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PROFITABILITY LIKELIHOOD OF INDIAN BANKS: A DISCRIMINANT ANALYSIS APPROACH

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ABSTRACT

Any country's economic development is inextricably linked to the development of the banking sector. Profit, along with productivity and operational efficiency, is an important criterion for measuring any bank's performance. This paper uses discriminant analysis to identify key characteristics that help in determining a bank's profitability levels. The study covers the period from April 2016 to March 2020. The profitability of a bank is measured using two categorical variables: recorded profit or loss. Predictors are chosen from a group of various financial ratios. The statistical significance of the research is proven by the classification results, canonical correlation, and Wilks' Lambda test. The square of canonical correlation is 0.665 which indicates that changes in the predictor variables are responsible for 66.5% variance in the discriminant model between the two categories of banks. The predictor variables ROCE and Loan to Advance are the most important factors in distinguishing between the two groups.

KEYWORDS

public banks, private banks, bank profitability, financial ratios.

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1. INTRODUCTION

The banking industry is one of the most important financial pillars of the financial sector. Any country's economic development is inextricably linked to the development of the banking sector. The Indian banking sector is a part of the global shift in business paradigms. Since the adoption of the policy of liberalization, privatization, and globalization in 1991, the Indian banking industry has become one of the country's fastest-growing industries. However, it sets up a stiff competition with the new private sector banks, forcing them to become more productive, profitable, and efficient to survive. Currently, there are 12 public sector banks (PSBs), 22 private Indian banks, and 46 private foreign banks functioning in India. Banks in which the significant portions of shares are held by the Indian Government are known as PSBs. Private banks are the banks where the majority stakes are held by the private entity. Moreover, the sector is emerging from a period of intense competition, regulatory changes, and the slow growth of the Indian economy, all of which have an impact on it. In the last few years, the Indian banking sector has undergone a massive transformation. Banking services have become more readily accessible in remote and underprivileged parts of India as new technologies have been introduced. Banks affect every aspect of contemporary societies and play a significant role in economic growth. As the contribution of the banking sector to GDP is about 7.7% of GDP, banks are pushed to perform at their peak efficiency in the fiercely competitive financial services industry (Tamatam et al., 2019). Banks with higher efficiencies have a better chance of survival than banks with lower efficiencies. This creates a pivotal need for bank owners, customers, governing bodies, and shareholders to track bank efficiency. However, banks are now confronted with several challenges, including frequent changes in technology required for modern banking, rigorous prudential norms, increasing competition, a worrying level of NPAs, growing consumer prospects, mounting pressure on profitability, assets-liability management, liquidity, and credit risk management, rising operating expenditure, the shrinking size of the spread, and so on. The banking sector's reforms have also put a strain on profitability (B.S.Bodla & Verma, 2006). As a result, profitability has become a major concern for bank management. Profit, along with productivity, financial, and operational efficiency, is an important criterion for measuring bank performance. The ultimate focus of a banking institution is to generate profit. Banks do this by focusing on financial performance analysis and intend to structure their portfolios to maximize their profit. The most widely used technique for analyzing a bank's financial statements is ratio analysis. Ratio Analysis enables bank management to identify the root causes of changes in their advances, income, deposit accounts, borrowing profits, and profitability over time. It in turn helps in determining the best course of action for increasing the deposits, revenue, advances, and cost-cutting measures which will lead to change in the banks' future profitability prospects (Subalakshm et al., 2018). Because bank profitability is the foundation of its auto-financing process and stability, researching bank profitability is and will continue to be an important issue. Efficient management of banking operations aimed at ensuring profitable growth and efficiency prompts current knowledge of all the factors that influence the bank's profit. In this paper, discriminant analysis is used to identify determinants of bank profitability. Some financial ratios are selected to check whether they determine profitability or not. Using this multivariate statistical method, it may be identified that banks can be classified into profitable or non-profitable groups based on select financial ratios (Ante & Ana, 2013).

