnings	15720	14888	15367	15366	15989	15799	12821	12651	10098	6827	
	EBIT	-909	-8170	-7896	-3529	-2669	890	-995	1320	759	1659	
	Book Value Of Equity	5710	4047	2618	1902	1690	1658	1350	1045	736	404	
INDIAN BANK	Total Assets	309468	280065	252716	218233	203710	192836	187226	162823	141419	121718	$Y = 7.410 + 6.560X_1 + 3.260X_2 + 6.720X_3 + 1.260X_2 + 6.720X_3 + 1.$
	Total Liabilities	309468	280065	252716	218233	203710	192836	187226	162823	141419	121718	
	Working Capital	286731	259811	234681	199368	188482	178712	173393	151079	132172	114303	

	Retained Earnings	21480	18908	17968	16682	15779	14353	13406	11143	9972	8691	
	EBIT	1373	284	1076	1758	955	1469	1476	1826	2268	2634	
	Book Value Of Equity	609	480	480	480	480	480	465	430	430	430	
STATE BANK OF INDIA	Total Assets	3951394	3680914	3454752	2705966	2357618	2048080	1792748	1566211	1335519	1223736	
	Total Liabilities	3951394	3680914	3454752	2705966	2357618	2048080	1792748	1566211	1335519	1223736	
	Working Capital	3460231	3229792	3020627	2353804	2047544	1798843	1644251	1415909	1196025	1069946	
	Retained Earnings	231115	220021	218236	187489	143498	127692	117536	98200	83280	64351	
	EBIT	25063	1607	-15528	14855	13774	19314	16174	19951	18483	14954	
	Book Value Of Equity	892	892	892	797	776	747	747	684	671	635	
PUNJAB NATIONAL BANK	Total Assets	830666	774949	765830	720331	667390	603334	550420	478948	458192	378325	Y=0.00+6.560X1+3.260X2+6.720X3+1.060X4
	Total Liabilities	830666	774949	765830	720331	667390	603334	550420	478948	458192	378325	
	Working Capital	774050	720859	707824	678534	627521	570546	523180	450738	431708	354632	
	Retained Earnings	61010	43866	40522	41421	37917	38709	35533	32323	27478	21192	
	EBIT	739	-15346	-19575	2012	-5738	3957	4691	6522	7037	6564	
	Book Value Of Equity	1348	921	552	426	393	371	362	353	339	317	
SYNDICATE BANK	Total Assets	326730	311279	323977	299073	307967	303135	251861	215122	182468	156539	Y=-0.001+6.561X1+3.262X2+6.719X3+1.044X4
	Total Liabilities	326730	311279	323977	299073	307967	303135	251861	215122	182468	156539	
	Working Capital	0	289567	305909	283514	291553	287705	236009	203390	173424	149451	
	Retained Earnings		14082	13525	13280	11635	12397	11220	9939	8439	6478	
	EBIT		-3103	-4388	652	-1022	1996	1643	1563	1427	1285	
	Book Value Of Equity		2488	1417	905	703	662	625	602	602	573	

UCO BANK	Total Assets	235908	230484	216056	231340	244883	245917	239125	198651	180498	163398	$Y=-0.00+6.560X1+3.261X2+6.719X3+1.052X4$
	Total Liabilities	235908	230484	216056	231340	244883	245917	239125	198651	180498	163398	
	Working Capital	202179	199115	186380	204077	220437	229601	224401	186826	169935	153752	
	Retained Earnings	9291	8371	7517	10044	10511	11473	10212	7107	6126	4969	
	EBIT	-2437	-4306	-4427	-1840	-2779	1582	1724	647	1150	945	
	Book value Of Equity	9918	5423	2308	1560	1076	1076	1015	753	665	628	
UNION BANK OF INDIA	Total Assets	550683	494039	487380	452704	404696	381616	353781	312134	262211	235984	$Y=-4.937+6.560X1+3.261X2+6.720X3+1.046X4$
	Total Liabilities	550683	494039	487380	452704	404696	381616	353781	312134	262211	235984	
	Working Capital	508827	457252	453855	422327	377711	362500	337587	298137	249121	222041	
	Retained Earnings	30363	24724	23928	22748	22204	19125	17734	16588	13972	12129	
	EBIT	-4028	-3927	-6641	343	1765	2783	2069	3064	2713	2955	
	Book value Of Equity	3423	1763	1169	687	687	636	630	597	551	524	

