

Impact of Non-Performing Assets on Bank Performance in India

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ABSTRACT

The role of public sector banks in India is very important as they are the financial institutions involved in priority sector lending as per the directive of the Government. The stakeholders (depositors and investors) of the banks could feel comfortable only if the banks are healthy. However, the healthiness of the banks is associated with their credit management because their major portion of assets formed by lending which generate huge interest income determining the financial performance of the banks. However, some of these loans usually fall into non-performing status and adversely affect banks' performance. So, the area of loan defaults i.e. non-performing assets requires continued in-depth research to avoid distresses in economic and financial system which is trusted by millions of individuals and business concerns. This research work will be a source for policy makers, other researchers and banking professionals to understand, control and to reduce the cancer of increasing non-performing assets from the economy. As the role played by the banks in the performance of India's economy is critical, it is felt essential to identify problems that affect the performance of these institutions. This is because these non-performing assets can affect the banks' ability to play their role in the development of the economy. In the light above, the present study is important as it can contribute to the existing works on NPAs and build up academic knowledge in various issues pertaining to NPAs. Further, this study would enable the management of the banks to come out with pragmatic loan recovery policies to reduce the NPAs.

1. INTRODUCTION

Non-Performing Assets is an accounting term used by financial institutions for classification of loans that are in jeopardy of default. Banking businesses are mainly that of borrowing from the public and lending it to the needy persons and business at a premium. Lending of money involves a credit risk. When the loans and advances made by banks or financial institutions turn out as non-productive, non-rewarding and non-remunerative then they will become Non Performing Assets (NPAs).

Once the borrower has failed to pay interest on principal amount or delayed paying installment of principal amount for 90 days, then loan is considered to be a non-performing asset. Non-performing assets are problematic for financial institutions since they depend on interest payments for income. Sometimes, trouble some pressure from the economy can lead to a sharp increase in non-performing loans and often results in massive write-downs.

After the economic reforms in the financial sector, the Indian banking system underwent significant transformation and since then gradually started adopting international best practices to strengthen the banking sector. At present, the Indian banking system is fairly mature in terms of supply, product range and reach. At the same time, the Indian banking industry which is dominated by Public sector banks in terms of total asset of banking industry have been encountering with excessive Non Performing Assets (NPAs), high employee cost and to certain extent lack in intellectual capital. Among these, the management of non-Performing assets (NPAs)

by banks remains an area of concern, particularly, due to the likelihood of deterioration in the quality of restructured advances. (Reserve Bank of India, Annual Report on “Trend and Progress of Banking in India”, March 31, 2010).

According to Reserve Bank of India (RBI), the gross NPAs figures in India seem more alarming than the net NPAs figure compared to other Asian countries and the United States (US). Historically, public sector banks in India have been efficient on credit recovery, mainly because of very little legal provision governing foreclosure and bankruptcy, lengthy legal battles, loans made to government public sector undertakings, waiver of loan and lending to priority sectors. The banking sector has been facing the serious problems of the rising NPAs. In fact Public sector banks (PSBs) are facing more problems than the private sector banks and foreign banks because lending credit to public sector undertakings and priority sectors are mandatory only for PSBs.

Non-Performing Assets are threatening the sustainability of the bank performance and even tending to demolish the banks' profitability through a loss of interest income, write-off of the principal loan amount itself. The problem of NPAs is not only affecting the banks but also the whole economy. In fact high level of NPAs in Indian banks is nothing but a reflection of the state of health of the industry and trade. To improve the efficiency and profitability of the banks, various steps have been taken either by government or by banks themselves to reduce the NPAs. It is highly impossible to have zero percentage NPAs. But at least Indian banks can try competing with foreign banks to maintain international standard. Hence, undertaking a study on this area may assist the government, bankers and policy makers in their steps to curtail the NPAs.

2. MATERIALS AND METHODS

The Study looks at all aspects of NPAs, such as trend and growth, relationship with profitability in addition to identifying the factors that contributing to the change in NPAs. The difference in NPAs between State Bank of India and Other Public Sector Banks are also focused here.

3. OBJECTIVES OF THE STUDY

The objectives framed for this study are:

- To assess the trend and growth in NPAs of SBI and Other Selected Public Sector Banks.
- To compare the NPAs between SBI and Other Selected Public Sector Banks.
- To analyze the relationship between NPAs and Profitability of Selected Public Sector Banks.
- To identify the impact of NPAs on overall financial healthiness (solvency condition) of Selected Public Sector Banks.