2. LITERATURE REVIEW

Bank profitability has been comprehensively investigated in different countries. Several factors affect a bank's profitability. There is a significant amount of literature detailing several research techniques used for performance assessment including Data Envelopment Analysis (Ong & Teh, 2011; Sufia & Habibullah, 2010), Ordinary least square analysis (Garcia & Guerreiro, 2016; Javaid et al., 2011),ratio analysis where several ratios are used as proxy of banks profitability (Alper & Anbar, 2011; Bogdan & Ihnatov, 2014).Further (Subbarayan et al., 2017) employed discriminant analysis to identify the ratios that are the determinants of profitability Six ratios viz. Capital Adequacy, Risk Sensitive Assets to Risk Sensitive Liabilities, Net Nonperforming Assets to Net Advances, Liquid Assets to Total Assets, Total Advances to Assets, and Expenditure to Income are taken as predictor variables where profitability is the predicted variable. The standardized discriminant model demonstrates that the predictor variable, Return on Assets, is the primary one that distinguishes between the two groups of banks. ((Ante & Ana, 2013) also performed discriminant analysis to examine and illustrate core features of bank profitability levels of all banks in the Republic of Croatia. Using discriminant analysis, it was confirmed that banks can be categorized as profitable or non-profitable and above or below average in profitability based on their financial ratios with greater precision. In earlier studies, other external factors that affect bank profitability were also incorporated into the models such as industry characteristics and macroeconomic variables (Alper & Anbar, 2011; Batten & Vo, 2019). The most widely used analysis is ratio analysis to determine banks profitability as (Simlai & Guha, 2019) in their study examined the liquidity, solvency, and profitability position of five popular and well-established automobile companies based on

different ratios such as Liquidity Ratios, Solvency Ratios, and Efficiency Ratios, and Profitability Ratios. After analyzing the ratios, the study also reveals how to improve a firm's long-term financial position by improving its conditions. Similarly, (Almaqtari et al., 2018) undertakes research that looks into the factors that influence commercial bank profitability in India. Return on assets (ROA) and return on equity (ROE) are used to determine the profitability of Indian banks, meanwhile, bank size, capital adequacy, liquidity, deposits, leverage, assets quality, operating efficiency, and the number of branches are used as bank-specific factors. The analysis indicated that bank size, branch count, asset management ratio, operational efficiency, and leverage ratio seem to be the most significant bank-specific determinants affecting Indian commercial bank profitability.(Sharma et al., 2018) undertook a study to evaluate the stock market performance of selected Indian pharmaceutical companies on the basis of a set of financial ratios. The most important variables distinguishing Market Outperformers and Market underperformers are revenue from operations/share and current ratio. The statistical significance is confirmed by classification results, canonical correlations, and Wilks' Lambda. The most common financial ratios used in the literature is ROA, ROE, Capital adequacy (AGBEJA et al., 2019) checks how the capital adequacy ratio affects bank profitability. Other goals include examining the effects of loans and advances on bank profitability of selected five Nigerian banks for the period 2010-2014. Findings suggest that the capital adequacy ratio and the profitability of a bank have a strong relationship. Banks are more profitable when their capital is higher., Return on Capital Employed in the study ((SINGH & YADAV, 2013) who examined the use of return on capital employed (ROCE) as a profit strategy. The return on capital employed of 30 SENSEX companies is investigated. Findings show that HDFC Ltd. has a high ROCE in the banking and finance industry and its operating profit is also high. In the consumer goods sector, HUL has the highest ROCE; (Chavali & RAO, 2016) conducted a study to assess and compare the relative performance of various public and private banks Results indicate that all the parameters except Interest Income as a percentage of total assets significantly affect profitability. Also, Deposits in current and savings accounts (CASA) have a significant impact on the cost structure of the banks. They are the most cost-effective ways for banks to raise funds. The higher the CASA deposits, the more profitable the banks are.

Accordingly, the present study aims to assess the determinants of profitability of select Indian banks on the basis of select financial ratios. The objective of the research is to compare the performance of Indian banks by classifying them into two groups to examine whether significant differences exist among the performance groups in terms of selected ratios. Also, to identify the main financial ratios which discriminate between two groups i.e profit-making and loss-making banks.

3. HYPOTHESIS DEVELOPMENT

H0: Financial ratios do not affect the profit or loss of banks.

H1: At least one of the financial ratios affects the profits or loss.

4. OBJECTIVES OF THE STUDY

The objective of paper is to determine the profitability likelihood of banks on the basis of financial ratio.

