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FINANCIAL HEALTH EVALUATION OF INDIAN BANKS THROUGH ALTMAN Z-SCORE MODEL: EVIDENCE FROM INDIAN BANK

Mr. Gunde Vamshi Kumar, Dr. R S Ch Murthy Chodisetty[2]
[1]*MBA Student (24881E0018), Department of Management studies,*
Vardhaman College of Engineering, Shamshabad, Hyderabad. Telangana

[2]*Associate Professor, Department of Management studies,*
Vardhaman College of Engineering, Shamshabad, Hyderabad. Telangana
0000-0001-6222-0373

ABSTRACT----------
*Financial stability is a critical indicator of the health and sustainability of banks, which form the backbone of the economy. This study aims to evaluate the **financial health of Indian Bank**, a leading public sector bank, using the **Altman Z-Score Model**, a widely recognized tool for predicting financial distress and bankruptcy risk. Secondary data from the bank's annual reports for the period 2018–2023 were collected and analyzed to compute the Z-Score, which combines multiple financial ratios into a single measure of financial soundness. The study examines the bank's liquidity, solvency, profitability, and leverage to determine its risk of financial distress. Findings reveal that Indian Bank maintains a moderate-to-strong financial position, with satisfactory profitability and solvency ratios, indicating low risk of insolvency. However, certain areas, particularly in asset quality and operational efficiency, require careful monitoring to sustain long-term stability. The study provides empirical evidence that can guide investors, policymakers, and banking professionals in assessing the financial robustness of Indian Bank and the broader banking sector in India.*

KEYWORDS
- *Indian Bank,*
- *Financial Health,*
- *Altman Z-Score,*
- *Banking Sector, India,*
- *Solvency,*
- *Liquidity,*
- *Profitability*

JEL Codes
- ***G21** – Banks; Depository Institutions; Micro Finance Institutions; Mortgages*
- ***G32** – Financing Policy; Financial Risk and Risk Management*
- ***G33** – Bankruptcy; Liquidation; Insolvency*
- ***C81** – Methodology for Panel Data or Quantitative Analysis.----------*

1. INTRODUCTION

Banks play a key role in the entire financial system by mobilizing deposits from households spread across the nation and making these funds available for investment, either by lending or buying securities. Today the banking industry has become an integral part of any nation's economic progress and is critical for the financial wellbeing of individuals, businesses, nations, and the entire globe. In this article, we will provide an overview of key industry concepts, main sectors, and key aspects of the banking industry's business model and trends. A bank is a financial institution that provides banking and other financial services to their customers. Banks are a subset of the financial services industry and play an important role in the global economies. They are a key player in stimulating economic growth. Banking is an important undertaking. The movement of capital handled by banks allows economies to grow and prosper. Businesses and governments need money to operate, and banks act as intermediaries between the suppliers of funds and users of funds.

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Global financial crisis blessed with growing inflation, currency depreciation, fiscal uncertainty, high level of interest rates and subdued industrial production was strong enough to break down the resilience of financial sector. The collapse of financial giants Lehman brothers and Merrill Lynch bought distress to many financial institutions across the globe. There are different methods of measuring this distress like capital adequacy ratio, profitability, liquidity or hybrid model like CAMEL rating. An important model to analyse financial soundness / distress of any corporate house is Altman score model. The model scores the financial soundness of corporate house in terms of Z values. Z score has originally been devised by Edward Altman to signal the possibility of financial bankruptcy of manufacturing units. But since then, it has been frequently updated to make it applicable to private companies, non-manufacturers and entities indulge in emerging credit. The model claims for more than 70% accuracy in predicting corporate bankruptcy. But unfortunately, it was least explored by researchers while studying financial soundness of banks.

The banking sector is a major segment of the U.S. and world economies. While some might define it more broadly, the U.S. Department of Commerce considers it a subsector of the larger financial services industry, which also includes subsectors focusing on asset management, insurance, venture capital, and private equity. In this context, the present study tests the efficacy of Altman model in Indian banking sector.