PERIOD OF THE STUDY

The study covers the financial activities of the selected banks during the period of 11 years from 2001-2002 to 2011-2012. For analysis purpose, only 10 years data have been considered as a decade may be the reasonable time for decision making purposes.

HYPOTHESES

By realizing the significance of the study, an attempt has been made to frame following null hypotheses:

- There is no significant difference in the non performing assets between State Bank of India and Other Selected Public Sector Banks.
- There is no significant relationship between NPAs and Profitability of the Selected Public Sector Banks.
- There is no impact of NPAs on financial healthiness of the banks.

4. METHODOLOGY

Designing a suitable methodology and the selection of analytical tools are important for a meaningful analysis of any research problem. In this section, the sampling design, collection of data and the tools of analysis are described.

SAMPLING DESIGN

There are 26 Public Sector Banks functioning in India (SBI - 1 & its associates - 5 and other Nationalized banks -20). Out of these, 8 Public Sector Banks were randomly selected. The selected banks are: State Bank of India, Bank of Baroda, Bank of India, UCO Bank, Central Bank of India, Punjab National Bank, Union Bank of India and Canara Bank.

5. DATA COLLECTION

This study is based purely on secondary data. The annual financial reports such as balance sheet, profit and loss account along with schedules are the secondary data collected. Only the audited financial reports of the selected banks are collected from CMIE, PROWESS data base. The other parts of the secondary data are collected from the RBI Website, NPAs published in different journal and magazines. Some of the data relevant to the study are also gathered through internet.

STATISTICAL TECHNIQUE USED

To analyze the NPAs of the selected banks, the following statistical tools are used. They are: descriptive statistics, Linear Growth Rate, Compounded Annual Growth Rate, t-test for independent sample, Factor Analysis (as data reduction, i.e., to group the related financial ratios into one or more common factor), Multiple Regression Analysis and Discriminant Analysis. The details of the statistical techniques are given hereunder.

DESCRIPTIVE ANALYSIS

The descriptive statistics such as mean and standard deviation are used to calculate the central tendency and deviation in the time series nature of financial data for the selected banks.

The formula for Mean

$$\bar{X} = \frac{\sum X_i}{n}$$

Where, X_i is value for 'ith' year 'n' is total number of years in the sample.
The formula for Standard deviation

$$\sigma = \sqrt{\frac{\sum X_i^2}{n} - (\bar{X})^2}$$

Where, X_i is the value for 'ith' year and 'n' is number of years under study and $\bar{X}$ is mean score for all the respondents.

COMPOUNDED ANNUAL GROWTH RATE (CAGR)

Consider the non-linear relationship between a study variable (Y) and time variable (X) as
 $Y = a b^X$ (1)

By taking logarithms on both sides, it may be written as

$$\text{Long } Y = \log a + \log b X$$

Or simply say $Y = A + BX$

The least square estimates of A and B are given by

$$\hat{\beta} = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$

$$\hat{A} = \bar{Y} - \hat{\beta} \bar{X}$$

$$\text{Where, } \bar{Y} = \frac{\sum y}{n} \text{ and } \bar{X} = \frac{\sum x}{n}$$

Here, n is number of time periods (years), an estimate of 'b' is given by $\hat{b} = \text{Antilog}(\hat{B})$

Now, an estimate of Compounded Annualized Growth Rate (CAGR) = $[\hat{b} - 1] \times 100$

LINEAR GROWTH RATE (LGR)

Consider a linear relationship between a study variable (Y) and time variable (X) as

$$Y = a + b X$$

The Linear Growth Rate ($\hat{b}$) is given by

$$\hat{b} = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$

The statistical significance of the growth and trend are ascertained using Student t-test.

INDEPENDENT SAMPLE T-TEST AND ONE WAY ANOVA (F TEST)

The significance of difference in mean values between two groups is checked with independent sample t-test and mean values across more than two groups is compared by F test (also called one-way ANOVA).