5. METHODOLOGY

5.1 Sampling and data collection

This study is based on secondary data. Secondary data published is gathered from money control as well as from annual reports of banks In the present study a sample of 26 public and private banks are selected out of which 10 are public sector banks and the rest are private. Data for the past 5 years i.e., from 2015 to 2020 has been collected to fulfill the objectives of the study. Various accounting and statistical techniques have been used for analysis. The authors have considered the ratios viz., Capital Adequacy, Loan to advance, Return on capital employed (ROCE), Current and saving account (CASA) relating to public and private sector banks in India as independent variables where profitability is the dependent variable. Financial ratios such as are used to check their impact on bank performance. Multiple Discriminant Analysis is used to classify the banks into profit-making and loss-making banks.

Discriminant analysis

Discriminant analysis is a collection of linear equations with independent variables that discriminate between different groups of dependent variables. The discriminant function is the linear combination of these two functions. The primary goal of discriminant analysis is to determine whether the classifications of groups in a variable Y are affected by at least one predictor. Discriminant Analysis is commonly used to estimate membership in particular groups. The discriminant analysis consists primarily of two steps: (1) determining the significance of a set of discriminant functions and (2) classification. The multivariate F test is used to determine whether or not there are any significant differences between groups. If the test is statistically significant, one must determine which variables have significantly different means across groups. If the means of the groups are statistically significant, the variables are classified.

5.2 Categorization of select public and private banks in India as profit-making and loss-making

The sample consists of 26 Public and private banks. The average Net profit for the last five years has been calculated from 2015-16 to 2019-20. If the average net profit is positive then it is said to be a part of the categorical group “Profit-making banks”. If the average net profit is negative, then it is said to be a part of the categorical group “loss-making banks”. Based upon the above specifications, all selected banks have been classified into two groups i.e., ‘One’ and ‘Zero’, ‘One’ i.e., “Profit-making banks” and ‘Zero’ i.e., “loss-making banks”. Hence, each bank gets weights of either 0 or 1 for each ratio depending upon their average net profit.

TABLE 1: AVERAGE NET PROFITS

Sr. No.	Banks	Average net profit	Performance Group	Sr. No	Banks	Average net profit	Performance Group
1.	Punjab And Sindh Bank	-348.21	0	2.	SBI	5847.53	1
3.	UCO Bank	-3168.84	0	4.	Indian Overseas Bank	-4975.7	0
5.	Indian Bank	890.27	1	6.	Central Bank	-3084.9	0
7.	Union Bank	-1837.16	0	8.	Bank of Maharashtra	-1362.5	0
9.	Bank of India	-4439	0	10.	Bank of Baroda	-1092.9	0
11.	DCB Bank	288.82	1	12.	Dhanlaxmi Bank	-28.90	0
13.	IndusInd Bank	3,405.86	1	14.	CSB Bank	-12.44	0
15.	City Union Bank	539.73	1	16.	Karnataka Bank	420.44	1
17.	Karur Vysya Bank	393.03	1	18.	South Indian Bank	228.28	1
19.	RBL Bank	592.31	1	20.	ICICI Bank	8,813.1	1
21.	Jammu and Kashmir Bank	-337.61	0	22.	IDFC First Bank	-495.41	0
23.	Axis Bank	3,369.46	1	24.	IDBI Bank	-8,008.0	0
25.	Yes Bank	-2,121.06	0	26.	Lakshmi Vilas Bank Ltd.	-375.74	0

6. ANALYSIS AND DISCUSSIONS OF RESULTS

TABLE 2: POOLED WITHIN-GROUPS MATRICES

Correlation	Roce	Casa	loan advance	capital adequacy
ROCE	1.000	.550	.205	.138
CASA	.550	1.000	-.348	-.292
Loan to advance	.205	-.348	1.000	.674
Capital adequacy	.138	-.292	.674	1.000

The correlation matrix is prepared to see if there was any multicollinearity (a high correlation between pairs of independent variables). The table results show that the correlation between any pair of values is not greater than 0.75. There does not appear to be any problem with multicollinearity.

TABLE 2: TESTS OF EQUALITY OF GROUP MEANS

	Wilks' Lambda	F	df1	df2	Sig.
ROCE	.475	26.535	1	24	.000
CASA	.994	.146	1	24	.706
Loan to advance	.473	26.785	1	24	.000
Capital adequacy	.663	12.201	1	24	.002

Tests of equality of group means shows that Return on capital employed, loan to advance, and capital adequacy all have p-values less than the alpha value of 0.05. As a result, there is strong statistical evidence that profit-making banks and loss-making banks differ significantly in terms of ratios. This provides strong statistical evidence of significant differences in profit and loss-making methods for all banks with ROCE, loan to advance ratio, and capital adequacy producing a very high-value of the F statistic.