Findings

- The multiple correlation coefficient of Allahabad Bank, which is measured at 1.00, quantifies the extent of the relationship between the actual value and the predicted value of the Z-Score. This predicted value is derived through a linear combination of various financial ratios, namely Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), Earnings Before Interest and Taxes to Total Assets (X3), and Book Value of Equity to Book Value of Total Liabilities (X4). The R-Square coefficient of determination quantifies the degree of accuracy of the estimated Sample Regression Plain (SRP) by indicating the amount of variability in the dependent variable that can be accounted for by the fitted sample regression equation. The R-Square value of 1 indicates that the entirety of the variation in the Z-Score can be accounted for and elucidated by the independent variables, namely Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), Earnings Before Interest and Taxes to Total Assets (X3), and Book Value of Equity to Book Value of Total Liabilities (X4). Furthermore, the significance of the R-Square value at the 1% level further supports the statistical validity of the model.

- This study examines the Gross Non-Performing Assets (GNPAs), net earnings, and total assets throughout two distinct periods: the first half spanning from 2011 to 2015, and the second half spanning from 2016 to 2020. It is evident that the mean values of Gross Non-Performing Assets (GNPAs) across all banks exhibited a significant increase throughout the latter half of the research duration in comparison to the initial half. During the latter part of the study period, it was observed that the net profits of all banks, with the exception of the State Bank of India, exhibited a negative trend. There has been a notable surge in non-performing assets (NPAs) subsequent to the fiscal year 2016-17, which is indicative of a detrimental trend in economic expansion. An elevated level of gross non-performing assets (GNPA) signifies the accumulation of problematic assets that are likely to have a detrimental impact on the profitability of a bank. The aforementioned observation signifies a lack of asset quality and subpar profitability.

- The liquidity situation of all public sector banks had a decline subsequent to 2016, potentially attributable to the implementation of long-term lending initiatives aimed at revitalising the economy.

- Among the public sector banks, Allahabad Bank exhibited a significant decrease in its profitability ratio, suggesting that its performance is comparatively poor in comparison to other banks. On the other hand, Indian Bank experienced a relatively smaller decrease in profitability when compared to all other public sector banks, indicating that its performance is relatively better in comparison to other banks.

- A reduction in operating expenses signifies that the bank has effectively managed its operational costs. A reduction in operational profit is expected to yield a favourable effect on net profit. In the aforementioned table, it is observed that Allahabad Bank, a public sector bank, exhibits lower operating expenses. This suggests that the bank has effectively managed its operational expenditures.

- The Union Bank of India has a higher capital adequacy ratio in comparison to other public sector banks, suggesting its superior ability to effectively manage risk.

Conclusion

The present study conducted an analysis of the financial performance of eleven public sector banks and five private sector banks, utilizing Altman's Z-Score model. The findings revealed that with the exception of Allahabad Bank and Syndicate Bank, all other banks were deemed to be within the safe zone. This determination was made based on the observation that the average Altman's Z-Score values for these two banks were twice as high as the established cut-off point of 2.9 for the safe zone. The variation in the Altman's Z-Score values among the banks could potentially be attributed to the disparity in their asset sizes. A notable disparity in the Altman's Z-Score value was noted during the initial and latter halves of the study period, during which all banks were aggregated.

The utilisation of the developing market model in the Indian setting is observed to be comparatively infrequent, as indicated by empirical studies. This study aims to assess both models using an identical dataset. This study determines that the solvency categorization of banks was consistent across both Altman's models, despite the utilisation of various cut-off thresholds. This is due to the fact that the Z-scores assigned all banks a classification as being financially secure, hence indicating a low risk of bankruptcy.

All sixteen banks that were selected reported Altman's Z-Score value, for both versions, significantly beyond the established safe zone threshold of 2.9. Nevertheless, a statistically significant difference was seen among the sixteen banks in relation to their Z-Score values. A statistically significant variation was observed in the Altman's Z-Score values between the initial eight-year period and the last two-year period of the study, when considering all banks collectively. The variable X3, which represents a component, was shown to have the most impact on Altman's Z-score. Specifically, a 1% increase in X3 resulted in an approximately 6.72% rise in Altman's Z-score.

The probability of bankruptcy would be significantly higher if the management company failed to promptly do an assessment of the company's financial state. Furthermore, it is imperative for any financial institution that has experienced bankruptcy to prioritise performance enhancement in order to minimise the likelihood of such occurrences in the future. Subsequent research endeavours may employ existing bankruptcy prediction models as a framework. This can be utilised as a comparative measure for the purpose of forecasting bankruptcy. Research may also be conducted in other companies that are publicly traded on the stock exchange.

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