2. REVIEW OF LITERATURE

- **Dutta Purkayastha, Rajashree (2022):** The Paper explained the argument that "Empirical analysis of commercial banks' credit risk management" can be found. The findings of the analysis are of significance both for theoretical and practical development. In total, 520 Ahmedabad District participants were invited to conduct a survey focusing on various aspects of credit-risk management in a structured banking environment that mould and reduce the risk profile. Based upon the findings of the report, the relationship of management commitment to credit risk management appears to be positive. Due to the mild impact this should be expected.
- **Chintan Arunkumar Vora (2021):** The Study Explain importance with regard to changing trends in the financial and economic climate and business banks' operations in India. This analysis is divided into three parts. The analysis begins with the changes since 2009 in the banking scenario and in the Indian Banking sector, the implementation of Basel III. Part II introduces the framework for Basel standards and explains why the transition from Basel II to Basel III is required to enforce measures and security standards to make the banks more resilient during financial crises. Part III addresses the Basel III conformity mechanism and the Indian banks' internal evaluation exercises. The conclusion is that there are emerging problems for the Indian Banking sector.
- **Turgut Tursoy (2020):** A study conducted by the author proposes that the new Basel Committee recommendations, which create tougher measures to tackle the growing risks associated with banking, form the latest revisions applied by the committee. BIS application should be introduced in banks to deal with losses suffered when performing banking activities. In the aftermath of the Lehman bankruptcy, the recent crises led the Basel Committee to establish a new paradigm for low liquidity coverage in banks to achieve high and stable levels. This report found some substantial findings with respect to the application by the Basel monetary authority: First, it is important for international banks to fund their business in a healthy way that a financially stable financial authority is formed.
- **Sharad Kumar (2019):** The author explained the Risk Management that is applied to schedule, lead, coordinate, and monitors the broad range of risks that are present in the daily and long-term functioning of the company. This research aims to identify the risks that are related to the banking industry, as well as the strategies used for risk management. Finally, the author draws the conclusion that, when banks deal with risk carefully, it is a benefit to successful management of the banking industry.
- **Eatessam Al-shakrchy (2018):** This Study empirically tests the effect of commercial banks on credit risk management's profitability in Sweden's leading place with an emphasis on the 2008 financial crisis. Author explores the risk of a bankruptcy being reduced by the danger of financial ruin and how the Swedish bank can cope with its credit crises. The purpose of this study was to identify the major problems caused by banking lending and the consequent financial instability. In addition,
- **Anwen Md Shafiqul Bari (2018):** The author explains that it is true that the industry is benefiting from the recession, which somewhat protects it, credit risk management is much more important for financial institutions because of the success of financial transactions. Also, it is an instrument or principle that impacts a company's financial performance, the growth of a company over time, and profit consistency. The aim of

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this paper is to analyse the relationship between credit risk management and its effect on Ethiopia's business banks' financial performance.

- **Waemustafa, SurianiSukri (2017):** This study explores the connection between macroeconomic and bank-specific credit risk factors in Islamic and traditional banks. The multivariate regression used in this study is applied between 2000 and 2010 on the sample of 15 traditional banks and 13 Islamic banks in Malaysia. This result indicates that financial institutions exert a unique impact on the formation of Islamic and traditional banks' credit risk. Several factors play a major role in assessing the credit risk of traditional banks. These include loan loss allowance, debt-to-total asset ratio, regulatory capital, duration, earnings administration, and liquidity.
- **Boris Siljkovic (2016):** The author demonstrated that while the public is aware of risk management in banks during periods of global economic crisis, it has not been followed. Risk management has now become a vital feature in the banking sector, and banking regulators are putting checks in place between financial institutions to reduce potentially adverse effects for the industry as a whole. Therefore, this report provides details on market risks, as well as how banks use those risks to their advantage.
- **Rob Nijskens, Wolf Wagner (2016):** The author assesses both the systemic risk preceding the crisis and how credit-default swap (CDS) and collateralized loan bond (CLB) exposure differs between banks (CLOs). As a result, the price beta of the business rises dramatically following their initial use of either risk transfer form. The results support the idea that the consumer was aware of the risks associated with these approaches well before the crisis. In other words, while banks are holding back on their own credit risk, they potentially present a greater systemic risk. As a result, it poses a new challenge with regard to financial regulation, which is normally based on each institution.
- **Somana devi Thiagarajan, et al (2015):** In this study, the author has assigned to both public and private banks, a broad R-square and health model as well as its ability to forecast the financial situation of the organizations, which models. The results indicate that late assets have a substantial and virtually essential positive impact on current non-performing assets. Banks and governments have changed their positions in the economy drastically with GDP and credit risk shifting in the opposite directions of public and private banking sectors. The research has found that macroeconomic and credit quality conditions of commercial banks are important in the assessment of the risk of the business banking sector.