The formula for Independent sample t-test

$$t = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{\left(\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2} \right)}}$$

Where,

$\overline{X}_1$	=	Mean of the group 1
$\overline{X}_2$	=	Mean of the group 2
σ_1^2	=	Variance of the group 1
σ_2^2	=	Variance of the group 2
n_1	=	Size of the Group 1
n_2	=	Size of the Group 2

The formula for F test

$$F = \frac{S_B^2}{S_W^2}$$

Where,

F	=	Ratio of variance (F Value)
S_B^2	=	Between group variance
S_W^2	=	Within group variance

FACTOR ANALYSIS (PRINCIPAL COMPONENT ANALYSIS)

The principal component method of factor analysis with varimax rotation is used to classify the financial variables in order to incorporate the composite effect of group of ratios under particular category. For example, all three ratios under liquidity viz., current ratio, quick ratio and cash ratio could not be used simultaneously as predictor variables in the regression model due to multicollinearity among them. Factor analysis are able to create new variable which has the essence of all these three ratios. The factor analysis first produces eigen value, proportion of explained variance of underlying factors (underlying dimensions). Any factor extracted by the analysis is considered to be a valid factor if its eigen value is above one based on the most commonly used criterion, which is known as Kaiser's criterion. The factor loadings (each item's correlation with valid factors) obtained from factor analysis are used for identifying actual characteristics of the underlying factors. Generally, an item belongs to one factor if its loading with that factor is 0.40 and above.

MULTIPLE REGRESSION

The multiple regression analysis is used to identify the factors determining NPAs in Banks. In the regression analysis, NPAs is treated as dependent variables and major aspects underlying financial characteristics of the banks are considered as variables in the independent set.

DISCRIMINANT ANALYSIS

The discriminant analysis is used in this study to identify the ratios relating to performance and non-performance assets that has unique power of discriminating (differentiating) between public and private sector banks. The discriminant analysis is a multivariate technique used to identify the difference in groups relative to linear composite of variables in the independent set. That is, this technique is used to find out power of one or more variables in the independent in discriminating the groups in the dependent.

The discriminant analysis first provide the results of the Chi-square test of successive roots (functions) to show which discriminant canonical function gives better discrimination (better power of differentiating the groups). The number of successive roots tested by the analysis is the number of groups in the dependent variable minus one. In our case, there are four respondent groups (relative to four time periods) and therefore, the number of discriminant function produced and tested by the discriminant analysis is three. The standardized canonical coefficients and structure correlation matrix produced by the analysis are used to bring out the significant variables in the independent set with predicting power.

The standardized canonical coefficients are like standardized beta coefficients in the multiple regression analysis, which are comparable across variables and help to identify the degree of predicting power. On the other hand, the structure matrix, which is the correlation between discriminant function and each one of the variables in the independent set, help identifies an extent of relationship between the variable and discriminant function. That is, it helps identify the relative importance of each predictor variable in discriminating the groups.

5. RESULTS AND DISCUSSION

All around the world, the reforms in banking sector has changed environment of many banks and led to increase in productivity, level of deposits, credits and decrease in non-performing assets resulting in significant impacts on their performance. However, the profitability, which is one of the important criteria for measuring the performance of banks, has come under pressure because of changing environment in the functioning of banks due to external factors arising out of economic policies of the government and internal factors like credit risk with respect to non performing assets in addition to other bank specific factors, viz., productivity, financial, operating efficiency.

Therefore, identifying the extent of impact of non-performing assets as well as identifying role of other bank specific and macro-economic variables on profitability of the banks will help the financial policy makers to formulate policies for improving the profitability of the banking industry. Therefore, analyzing the role of non-performing assets along with other bank specific and country's economic factors in determining the profitability of the banks has attracted the interest of academic research as well as of bank management, financial markets and bank supervisors. Hence, in this paper an attempt is made in this direction.

SELECTION OF VARIABLES AND SPECIFICATION OF MODEL

In the present study, Return on Assets (ratio of net profit to total assets) is used as proxy for profitability of a bank as this ratio reflects the ability of a bank's management to generate profits out of bank assets. In the model for identifying the impact of NPAs on bank performance, the bank specific factors viz., size, capital adequacy ratio (CAR), Loan to Total assets (LOANTA), Deposits to Total assets (DEPOTA), Capital to Total assets (CAPTLTA), Non-interest Income to Total assets (NIITA) and Operating expense to Operating income (OEOI), and macro economic factors, such as GDP (Gross Domestic Product), Inflation and Interest rate (rate of interest on loan issued by banks / financial institutions), are used as control variables.

In order to identify effect of NPAs in the presence of bank specific and macro economic variables on bank performance, Multiple Regression Model is used. Before going for the regression model, the selected bank specific and macro economic variables are subjected to principal component method of factor analysis in order to capture their qualities into minimum number of factors. This is undertaken because number of control variables considered here is higher than the number of observation (sample size) for each bank (data are for 10 years for each bank).

