

COMPARATIVE ANALYSIS OF IMPACT OF NPAS ON PROFITABILITY

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ABSTRACT

Banking sector reforms changed the structure and functioning of banking sector in India to a great extent. . Although these banking sector reforms have proved fruitful for the growth of banking industry yet it also led to the emergence of a major problem of non-performing assets. Generally NPAs are considered to have negative impact on the profitability of banks. But the need is to test this notion statistically. Moreover the objective of this research is to find the comparative impact of NPAs on profitability of various groups of banks. To achieve this objective, data regarding various parameters of profitability and NPAs have been collected for a very long period of 20 years viz. from 1997-98 to 2016-17. The collected data have been statistically analysed to know the comparative impact of NPAs on profitability of various groups of SCBs.

Keywords: Gross NPA to Gross Advances Ratio, Impact, NPAs, Profitability, SCBs.

1. Introduction and Objective of Study:

A sound financial system leads to empowering the economy and accelerates the process of economic growth and development by ensuring the smooth, efficient and effective flows of funds. Banking sector is the focal point of any financial system. All the components of financial system revolve around banking. To have sustained development of a nation, a robust financial system is needed and to have a robust financial system, well developed and efficient banking system is required. Banking sector reforms changed the structure and functioning of banking sector in India to a great extent. . Although these reforms have proved fruitful for the growth of banking industry yet it also led to the emergence of a major problem of non-performing assets. Generally NPAs are considered to have negative impact on the profitability of banks. But the need is to test this notion statistically. Moreover the objective of this research is to find the comparative impact of NPAs on profitability of various groups of banks. So the data compiled for a long period of time regarding NPAs and various indicators of profitability have been statistically tested. Here gross NPAs to gross advances ratio has been taken as an indicator of NPAs. For profitability five indicators have been used viz. net profit as percentage of total assets, net profit as percentage of total equity, interest earned on advances as percentage of average advances , net profit as percentage of total funds and interest income as percentage of total assets.

2. Review of Literature

Aggarwal and Mittal (2012) evaluate the operational performance in terms of NPAs' position of the selected public sector banks and private sector banks in India. This research work analyses NPA data to find the level of efficiency of NPA management of public sector banks and private sector banks. Siraj and Pillai (2012) study the changes in different indicators of NPAs and also do their comparison with advances as well as deposits of various banks. The data analysed, using the statistical techniques of correlation and regression, show that despite the various strategies adopted by RBI and SCBs to diminish the increasing trend of NPAs, NPAs still remain a major threat to banks. The efficiency of credit risk management of banks becomes questionable due to incremental component of NPAs. Pandey and Kaur (2012) attempt to chalk out the relationship between advances and non-performing assets. A positive correlation between NPAs and advances has been found. This study shows that NPAs are more efficiently managed by bankers of public sector banks in comparison to bankers of private sector banks. An upward trend of non-performing assets of the private banks can be due to the increased amount of advances sanctioned by these banks in the real estate and personal loan segment. Kavitha (2012) assess the magnitude and impact of Non-performing Assets on profitability of banks. She studies that how NPAs affect the profitability of all public sector banks. It is found that certain proportion of total advances has been doubtful asset in the past. The profitability of all public sector banks have been badly affected by these doubtful assets. Non-performing Assets have also negatively affected the efficiency and productivity of public banks. Siraj and Pillai (2011) investigate the impact of global financial crisis (2007-09) on the profitability, asset quality and level of NPAs of Indian

scheduled commercial banks. The results of the data analysed show that even though numerous remarkable changes were there in the banking sector to improve its efficiency yet the banks are still vulnerable to the financial crisis. The vulnerability of the banking sector is not desirable for the growth of economy. Hence reforms should be further strengthened to improve the financial stability of banking sector. **Misra and Dhal (2010)** analyse the profitability of bank indicators with a focus on NPAs of public sector banks. It reveals that banks' NPAs are influenced by three major set of factors viz. terms of credit, bank specific indicators and the business cycle shocks. The results of panel regression model used in this research work shows that the terms of credit and bank specific indicators/variables have significant impact on the bank's NPAs in the presence of macroeconomic shocks. The business cycle impact on NPAs could be managed with appropriate terms of lending in terms of maturity, loan interest rate and capital requirement. **Bidani (2002)** explains that non-performing assets have adverse impact on the stability of banks in India. NPAs cause a loss of interest income and also lead to writing off of the principal loan amount itself. They affect the profitability of banks negatively. The problem of NPAs can be tackled with efficient management of NPAs in banks. This research also deals with the recovery of NPAs in banks.