3. STATEMENT OF THE PROBLEM

Risk analysis and risk management have become increasingly relevant in the Indian economy during this period of liberalization. The most pressing issue facing the banking industry today is the challenge of identifying and managing risk. The banking industry's very presence instills the threat of risk. Banks' primary role is to serve as a bridge between those who have capital and those who need it. As a result, operating risk must be assessed alongside other credit and market risk factors in order to determine the required composite estimate.

4. RESEARCH GAP

This study opted to use Altman's Z Score model as admeasure of the financial distress of commercial listed on the RSE for the period from 2017-18 to 2021-2022.The study is different from others that use ratios to assess the financial performance and soundness of public sector Banks in India.

5. OBJECTIVES OF THE STUDY

- To Study the Financial Soundness of Indian Bank using Altman's Z- Score Model.
- To Study the Relationship between Altman's z score NPAs and Net Profits Indian Bank during this Period
- To estimate the differences in the Altman's Z Score Values of the Indian Bank

6. HYPOTHESES OF THE STUDY

H0: There is no Relationship between Altman's z score and Net Profits Indian Bank during this Period.
H1: There is no Relationship between Altman's z score and Net Profits Indian Bank during this Period.
H0: There is no Impact on Altman's z score and Net Profits Indian Bank during This Period.
H1: There is no Impact on Altman's z score and Net Profits Indian Bank during This Period

7. RESEARCH METHODOLOGY

The study applies Altman Z score model to Indian Small finance bank. This model is a hybrid model, which calculates Z score for the corporate house on the basis of four variables viz., "Working Capital, Retained Earnings, Earnings before Interest and Tax, Book Value of Equity, Total Liability and Total Assets". The data used in the

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study is a secondary data collected from "Economics Times, Money Control and Annual Financial Reports of Small Finance Banks". The calculation of Z score has been done.

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

X1 = "Working Capital / Total Assets"
X2 = "Retained Earnings / Total Assets"
X3 = "Earnings before Interest and Taxes / Total Assets"
X4 = "Book value of Equity / Total Liabilities".
X5 = "Sales/Total Assets"

8. STATISTICAL TOOLS USED

- **Correlation:** It is in statistics, correlation or dependence is any statistical relationship, whether causal or not, between two random variables or bivariate data.
- **Regression:** It is Regression is a statistical method used in finance, investing, and other disciplines that attempts to determine the strength and character of the relationship between one dependent variable (usually denoted by Y) and a series of other variables (known as independent variables).
- **Unit root test:** It is applied to know the stationary of the data and it is done with the help of following method.
- **Ordinary Lest Square Method:** It is used to determine the impact of an independent variable on the Dependent variable. In this study, credit risk (Z bank score) acts as an independent variable and Bank's stability have dependent variable (Operating Profit).

9. SCOPE OF THE STUDY

Punjab National Bank is an Indian Public sector bank headquartered in Delhi, India; it is under the ownership of the Ministry of Finance, government of India. The bank was founded in May 1894 and is the second largest government-owned bank in India, both in terms of its business volumes and its network.