To find out the impact of NPAs on performance for each bank, then model need to be run separately for each bank. However, threshold of number of predictors is two less than the number of sample size. First a regression is run with all valid factors bank specific and macro economic variables. The stepwise process is adopted to get the refined model. The refined model is run again after including proxy for NPAs, i.e., ratio of NPAs to Total Loan, to find out the main effect of NPAs on ROA, i.e., on bank performance. The results of the analysis are tabulated and discussed in the following part of this paper.

EIGEN VALUE OF THE FACTORS UNDERLYING BANK SPECIFIC AND MACRO ECONOMIC VARIABLES

FACTOR	BEFORE VARIMAX ROTATION			AFTER VARIMAX ROTATION		
	EIGEN VALUE	% TOTAL VARIANCE	CUMULATIVE % OF TOTAL VARIANCE	EIGEN VALUE	% TOTAL VARIANCE	CUMULATIVE % OF TOTAL VARIANCE
1	2.3342	23.34	23.34	2.2946	22.95	22.95
2	2.0974	20.97	44.32	2.0256	20.26	43.20
3	1.5374	15.37	59.69	1.4898	14.90	58.10
4	1.1628	11.63	71.32	1.3217	13.22	71.32
5	0.8435	8.44	79.75			
6	0.5915	5.92	85.67			
7	0.5519	5.52	91.19			
8	0.4244	4.24	95.43			
9	0.3024	3.02	98.45			
10	0.1547	1.55	100.00			

TABLE NO 1

Table 1 shows the eigen values of the factors underlying bank specific and macro-economic variables as produced by the principal component method of factor analysis. Eigen value shows the amount of variation in the actual variables accounted for by each factor. Eigen value is also used for identifying the valid factors, which are extractable and used for subsequent analysis. According to a criterion proposed by Kaiser (1960), a factor with eigen value above one is considered to be a valid factor and can be considered for further analysis.

As per the table, there are four factors with eigen value more than one. All these four factors together could explain 71.32 per cent of the variance in the actual data. That is, these four factors together possess 71.32 per cent of the qualities of the actual data (bank specific and macroeconomic characteristics). To know which factor characterizes the qualities which variable, loadings of each variable with extracted factors produced by the analysis are used. The loadings, also called as the factor loading is nothing but the correlation between a variable and valid factor. A variable having high loading with any one of four factors is considered to be belonging to that factor.

Table 2 present the factor loading of the bank specific and macro economic variables under study. It can be observed from the table that first factor is highly loaded size variable (positively) followed by deposit to total assets (negative) and capital to total assets.

LOADINGS OF VARIABLES WITH VALID FACTORS

INDEPENDENT VARIABLES	VALID FACTORS			
	FIRST	SECOND	THIRD	FOURTH
Size	0.8836	0.2553	0.0256	0.0227
Capital Adequacy Ratio	0.0682	-0.3405	-0.1148	-0.8154
Loan to Total Assets	0.3487	0.7679	0.0241	0.1371
Deposit to Total Assets	-0.8413	0.1188	0.0904	0.1758
Capital to Total Assets	0.7871	-0.1045	0.0450	0.0253
Non-Interest Income to Total Assets	0.0541	-0.8865	0.0413	-0.0909
Operating Expenses to Operating Income	-0.2296	0.6175	-0.1973	-0.1770
Gross Domestic Products (GDP)	0.0147	-0.0959	0.8129	0.0495
Inflation	-0.0488	-0.2308	-0.3539	0.7346
Interest rate (Lending Rate)	0.0468	0.0102	-0.7991	0.1557
Factor Characteristics	Reduction in Deposits with increase in Capital and Size	Decline in Non-Interest Income and increase in loans and operating expenses	Decline in GDP while increase in Lending Rate	Decline in Capital Adequacy while increase in inflation

TABLE NO 2

While the loadings of NIITA with negative sign is high followed by LOANTA and OEOI positively with second factor, the loadings of GDP with negative sign, on the other hand, followed by Interest rate with positive sign have high loadings with third factor. The fourth factor is found to be highly characterizing CAR (Capital Adequacy Ratio) (negatively) and Inflation (positively). Based on the loading of the variables with valid factors, the first factor exposes the “Reduction in deposits with increase in capital and size”, second factor explains “Decline in Non-interest income while increase in Loan and Operating expenses”, third factor reveals “Decline in GDP while increase in Lending Rate” and fourth factor demonstrates “Decline in Capital Adequacy while increase in inflation”. A regression model with stepwise process for each selected bank is run with four factors that characterizes the bank specific and macro economic variables as independent to get the refined model. Another run is undertaken with inclusion of NPAs variables in the refined model to find out its unique effect on the ROA.