3. Research Methodology and Data Analysis

To achieve the objective of this research work, data regarding various parameters of profitability and NPAs have been collected for a very long period of 20 years viz. from 1997-98 to 2016-17. All the data have been obtained from secondary sources of data i.e. Annual Reports of RBI. In order to analyse the impact of NPAs on profitability the statistical technique of linear regression has been used where NPAs i.e. gross NPAs to gross advances ratio is the independent variable and various indicators of profitability as specified above are the dependent variables. For each dependent variable the analysis has been done in the further five sub-sections.

3.1 Comparative Analysis of Impact of Gross NPAs to Gross Advances Ratio on Net Profit as percentage of Total Assets

In order to study the comparative impact of gross NPAs to gross advances ratio on net profit as percentage of total assets the regression equation is formulated to apply the Linear Regression Model. This regression equation can be numerically expressed as below:

$$Y_1 = \alpha + \beta X$$

Where,

- Y_1 represents dependent variable i.e. net profit as percentage of total assets
- α is the constant
- β is the regression coefficient or slope of the regression line
- X is the independent variable viz. gross NPA to gross advances ratio

The statistical significance of the presence of impact of gross NPA to gross advances ratio on net profit as percentage of total assets is tested with the help of 't' statistic in the Regression Model. The fitness of the model has been tested with the help of 'F' statistic. 5% level of significance has been used to test the statistical significance of presence of impact of gross NPAs to gross advances ratio on net profit as percentage of total assets and also to test the fitness of the model. The results of Linear Regression Model are shown in the forthcoming tables:

Table 1
Table Showing Results of Linear Regression

Dependent Variable	Independent Variable	Public Sector Banks			Old Private Sector Banks			New Private Sector Banks			Foreign Banks			All SCBs		
		Regression Coefficient	t (p value)	F Statistic (p value)	Regression Coefficient	t (p value)	F Statistic (p value)	Regression Coefficient	t (p value)	F Statistic (p value)	Regression Coefficient	t (p value)	F Statistic (p value)	Regression Coefficient	t (p value)	F Statistic (p value)
Net Profit as percentage of Total Assets	Constant	0.927			0.920			1.748			2.089			1.099		
	Gross NPA to Gross Advances Ratio	-0.029	-3.187 (0.005)	10.160 (0.005)	0.012	0.712 (0.486)	0.507 (0.486)	-0.151	-4.360 (0.000)	19.008 (0.000)	-0.190	-6.331 (0.000)	40.084 (0.000)	0.021	1.149 (0.266)	1.320 (0.266)

Table 2
Table showing summary of Linear Regression Model

Type of Banks	R square
Public Sector Banks	37.4%*
Old Private Sector Banks	2.9%
New Private Sector Banks	52.8%*
Foreign Banks	70.2%*
All SCBs	7.2%

*Indicates Statistically Significant Impact

The results shown in table 1 indicate that the p value of 't' statistic is less than 5% level of significance in case of public sector banks(0.005), new private sector banks (0.000) and foreign banks (0.000). Hence it can be concluded that in case of public sector banks (-0.029), new private sector banks (-0.151) and foreign banks (-0.190) gross NPAs to gross advances ratio is having a significant impact on net profit as percentage of total assets. The impact of gross NPA to gross advance ratio on net profit as percentage of total assets is statistically not significant in case of old private sector banks (0.486). The p value of 'F' statistic is less than 5% level of significance in case of public sector banks, new private sector banks and foreign banks thus showing the statistical fitness of regression model in case of these bank groups. The values of regression coefficient indicate that the highest negative impact of gross NPAs to gross advances ratio on net profit as percentage of total assets is in case of foreign banks whereby with every 1 percent increase in gross NPA to gross advance ratio, net profit as percentage of total assets decline by 0.190% whereas it decline by 0.151% and 0.029% in case of new private sector banks and public sector banks respectively thus showing the second and third highest impact on new private sector banks and public sector banks respectively.