10. LIMITATIONS OF THE STUDY

- The present study is limited to four Small Finance Banks.
- The data which has been used for the study mainly secondary data, so limitation of secondary data remains with it and also applies to this study.

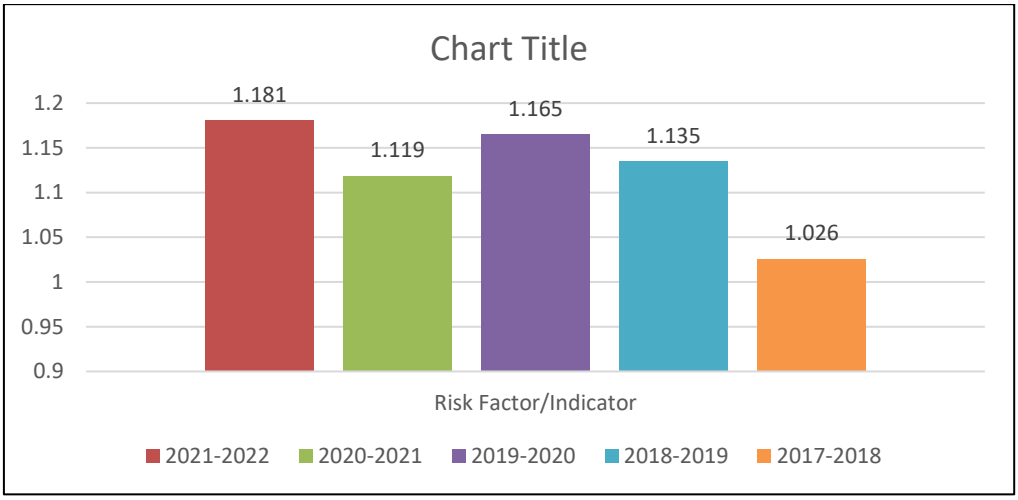
11. RESULT AND DISCUSSION

- **To Study the Financial Soundness of Panjab National Bank using Altman's Z- Score Model**.

Years	INDIAN BANK WITH Z-SCORE MODEL					
	X1	X2	X3	X4	X5	Altman Z score
	Working Capital/Total Assets	Retained Earnings / Total Assets	EBIT / Total Assets	Equity/ Total Liability	Sales / Total Assets	Risk Factor/Indicator
2021-2022	0.907	0.005	0.005	0.012	0.061	1.181
2020-2021	0.898	-0.007	-0.007	0.014	0.066	1.119
2019-2020	0.902	0.003	0.002	0.015	0.062	1.165
2018-2019	0.899	-0.002	-0.003	0.008	0.062	1.135
2017-2018	0.811	-0.002	-0.004	0	0.068	1.026

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INDIAN BANK WITH Z-SCORE MODEL