The table 3 shows the results of regression analysis of main effect of NPAs on ROA for State Bank of India.

MAIN EFFECT OF NPAS ON ROA FOR STATE BANK OF INDIA

PREDICTORS	REGRESSION MODELS		
	FULL MODEL	REDUCED MODEL	MODEL WITH NPAS
Intercept	0.8553** (6.62)	0.8950** (44.54)	0.9062** (21.09)
Reduction in Deposits with increase in Capital and Size (Factor 1)	0.0195 (0.32)		
Decline in Non-interest income while increase in Loan and Operating expenses (Factor 2)	-0.0080 (-0.19)		
Decline in GDP while increase in Lending Rate (Factor 3)	0.0726* (2.97)	0.0756** (4.52)	0.0760** (4.23)
Decline in Capital Adequacy while increase in inflation (Factor 3)	0.0182 (0.37)	0.0304 (1.05)	0.0226 (0.56)
Non-Performing Assets to Total Advance			-0.0060
			-(0.30)
R ²	0.7565	0.7508	0.7545
Adjusted R ²	0.5618	0.6796	0.6317
F Value	3.88 ^{NS}	10.55**	6.15*
Degrees of freedom	4..5	2..7	3..6

Figures in brackets are t-values; *Significant at 5% level; **Significant at 1% level.

Table Value @5% 2.30 and @1% 3.36

TABLE NO 3

In the table, it can be observed that the full model is found to be inappropriate model with selected four factors as it is fitted insignificantly though estimated coefficient of third factor is significant at 5 per cent level. The model with significant coefficient for individual predictor and insignificant of fit overall model reveals that the bank performance is significantly affected by decline in GDP with increase in lending rate but all predictors together do not have power of explaining the bank performance.

To get the refine model, an improved model, a stepwise regression approach is undertaken. The stepwise process has yielded a model two predictors, i.e, factor 3 and 4 that is fitted significantly determining 75.08 per cent of the variation in the bank performance. Between two predictors, the estimated coefficient of the third one (Factor 3) is positive and significant 1 per cent level. In order to identify the unique influence of NPAs on bank performance, the NPA to TL variable is included and the model is rerun.

Surprisingly, in the presence of NPAs, the explanatory power of refined mode has come down when compared by Adjusted R^2 (explanatory power after adjusting for number of explanatory terms in the model). Further, the coefficient of NPATL (Non performing assets to Total loan) is insignificant. Hence, it is found that the performance of SBI in respect of generating profit from total assets is unaffected by the level of NPAs in Total Loan but significantly affected by decline in GDP when there has been an increase in interest rate.

From Table 5.4, the results of the regression for Bank of Baroda, it is understood that full model, refined model and model with NPAs are all fitted insignificantly.

For Bank of India, the regression results eliciting the influence of NPAs on ROA are exhibited in Table 4.

MAIN EFFECT OF NPAS ON ROA FOR BANK OF INDIA

PREDICTORS	REGRESSION MODELS		
	FULL MODEL	REDUCED MODEL	MODEL WITH NPA
Intercept	0.7757** (12.75)	0.7786** (13.85)	1.0176** (11.99)
Reduction in Deposits with increase in Capital and Size (Factor 1)	0.2616* (2.45)	0.2338* (2.44)	0.1041 (1.37)
Decline in Non-interest income while increase in Loan and Operating expenses (Factor 2)	-0.3288** (-4.36)	-0.3170** (-4.60)	-0.4704** (-7.02)
Decline in GDP while increase in Lending Rate (Factor 3)	0.0568 (0.87)		
Decline in Capital Adequacy while increase in inflation (Factor 3)	0.1003 (0.79)		
Non-Performing Assets to Total Advance			-0.1129* (-3.14)
R^2	0.8112	0.7731	0.9140
Adjusted R^2	0.6601	0.7082	0.8711
F Value	5.37*	11.92**	21.27**
Degrees of freedom	4..5	2..7	3..6

Figures in brackets are t-values; *Significant at 5% level; **Significant at 1% level.