Table 2 shows R square values which indicate the degree of variance in the dependent variable which can be explained by independent variable. Out of those groups of banks which are indicated by table 1 to have significant impact, foreign banks (70.2%) have the highest R square followed by new private sector banks (52.8%) and public sector banks (37.4%). It means in case of foreign banks 70.2% of the variance in net profit as percentage of total assets can be explained by gross NPA to gross advances ratio or it can be said that net profit as percentage of total assets of foreign banks is 70.2% dependent on its gross NPA to gross advances ratio and so on.

3.2 Comparative Analysis of Impact of Gross NPA to Gross Advances Ratio on Net Profit as percentage of Total Equity

To study the impact of gross NPA to gross advances ratio on net profit as percentage of total equity, the researcher has used the Linear Regression Model. To use this model the following regression equation is formulated:

$$Y_2 = \alpha + \beta X$$

Where,

Y_2 represents dependent variable i.e. net profit as percentage of total equity

α is the intercept or constant

β is the regression coefficient

X is the independent variable viz. gross NPA to gross advances ratio

This regression equation is used to test the impact of gross NPA to gross advances ratio on net profit as percentage of total equity. The statistical significance of the presence of impact of gross NPA to gross advances ratio on net profit as percentage of total equity is tested with the help of 't' statistic in the Regression Model. The fitness of the model has been tested with the help of 'F' statistic. 5% level of significance has been used to test the statistical significance of presence of impact of gross NPAs to gross advances ratio on net profit as percentage of total equity and also to test the fitness of the model. The results of Linear Regression Model are shown in the forthcoming tables:

Table 3
Table Showing Results of Linear Regression

Dependent Variable	Independent Variable	Public Sector Banks			Old Private Sector Banks			New Private Sector Banks			Foreign Banks			All SCBs		
		Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)
Net Profit as percentage of Total Equity	Constant	17.153			12.000			16.568			13.139			14.870		
	Gross NPA to Gross Advances Ratio	-0.457	-2.746 (0.014)	7.542 (0.014)	0.174	0.717 (0.483)	0.514 (0.483)	-0.571	-1.841 (0.083)	3.390 (0.083)	-0.401	-1.353 (0.194)	1.830 (0.194)	0.621	1.920 (0.072)	3.686 (0.072)

Table 4
Table showing summary of Linear Regression Model

Type Of Banks	R square
Public Sector Banks	30.7%*
Old Private Sector Banks	2.9%
New Private Sector Banks	16.6%
Foreign Banks	9.7%
All SCBs	17.8%

*Indicates Statistically Significant Impact

Table 3 reveals that p value of 't' statistic is less than 5% level of significance only in case of public sector banks (0.014). Hence it can be concluded that the impact of gross NPA to gross advances ratio on net profit as percentage of total equity is significant in case of public sector banks only. The p value of 'F' statistic is less than 5% level of significance in case of public sector banks only indicating thereby that here the regression model is a statistical fit for public sector banks only. The value of regression coefficient of public sector banks (-0.457) indicates that with every 1 % increase in gross NPA to gross advances ratio, net profit as percentage of total equity falls by 0.457%. Gross NPA to gross advances ratio is having no significant impact on net profit as percentage of total equity in case of old private sector banks (0.483), new private sector banks (0.083) and foreign banks (0.194).

The results shown in table 4 make it clear that 30.7% of the dependence of net profit as percentage of total equity can be explained by gross NPA to gross advances ratio of public sector banks. On the other hand 2.9%, 16.6% and 9.7% of the dependence of net profit as percentage of total equity can be explained by gross NPA to gross advances ratio of old private sector banks, new private sector banks and foreign banks respectively. However this dependence is having no statistical significance.