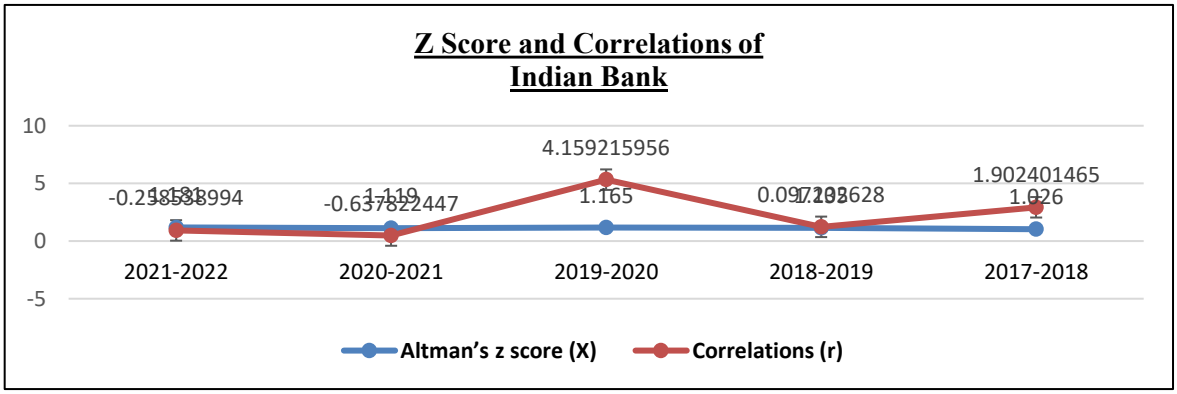
RESULT & DISCUSSION

Above Table and Graph Explain having a higher chance of bankruptcy from 2017 to 222**Indian Bank** Altman's z score of 2021-22 is 1.181, indicating that the bank faces a high credit risk. According to the results of this report, retained earnings to total assets have decreased, and EBIT to total assets has decreased from 0.005 to -0.007, resulting in **Indian Bank** having a negative credit score (Alt man Z score). **Indian Bank** would concentrate on EBIT to total assets, retained earnings to total assets, and Market Value of Equity/Book Value of Total Liability to enhance its standing

Table Shows Z Score and Correlations of Indian Bank from 2017-18 to 2021-22.

PANJAB NATIONAL BANK				
Year	**Altman's z score (X)**	**Advance**	**Deposits**	**Correlations (r)**
2021-2022	1.181	728,185.68	1,146,218.45	-0.258538994
2020-2021	1.119	674,230.08	1,106,332.47	-0.637822447
2019-2020	1.165	471,827.72	703,846.32	4.159215956
2018-2019	1.135	458,249.20	676,030.14	0.097202628
2017-2018	1.026	433,734.72	642,226.19	1.902401465

Graph Shows Z Score and Correlations of Indian Bank from 2017-18 to 2021-22.



RESULT & DISCUSSION

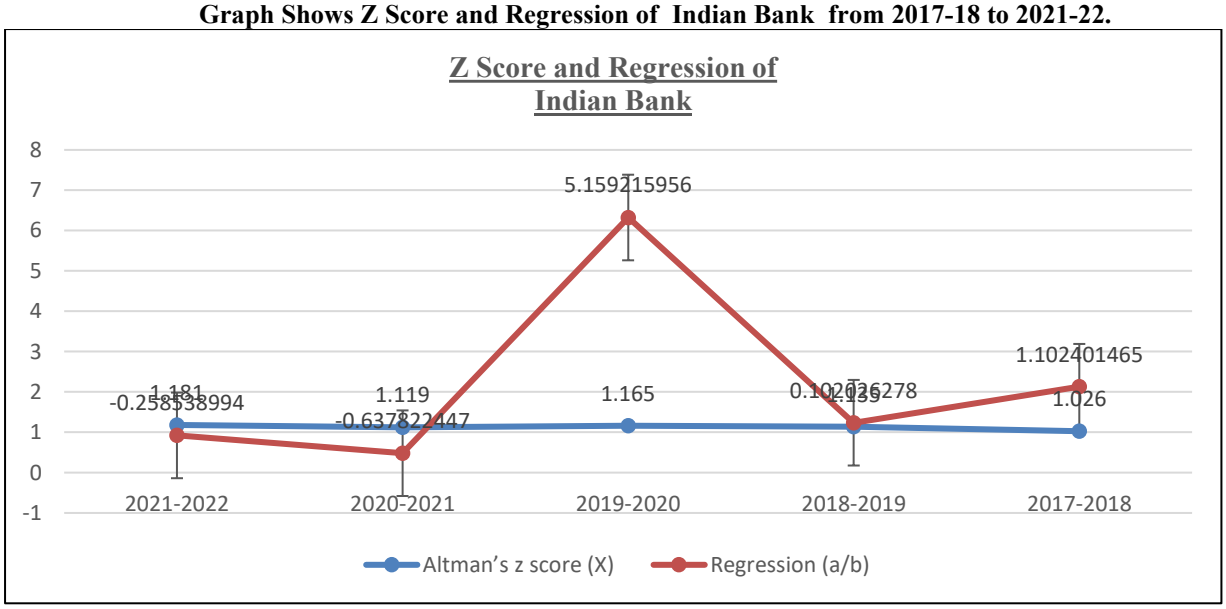
Above Table and explain regarding the Indian Bank of Five years from 2016-17 to 2021-22 respectively. I identifying Altman Z Score and Correlation (r) Values of Indian Bank of Five years shows that the values are -0.258538994, -0.637822447, 4.159215956, 0.097202628, 1.902401465 respectively. Here I observed in the year of 2019-20 the Correlation (r) value of 4.159215956, so the correlation of Panjab National Bank is Positively associated with Bank.