Table Value @5% 2.30 and @1% 3.36

TABLE NO 4

According to the table, the full model with all four factors of bank specific and macro-economic variables is fitted significantly and coefficient of two factors, i.e., 1 and 2, is significant at required level (positive for first factor and negative for second one). However, stepwise process has yielded a model better than the initial one with just two predictors, Factor 1 and Factor 2. Hence, this model is used to find out the main effect of NPAs. In the model with NPAs, the coefficient of Factor 1 is insignificant, and that of Factor 2 as well as the coefficient of NPATL is significant. In the presence of NPATL, the power of Factor 1 (Reduction in Deposits with increase in Capital and Size) has diminished.

From the significant and negative coefficient of NPATL, it becomes apparent that the reduction in NPAs has unique power of increasing the profitability of BOI. Hence, it is found that the performance of BOI tend to improve significantly with significant reduction in NPAs in the presence of decline in Non-interest income while there is an increase in loan and operating expenses.

MAIN EFFECT OF NPAS ON ROA FOR PUNJAB NATIONAL BANK

PREDICTORS	REGRESSION MODELS		
	FULL MODEL	REDUCED MODEL	MODEL WITH NPA
Intercept	0.9476** (10.97)	0.9467** (11.75)	0.9619** (7.66)
Reduction in Deposits with increase in Capital and Size	0.1831 (2.15)	0.1802 (2.27)	0.1694 (1.58)
Decline in Non-interest income while increase in Loan and Operating expenses	-0.0876 (-1.10)	-0.0942 (-1.28)	-0.0952 (-1.19)
Decline in GDP while increase in Lending Rate	0.0682 (2.13)	0.0641 (2.23)	0.0619 (1.82)
Decline in Capital Adequacy while increase in inflation	0.0232 (0.47)		
Non-Performing Assets to Total Advance			- 0.0069
			-(0.17)
R ²	0.6566	0.6414	0.6434
Adjusted R ²	0.3819	0.4621	0.3582
F Value	2.39NS	3.58NS	2.26NS
Degrees of freedom	4..5	3..6	4..5

Figures in brackets are t-values; *Significant at 5% level; **Significant at 1% level.

Table Value @5% 2.30 and @1% 3.36

TABLE NO 5

Regarding the role of NPAs in influencing the net profit to relative total assets of PNB, an examination of Table 1.8 shows that none of the three models are fitted at significant level. The coefficients of individual predictors in all three models are also not at significantly. Hence, it is found that the performance of PNB in generating the profit from total assets is unrelated to the level of NPAs as well as selected bank specific and macro-economic variables.

Table 6 shows the results of three regression models, viz., full model, refined model and refined model with NPAs in order to identify the effect of NPAs on performance in terms of profitability of Union bank of India. As shown in the table, the full model, i.e., the regression model with all four factors of bank specific and macro-economic variables, is not fitted significantly. However, the fit of refined model as well as the refined model with NPAs in the predictor set is significant at 5 per cent level. Further, the estimated coefficient of NPATL in the third model is negative and significant at 5 per cent level. This indicates that ROA of UBI is related to the status of NPAs in the presence of bank specific and macro-economic variables. Further, out of two predictors other than NPAs, the coefficient of Factor 2 (Decline in Non-interest income while increase in Loan and operating expenses) is negative and significant. This reveals that the ROA is likely to increase

substantially when there is a notable increase in Non-interest income (inverse relationship) when there is a decline in advances (loans) and operating expenses.

MAIN EFFECT OF NPAS ON ROA FOR CANARA BANK

PREDICTORS	REGRESSION MODELS		
	FULL MODEL	REDUCED MODEL	MODEL WITH NPA
Intercept	1.0401** (72.92)	1.0387** (72.61)	0.9716** (27.73)
Reduction in Deposits with increase in Capital and Size	-0.1793* (-3.00)	-0.2222** (-5.07)	-0.1211 (-1.98)
Decline in Non-interest income while increase in Loan and Operating expenses	-0.0310 (-1.04)		
Decline in GDP while increase in Lending Rate	-0.1075** (-4.86)	-0.1249** (-8.51)	-0.1170** (-9.35)
Decline in Capital Adequacy while increase in inflation	0.0756** (6.51)	0.0811** (7.77)	0.0683** (6.47)
Non-Performing Assets to Total Advance			0.0401
			(2.03)
R ²	0.9650	0.9574	0.9766
Adjusted R ²	0.9370	0.9361	0.9579
F Value	34.46**	44.92**	52.22**
Degrees of freedom	4..5	3..6	4..5

Figures in brackets are t-values; *Significant at 5% level; **Significant at 1% level.