3.3 Comparative Analysis of Impact of Gross NPA to Gross Advances Ratio on Interest Earned on Advances as percentage of average advances

The Linear Regression Model is used to study and analyse the impact of gross NPA to gross advances ratio on interest earned on advances as percentage of average advances. For this purpose the linear equation formulated is expressed as below:

$$Y_3 = \alpha + \beta X$$

Where,

Y₃ represents dependant variable viz. interest earned on advances as percentage of average advances

α is the intercept

β is the slope of the regression line or regression coefficient

X is the independent variable i.e. gross NPA to gross advances ratio

Linear Regression Model has been applied using this regression equation. The statistical significance of the presence of impact of gross NPAs to gross advances ratio on interest earned on advances as percentage of average advances is tested with the help of 't' statistic in the Regression Model. The fitness of the model has been tested with the help of 'F' statistic. 5% level of significance has been used to test the statistical significance of presence of impact of gross NPAs to gross advances ratio on interest earned on advances as percentage of average advances and also to test the fitness of the model. The results of Linear Regression Model are shown in the following tables:

Table 5
Table Showing Results of Linear Regression

Dependent Variable	Independent Variable	Public Sector Banks			Old Private Sector Banks			New Private Sector Banks			Foreign Banks			All SCBs		
		Regression Coefficient	t Statistic (pvalue)	F Statistic (p value)	Regression Coefficient	t Statistic (pvalue)	F Statistic (p value)	Regression Coefficient	t Statistic (pvalue)	F Statistic (p value)	Regression Coefficient	t Statistic (pvalue)	F Statistic (p value)	Regression Coefficient	t Statistic (pvalue)	F Statistic (p value)
Interest Earned On Advances As Percentage Of Average Advances	Constant	8.856			12.076			11.209			6.192			8.530		
	Gross NPA to Gross Advances Ratio	-0.267	-2.803 (0.012)	7.859 (0.012)	-0.747	-7.932 (0.000)	62.918 (0.000)	-1.013	-3.990 (0.001)	15.919 (0.001)	0.805	2.257 (0.037)	5.095 (0.037)	0.034	0.415 (0.683)	0.172 (0.683)

Table 6
Table showing summary of Linear Regression Model

Type of Banks	R square
Public Sector Banks	31.6%*
Old Private Sector Banks	78.7%*
New Private Sector Banks	88.4%*
Foreign Banks	23.1%*
All SCBs	1.0%

*Indicates Statistically Significant Impact

The results shown in table 5 indicate that p value of 't' statistic is less than 5% level of significance in case of public sector banks (0.012), old private sector banks (0.000), new private sector banks (0.001) and foreign banks (0.037) thus indicating that gross NPA to gross advances ratio is having significant impact on interest earned on advances as percentage of average advances in case of public sector banks, old private sector banks, new private sector banks and foreign banks. This significant impact is negative in case of public sector banks (-0.267), old private sector banks (-0.747) and new private sector banks (-1.013) whereas it is positive in case of foreign banks (0.805). Hence the highest negative impact of gross NPA to gross advances ratio on interest earned on advances as percentage of average advances is in case of new private sector banks (-1.013) whereas old private sector banks (-0.747) and public sector banks (-0.267) stand on the second and third position respectively as far as this negative impact is concerned. The positive regression coefficient of 0.805 of foreign banks reveals that with every 1% increase in gross NPA to gross advances ratio, interest earned on advances as percentage of average advances increase by 0.805%. On the other hand the negative regression coefficients of -0.267, -0.747 and -1.013 of public sector banks, old private sector banks and new private sector banks show that with every 1 % increase in gross NPA to gross advances ratio, interest earned on advances as percentage of average advances decline by 0.267%, 0.747% and 1.013% respectively.