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Table Shows Z Score and Regression of Panjab National Bank from 2017-18 to 2021-22.

INDIAN BANK				
Year	**Altman's z score (X)**	**Advance**	**Deposits**	**Regression (a/b)**
2021-2022	1.181	728,185.68	1,146,218.45	-0.258538994
2020-2021	1.119	674,230.08	1,106,332.47	-0.637822447
2019-2020	1.165	471,827.72	703,846.32	5.159215956
2018-2019	1.135	458,249.20	676,030.14	0.102026278
2017-2018	1.026	433,734.72	642,226.19	1.102401465

Graph Shows Z Score and Regression of Indian Bank from 2017-18 to 2021-22.



RESULT & DISCUSSION

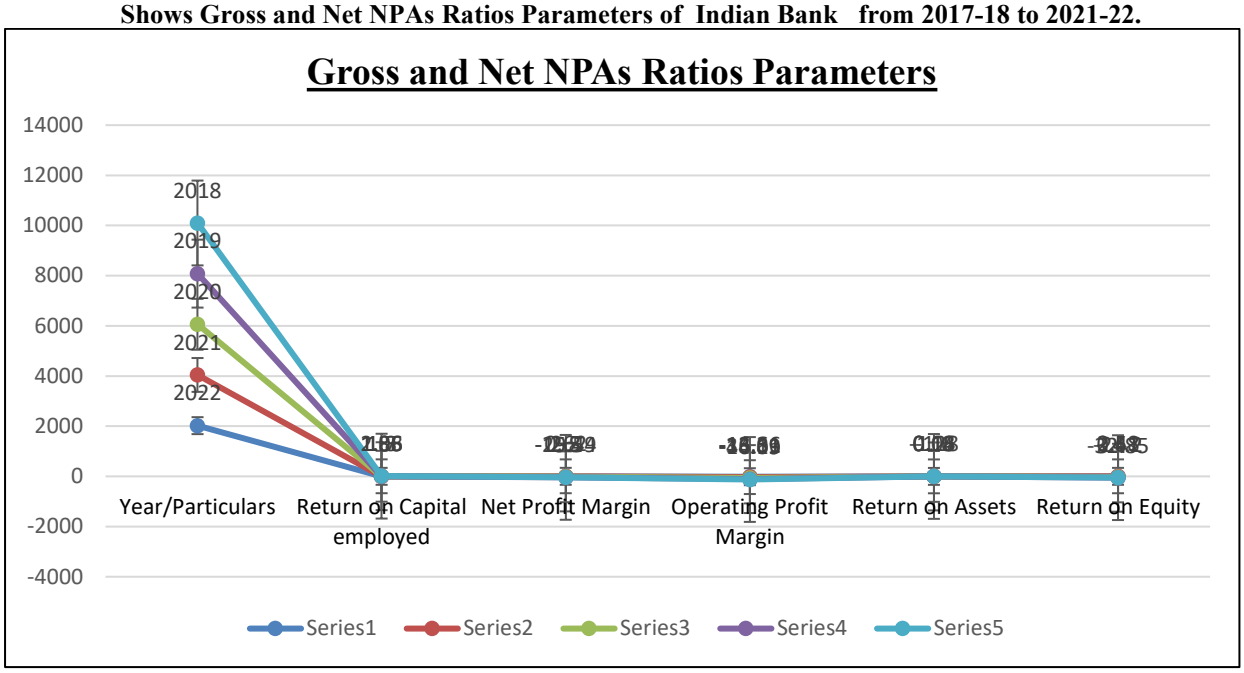
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Shows Gross and Net NPAs Parameters of Indian Bank from 2017-18 to 2021-22.