Table Value @5% 2.30 and @1% 3.36

TABLE NO 6

When the variable NPATL is added along with existing two predictors, the refined model is also again fitted significantly, in turn indicating that the presence of NPAs does not suppress overall explanatory power of the model. But the estimated coefficient of NPAs, which is positive, is not statistically significant.

However, it is apparent that the unique power of Factor 1 is absorbed by the presence of NPAs. This indicates that NPAs has substantial power in explaining the dependent. Therefore, it is concluded that profitability of Canara Bank tend to go up when there is a significant increase in GDP and decline in inflation if there is marginal increase in deposits in the presence of reduction in capital as well as reduction in bank size regardless of marginal increase in NPATL.

For all Other Selected Public Sector banks, the results reported in Table 5.11 shows that the bank specific and macro economic factors have the power of determining their performance with and without presence of NPAs (fit of all three models are significant). The adjusted R² value of 0.6475 in the refined model with NPAs compared to 0.5920 in refined model without NPAs has indicated that NPAs alone can explain 5.55 per cent of the variance in the profitability of all Other Selected Public Sector Banks.

The estimated coefficient is positive and significant for Factor 1 (Reduction in Deposits with increase in Capital and Size), while it is negative and significant for Factor 2 (Decline in Non-interest income while increase in Loan and Operating expenses) and NPATL.

MAIN EFFECT OF NPAS ON ROA FOR ALL OTHER SELECTED PUBLIC SECTOR BANKS

PREDICTORS	REGRESSION MODELS		
	FULL MODEL	REDUCED MODEL	MODEL WITH NPA
Intercept	0.9146** (39.57)	0.9136** (40.23)	1.0072** (29.02)
Reduction in Deposits with increase in Capital and Size	0.2020** (7.37)	0.2003** (7.46)	0.1324** (4.14)
Decline in Non-interest income while increase in Loan and Operating expenses	-0.1589** (-7.18)	-0.1590** (-7.29)	-0.2214** (-8.10)
Decline in GDP while increase in Lending Rate	-0.0110 (-0.49)		
Decline in Capital Adequacy while increase in inflation	-0.0038 (-0.17)		
Non-Performing Assets to Total Advance			-0.0443**
			-(3.40)
R ²	0.6055	0.6039	0.6628
Adjusted R ²	0.5812	0.5920	0.6475
F Value	24.94**	51.07**	43.25**
Degrees of freedom	4..65	2..67	3..66

Figures in brackets are t-values; *Significant at 5% level; **Significant at 1% level.

Table Value @5% 2.30 and @1% 3.36

TABLE NO 7

Putting all together, it is concluded that the performance of all Other Selected Public Sector Banks in respect of generating profits from total assets tend to go up substantially if there is a significant reduction in NPATL when there is a reduction in Reduction in Deposits with increase in Capital and Size (Factor 1) and increase in Non-interest income while decrease in Loan and Operating expenses (Factor 2 – inverse relationship).

POWER OF NPAs IN DISCRIMINATING SBI AND OTHER SELECTED PUBLIC SECTOR BANKS

In this part of this paper, an attempt is made to find out the extent of role played by NPAs in differentiating between SBI and Other Selected Public Sector banks in the presence of bank specific and macro-economic factors. The multivariate statistical technique, discriminant analysis is used for this purpose. The discriminant analysis is a multivariate statistical technique used to identify an explanatory variable which has unique power of discriminating groups in the dependent side in the presence of other explanatory variables in the independent set. The discriminant analysis first provide the results of the Chi-square test of successive roots (functions) to show which discriminant canonical function gives better discrimination. The power of a variable in the independent set is ascertained by standardized coefficients produced by the analysis. The variable which is dominant in the discriminant function is identified by factor structure matrix with discriminant function. That is, the standardized canonical coefficients are comparable across variables and help identify the degree of predicting power of every variable in the independent set. On the other hand, the structure matrix, which is the correlation between discriminant function and each of the variables, help identify an

extent of relationship between a variable and discriminant function. The results of the analysis discriminant analysis identifying the power of NPAs in discriminating the SBI and other selected public sector banks in the presence of bank specific and macro-economic factors are provided hereunder.