Table 6 reveals R square values which indicate the extent of variance in dependent variable that can be explained by independent variable. It is clear from the table that regarding R square values new private sector banks (88.4%), old private sector banks (78.7%), public sector banks (31.6%) and foreign banks (23.1%) stand on first, second, third and fourth position respectively. It means 88.4% of the variation in interest earned on advances as percentage of average advances of new private sector banks is explained by gross NPA to gross advances ratio and so on.

3.4 Comparative Analysis of Impact of Gross NPA to Gross Advances Ratio on Net Profit as percentage of Total Funds

A regression equation is formulated to test the impact of gross NPA to gross advances ratio on net profit as percentage of total funds. It can be expressed numerically as:

$$Y_4 = \alpha + \beta X$$

Where,

Y₄ represents dependent variable i.e. net profit as percentage of total funds

α is the constant

β is the regression coefficient

X is the independent variable i.e. gross NPA to gross advances ratio

This regression equation is used to test the impact of gross NPA to gross advances ratio on net profit as percentage of total funds. The statistical significance of the presence of impact of gross NPA to

gross advances ratio on net profit as percentage of total funds is tested with the help of ‘t’ statistic in the Regression Model. The fitness of the model has been tested with the help of ‘F’ statistic. 5% level of significance has been used to test the statistical significance of presence of impact of gross NPAs to gross advances ratio on net profit as percentage of total funds and also to test the fitness of the model. The results of Linear Regression Model are shown in the following tables 7 and 8:

Table 7
Table Showing Results of Linear Regression

Dependent Variable	Independent Variable	Public Sector Banks			Old Private Sector Banks			New Private Sector Banks			Foreign Banks			All SCBs		
		Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)
Net Profit as percentage of Total Funds	Constant	8.370			8.032			8.180			9.253			7.961		
	Gross NPA to Gross Advances Ratio	-0.096	-2.125 (0.049)	4.515 (0.049)	0.040	0.488 (0.632)	0.238 (0.632)	0.024	0.146 (0.886)	0.021 (0.886)	-0.732	-3.744 (0.002)	14.015 (0.002)	0.038	0.742 (0.468)	0.551 (0.468)

Table 8
Table showing summary of Linear Regression Model

Type of Banks	R square
Public Sector Banks	21.0%*
Old Private Sector Banks	1.4%
New Private Sector Banks	0.1%
Foreign Banks	45.2%*
All SCBs	3.1%

*Indicates Statistically Significant Impact

The results shown in table 7 indicate that p value of ‘t’ statistic is less than 5% level of significance in case of public sector banks (0.049) and foreign banks (0.002) reflecting thereby that there is significant impact of gross NPA to gross advances ratio on net profit as percentage of total funds in case of public sector banks (-0.096) and foreign banks (-0.732). Both these groups of banks show negative impact of NPA on profitability. More negative impact (-0.732) is in case of foreign banks whereas comparatively less negative impact (-0.096) is found in case of public banks. It means that with every 1 % increase in gross NPA to gross advances ratio, net profit as percentage of total funds falls by 0.732% and 0.096% in case of foreign banks and public sector banks respectively. Moreover no significant impact of gross NPA to gross advances ratio on net profit as percentage of total funds is there in case of old private sector banks and new private sector banks. The p value of ‘F’ statistic is less than 5% level of significance in case of public sector banks and foreign banks thus indicating the statistical fitness of the model in case of these bank groups.

R square values shown in table 8 depict that 45.2% of the variation of net profit as percentage of total funds of foreign banks can be explained by gross NPA to gross advances ratio. But this value is only 21% in case of public sector banks. It is very less (1.4% and 0.1%) in case of old and new private sector banks respectively and having no statistical significance.