INDIAN BANDK					
Year/Particulars	**2022**	**2021**	**2020**	**2019**	**2018**
Gross NPA	92,448.04	104,423.42	73,478.76	78,472.70	86,620.05
Net NPA	34,908.73	38,575.70	27,218.89	30,037.66	48,684.29
Total					
Percentage of Gross NPA	11.78	14.12	14.21	15.50	18.38
Percentage of Net NPA	4.80	5.73	5.78	6.56	11.24
Percentage Return on Assets	0.26	0.15	0.04	-1.25	-1.60
Ratios:					
Return on Capital employed	1.85	1.8	1.7	1.38	2.06
Net Profit Margin	2.5	0.62	-19.44	-25.59	2.8
Operating Profit Margin	-13.36	-16.61	-33.81	-44.09	-16.13
Return on Assets	0.16	0.04	-1.28	-1.6	0.18
Return on Equity	2.41	0.58	-24.2	-32.85	3.47

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Shows Gross and Net NPAs Ratios Parameters of Indian Bank from 2017-18 to 2021-22.



RESULT & DISCUSSION

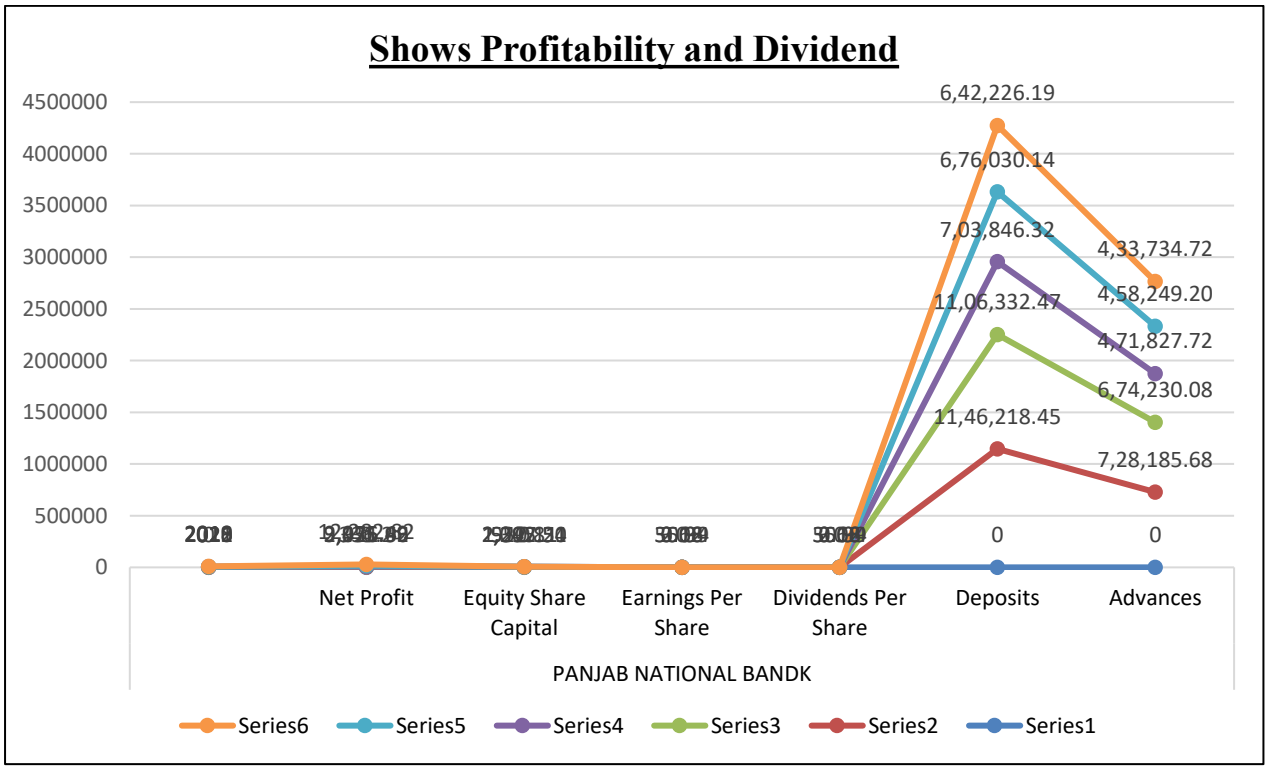
From the above table and chart, we can outline the ratios, the relationship between NPA and Profitability. In the year from 2016-17 to 2020-21, the ratios are Return on Capital employed, Net Profit Margin, Operating Profit Margin, Return on Assets, Return on Equity. Return on Capital employed is highest for the year 2016-17 i.e., 2.06 and lowest in 2017-18 i.e, 1.38. So, the NPA of 2020-21 indicates of Rs. 142999.12, Net Profit Margin is highest for the year 2016-17 i.e 2.80, Operating Profit Margin is highest for the year 2020-21 i.e, -13.36, Return on Assets is highest for 2016-17 i.e, 0.18 and Return on Equity is highest in the year 2016-17 i.e,3.47