SIGNIFICANCE OF DISCRIMINATION FUNCTION FOR BANKS WITH NPAS, BANK SPECIFIC AND MACRO ECONOMIC VARIABLES

FUNCTION	EIGEN VALUE	CANONICAL R	WILKS' LAMBDA	CHI-SQUARE	DF	LEVEL OF SIGNIFICANCE
0	0.9451	0.6970	0.5141	50.23	5	0.0000

**Significant at 1% level

TABLE NO 8

As per the Table 8, there was one discriminant function as the number of groups in the dependent was two. For the discriminant function, the eigen value (the proportion of variance explained in the canonical function) was 0.9451, canonical correlation (a canonical correlation is a correlation between the discriminant scores and the levels of the dependent variable) was 0.6970 and Wilks' Lamda was 0.5141 with significant chi-square value of 50.23.

As the discriminant function is significant, it was understood that there was significant difference in the linear composite of NPAs, Bank specific and Macro Economic Factors between SBI and Other Selected Public Sector Banks. As discriminant function was significant, further analysis was carried out to know which out of five variables best discriminates the two bank groups. Table 1.9 provides the group centroid, i.e., mean canonical scores for SBI and other selected Public Sector Banks.

GROUP CENTROID (MEANS FOR CANONICAL VARIABLES)

BANK GROUPS	CANONICAL FUNCTION
	1
SBI	2.5397
Other Selected Public Sector Banks	-0.3628

TABLE NO 9

As provided in the table, the centroid for SBI is positive while that of other selected public sector banks is negative. This exposes the fact that the discriminant function was very well separating the SBI from Other Selected Public Sector Banks.

Table 10 presents the structure matrix and standardized canonical coefficient for variables in the predictor set (independent set) with discriminant function.

**STANDARDIZED CANONICAL COEFFICIENTS AND STRUCTURE COEFFICIENTS
FOR PREDICTORS WITH SIGNIFICANT DISCRIMINANT FUNCTION FOR BANK
GROUP**

INDEPENDENT FACTORS	STANDARDIZED COEFFICIENTS	STRUCTURE COEFFICIENTS
	FUNCTION 1	FUNCTION 1
Reduction in Deposits with increase in Capital and Size (Factor 1)	1.2389	0.7719
Increase in NPAs while Decline in Loan and Increase in Non-Interest Income (Factor 2)	0.1486	-0.1678
Decline in GDP while increase in Lending Rate (Factor 3)	-0.1521	-0.0878
Decline in Capital Adequacy while increase in inflation (Factor 4)	-0.3526	-0.1578
Non-Performing Assets to Total Advance	0.7912	-0.0004

TABLE NO 10

From structure matrix, the correlation between each variable in the independent set and discriminant function, it was understood that the obtained discriminant function was positively and highly correlated with Factor 1 (Reduction in Deposits with increase in Capital and Size). That is, the discriminant function was highly dominated by change in deposits, capital and asset size of the banks. However, unique contribution of each predictor could be ascertained from standardized coefficients and not from structure matrix. So, from the observation of the standardized coefficients, it was apparent that the coefficient of Factor 1 (Reduction in Deposits with increase in Capital and Size) is very high followed by the coefficient of NPATL. This indicates that Factor 1 prior to NPATL has more power of discriminating the bank groups. However, the coefficient of NPATL is also substantial, in turn indicating that the status NPAs in total loan also plays a substantial role in differentiating the bank groups. From combining centroid with standardized coefficient of important factors, it is inferred that the increase in the proportion of NPAs in total loan, reduction in deposits, increase in capital and increase in asset size discriminate the SBI from Other Selected Public Sector Banks in India.

6. CONCLUSION

The role of NPAs in the presence of bank specific and macro economic variables in determining the performance of selected banks is analyzed by regression analysis. From the inferences of the results, it is concluded that the performance of SBI, BOB, CBI, PNB and CANB for generating profits from total assets is unaffected by the level of NPAs in Total Advances whereas it is vice versa in the case of BOI, UCO and UBI. The profitability of BOI, UCO Bank and UBI tend to increase with significant reduction in the level of NPAs in Total Loan. But from the results of regression for all other Selected Public Sector Banks, it is understood that NPAs has significant inverse relationship with profitability. This has led to the conclusion that the profitability of the nationalized banks is likely to go up if there is a remarkable decline in proportion of NPAs in total loan.

The scenario is same when the analysis are carried out for pooled data of SBI and Other Selected Public Sector Banks, in turn exposing the fact that the banks in India should reduce the NPAs for improve their performance for generating more the profit from available resources. It is also understood that increase in NPAs, reduction in deposits, increase in capital and increase asset size discriminate (differentiate) the SBI from all Other Selected Public Sector Banks. It is summarized that the Indian banks are able to improve their performance for generating more profit out of available resources if they are able to reduce the proportion of NPAs in Total loan.

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