TABLE 3: EIGEN VALUE

Function		Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
dimension0	1	1.978[a]	100.0	100.0	.815

The eigenvalues table contains information on each discriminant equation generated. The number of discriminant equations produced is limited to the number of groups minus one. Because there are two groups in the current study, profit-making banks and loss-making banks, only one equation is produced. An eigenvalue represents the proportion of variance explained. A higher eigenvalue denotes a more powerful function. A canonical relationship is a correlation between discriminant scores and dependent variable levels. A high correlation indicates a discriminating function. The correlation, in this case, is 0.815, which is quite high. The canonical correlation coefficient squared is 0.664. This means that the changes in the predictor variables mentioned above account for 66.4 percent of the variance in the discriminant model between two groups of banks

TABLE 4: WILKS LAMBDA

Test of Function(s)		Wilks' Lambda	Chi-square	df	Sig.
Dimension 0	1	.336	24.011	4	.000

Wilk's lambda represents the proportion of total variants that are not explained by the discriminant function. Wilk's lambda and chi-square values are 0.336 and 24.011, respectively. The chi-square value clearly shows that there is a significant difference between the two groups of banks.

TABLE 5: STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

Ratios	Function
	1
ROCE	.866
CASA	-.380
Loan to advance	.468
Capital adequacy	-.039

In general, any variable with a correlation of 0.3 or higher is considered significant. The interpretation of discriminant coefficients (weights) is the same as it is for multiple regressions. Table of standardized canonical discriminant function coefficients shows an index of importance for each independent variable, similar to how standardized regression coefficients (beta) do in multiple regressions. The sign denotes the relationship's direction. Table demonstrates that ROCE, CASA and loan to advance are the most powerful independent variables. Large coefficient variables stand out as those that strongly predict bank allocation into loss-making and profit-making banks.

TABLE 6: STRUCTURE MATRIX

	Function
	1
Loan to advance	.751
ROCE	.748
Capital adequacy	.507
CASA	-.055

The Structure Matrix table depicts a different method of emphasizing the relative importance of predictors. Structure matrix correlations, according to researchers, are more accurate than Standardized Canonical Discriminant Function Coefficients. Table 8 shows the correlations of each variable with each discriminant function. These are also referred to as discriminant loadings. In general, any variable with a correlation of 0.3 or higher is considered significant. Loan to advance, ROCE, and Capital adequacy has the highest loadings and are used to differentiate between profit-making and loss-making banks.

TABLE 7: CLASSIFICATION RESULTS

		profit/loss		Predicted Group Membership		Total
				0	1	
Original	Count	dimension2	0	15	0	15
			1	1	10	11
	%	dimension2	0	100.0	.0	100.0
			1	9.1	90.9	100.0

a. 96.2% of original grouped cases correctly classified.

The classification results show that 96.2 percent of the banks were correctly classified as "profitable" or "loss-making." The 'hit ratio' refers to the discriminant function's overall predictive accuracy. It can be seen that all 15 banks were correctly classified as loss-making banks, and ten banks were correctly classified as profit-making banks out of 11 banks.

7. CONCLUSION OF THE STUDY

The current study used discriminant analysis to determine the impact of financial ratios on the performance of selected Indian banks. The study took into account four major financial ratios based on their correlation with one another. Return on capital employed, capital adequacy, CASA, and loan to advance ratio were thus the predictor variables. Based on Box's M and Approximate F, the alternate hypothesis, H1, is accepted. As a result, it has been established that at least one financial ratio influences the performance of a subset of Indian banks. The discriminant model correctly classified 96.2 percent of the banks into two groups. A closer look at the Structure Matrix table reveals three significant predictors, namely Return on capital employed loan to advance and Capital adequacy. The study's findings may aid in the formulation of policies for the efficient determination of financial ratios by bank management authorities. Individual and institutional investors will find the discriminant model presented in this study useful in their decision-making process.

8. FURTHER SCOPE OF THE STUDY

This study is limited to public and private sector banks of India which may be extended all commercial banks as well as companies to determine the factors that influence profitability. Also, few financial ratios have been used to discriminate between profit-making and loss-making banks. Some other factors such as macro-economic, management attitude, and NPAs which may affect profitability may be considered.

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