Shows Profitability and Dividend Parameters of Indian Bank from 2017-18 to 2021-22.

INDIAN BANDK						
Year	Net Profit	Equity Share Capital	Earnings Per Share	Dividends Per Share	Deposits	Advances
2022	3,456.96	2,202.20	3.16	3.16	1,146,218.45	728,185.68
2021	2,021.62	2,095.54	2.08	2.08	1,106,332.47	674,230.08
2020	336.20	1,347.51	0.62	0.62	703,846.32	471,827.72
2019	9,975.49	920.81	30.94	30.94	676,030.14	458,249.20
2018	12,282.82	552.11	55.39	55.39	642,226.19	433,734.72

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RESULT & DISCUSSION

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- **To estimate the differences in the Altman's Z Score Values between the Select Indian Public Sector Banks**

Ordinary Least Square of Indian Bank

Dependent Variable: OPERATING_PROFIT_IB				
Method: Least Squares				
Sample: 1 5				
Included observations: 5				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	97.43043	4.226769	23.05080	0.0002
Altman's z score of PNB	-0.963520	1.814594	4.530984	0.0322
R-squared	0.885908	Mean dependent var		95.24452
Adjusted R-squared	-0.218790	S.D. dependent var		1.940945
S.E. of regression	2.142781	Akaike info criterion		4.651260
Sum squared resid	13.77453	Schwarz criterion		4.495035
Log likelihood	-9.628150	Hannan-Quinn criter.		4.231968
F-statistic	0.281944	Durbin-Watson stat		3.056428
Prob(F-statistic)	0.000228			

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12. CONCLUSION OF THE STUDY

The study form Altman Z score result indicated that, Z score for the selected Small Finance bank is below the 1.8, which states that the Credit risk is observed to be higher for selected SFB. Hence the study suggests the Small Finance banks should work to improve the working capital ratio, so that the Credit risk management will improve significantly.

The study result indicated that the change in Credit risk will have the adverse effect on the Operating profit of Small Finance bank. Hence the study suggests the bankers should focus on the management of the credit activities in order to reduce improper loans, which would ultimately reduce risk in a bank and increase the capital base. Banks should be equipped with the latest credit risk management techniques to protect bank funds and minimize insolvency risks. In order to avoid these risks, banks should generate credit derivatives markets.

The findings of the Basel III preparation highlighted the need for banks to be prepared with comprehensive tools in advance so that problems do not hinder effective execution. Therefore, considering the impact of distinct dimensions on bank preparedness, they need to devise methods to control expenses and overcome problems while at the same moment deriving maximum execution benefit.

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