3.5 Comparative Analysis of Impact of Gross NPA to Gross Advances Ratio on Interest Income as percentage of Total Assets

In order to analyse the impact of gross NPA to gross advances ratio on interest income as percentage of total assets the following regression equation is formulated:

$$Y_5 = \alpha + \beta X$$

Where,

Y₅ represents dependent variable viz. interest income as percentage of total assets

α is the intercept or constant

β is the regression coefficient

X is the dependent variable i.e. gross NPA to gross advances ratio

Linear Regression Model has used the above stated regression equation to find the results. The statistical significance of the presence of impact of gross NPAs to gross advances ratio on interest income as percentage of total assets is tested with the help of ‘t’ statistic in the Regression Model. The fitness of the model has been tested with the help of ‘F’ statistic. 5% level of significance has been used to test the statistical significance of presence of impact of gross NPAs to gross advances ratio on interest income as percentage of total assets and also to test the fitness of the model. The results of Linear Regression Model are shown in the following tables 9 and 10:

Table 9
Table Showing Results of Linear Regression

Dependent Variable	Independent Variable	Public Sector Banks			Old Private Sector Banks			New Private Sector Banks			Foreign Banks			All SCBs		
		Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	Regression Coefficient	t Statistic (p value)	F Statistic (p value)
Interest Income As Percentage Of Total Assets	Constant	7.254			8.163			8.280			4.564			7.140		
	Gross NPA to Gross Advances Ratio	0.113	3.997 (0.001)	15.977 (0.001)	0.092	1.473 (0.160)	2.169 (0.160)	-0.175	-1.164 (0.261)	1.355 (0.261)	0.708	7.423 (0.000)	55.105 (0.000)	0.133	3.805 (0.002)	14.479 (0.002)

Table 10
Table showing Summary of Linear Regression Model

Type of Banks	R square
Public Sector Banks	50%*
Old Private Sector Banks	11.9%
New Private Sector Banks	7.8%
Foreign Banks	77.5%*
All SCBs	47.5%*

*Indicates Statistically Significant Impact

The results shown in table 9 indicate that p value of 't' statistic is less than 5% level of significance in case of public sector banks (0.001) and foreign banks (0.000) indicating that gross NPA to gross advances ratio is having significant impact on interest income as percentage of total assets of public sector banks (0.113) and foreign banks (0.708) whereas no significant impact of gross NPA to gross advances ratio on interest income as percentage of total assets is found in case of old private sector banks and new private sector banks. The significant impact of gross NPAs to gross advances ratio on interest income as percentage of total assets in case of public sector banks and foreign banks is positive. The positive significant impact shows that with every 1 % increase in gross NPA to gross advances ratio, interest income as percentage of total assets is increasing by 0.113% in case of public sector banks and by 0.708% in case of foreign banks. The model is found to be statistically fit in case of public sector banks and foreign banks as the p value of 'F' statistic is less than 5% level of significance in these two cases.

The R square values depicted in table 10 indicate that in case of foreign banks 77.5% and in case of public sector banks 50% of the variation in interest income as percentage of total assets can be explained by gross NPA to gross advances ratio. However this dependence is only 11.9% and 7.8% in case of old private sector banks and new private sector banks respectively. Moreover this low dependence is statistically not significant.

4. Conclusion

In the previous five sub sections the researcher has discussed the impact of NPAs on five indicators of profitability one by one. Now the collective impact of NPAs on these five indicators of profitability is considered. From the results shown in the tables in the previous five sub-sections, a new table is drawn as below:

Table 11
Table showing number of cases of significant impact of NPAs on profitability

Types of Banks	Significant Impact	Negative Significant Impact	Positive Significant Impact
Public Sector Banks	5	4	1
Old Private Sector Banks	1	1	-
New Private Sector Banks	2	2	-
Foreign Banks	4	2	2
All SCBs	1	-	1

This table 11 reveals that out of five cases of impact of NPAs on profitability studied so far there is significant impact in all the five cases in case of public sector banks. Moreover public sector banks have

significant negative impact in four cases and significant positive impact in one case. Old private sector banks show significant impact of NPA on profitability in one case only. Significant impact of NPA on profitability is there in two and four cases of new private sector banks and foreign banks respectively. To conclude it can be said that the highest impact of NPA on profitability is there in case of public sector banks whereas foreign banks, new private sector banks and old private sector banks stand on the second, third and fourth position, respectively.

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