

Comparative analysis of trends of NPAs of various groups of scheduled commercial banks

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Abstract: NPAs have emerged as a major problem for the banking industry in India. All the groups of scheduled commercial banks have been facing this problem since long. However the magnitude of NPAs vary across different groups of SCBs. So it is required to study the comparative trends of NPAs over a long period of time. In this research paper the presence of long term trend in the behaviour of gross NPAs of different groups of SCBs is comparatively analyzed. For this purpose the statistical techniques of Annual Trend Analysis, Exponential Growth Analysis and Descriptive Analysis have been used.

1. Introduction

The performance of a country's banks is indicated by the level of its NPAs. With increase in NPAs, there is a downfall in bank's performance. There is inverse relationship between NPAs and performance of banks. This crisis of NPAs is shattering the entire economy along with banking sector[1]. A large amount of NPAs are towards big industrialists who have considerable influence in corridors of power[2]. Reduction of NPAs should be treated as an item of national priority to ensure strong and sustainable banking system[3]. Many small banks are merging with big banks to ensure their survivability in the competitive environment[4]. The bankers are required to regularly follow their customers to ensure the proper use of funds for the purpose to which it was meant. Moreover there should be frequent discussions with respect to NPAs with the employees in the banks and their recommendations in relation to measures of NPA recovery should be acknowledged to make them more concerned for reducing the adverse impact of NPAs[5].

2. Research Methodology

This research paper analyses comparatively the trends of NPAs amongst various groups of SCBs viz. public sector banks, old private sector banks, new private sector banks and foreign banks. For this purpose data regarding Gross NPAs, Net NPAs, Gross NPAs to Gross Advances Ratio and Net NPAs to Net Advances Ratio of different groups of banks have been compiled for a very long period of 20 years viz. from 1997-98 to 2016-17. Most of the data have been extracted from various issues of the report published by RBI named "Report on Trends and Progress of Banking in India". However some portion of the data have been obtained from another publication of RBI i.e. "Statistical Tables Relating to Banks in India". The compiled data have been analysed using the statistical techniques of Bi-variate Regression, Semi-log Model and Descriptive Analysis.

3. Data Analysis and Interpretation

This section has been divided into two sub sections- first sub section deals with comparative trend analysis of Gross NPAs and another sub section deals with comparative trend analysis of Net NPAs.

3.1 Comparative Trend Analysis of Gross NPAs

Gross NPAs means the total NPAs of banks without making any provision out of it. The data of GNPAs is released by RBI in two formats – one is gross NPAs in absolute terms and another is gross NPA to gross

advances ratio in relative terms. The trend analysis for both types of data has been done. In order to do comparative trend analysis of absolute gross NPAs the statistical methods of 'Annual Trend Analysis' and 'Exponential Growth Analysis' have been used by the researcher. For analysing the data regarding gross NPAs to gross advances ratio the descriptive analysis has been done. In order to do comparative trend analysis of gross NPAs this sub-section is further divided into three sub sub sections.

3.1.1 Comparative Annual Trend Analysis of Absolute Gross NPAs

The absolute data of gross NPAs have been comparatively analyzed using Bi-variate Regression Model where the variables suggest gross NPAs is dependent variable and the time in years is considered to be independent variable. The Bi-variate Regression Model can be represented as

$$Y_i = \alpha + \beta X_i$$

Where α is the intercept & β represents the presence of long term trend in the behaviour of dependent variable. Y_i is the dependent variable viz. gross NPAs and X_i is the independent variable viz. time in years. The statistical significance of the presence of long term trend in gross NPAs is tested with the help of 't' statistic in the Regression Model. 'F' statistics have been calculated to verify the statistical fitness of the model. The significance of presence of long term trend is tested at 5% level of significance. The results of Bi-variate Regression Model for gross NPAs are shown below in Table 1

Table 1
Table of Annual Trend in Gross NPAs (Amount in Rs. Billions)

Bank Group	Dependent Variable	Independent Variable	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	R ²	Remarks
Public Sector Banks	Gross NPA	Constant Time (In Years)	-168374.059 84.342	-3.968 (0.001) 3.987 (0.001)	15.898 (0.001)	48.3%	Significant positive trend exists
Old Private Sector Banks	Gross NPA	Constant Time (In Years)	-2800.014 1.417	-2.513 (0.022) 2.550 (0.021)	6.503 (0.021)	27.7%	Significant positive trend exists
New Private Sector Banks	Gross NPA	Constant Time (In Years)	-23571.553 11.794	-11.767 (0.000) 11.810 (0.000)	139.485 (0.000)	89.1%	Significant positive trend exists
Foreign Banks	Gross NPA	Constant Time (In Years)	-9190.461 4.604	-6.364 (0.000) 6.394 (0.000)	40.887 (0.000)	70.6%	Significant positive trend exists
All SCBs	Gross NPA	Constant Time (In Years)	-203823.609 102.099	-4.473 (0.000) 4.495 (0.000)	20.202 (0.000)	54.3%	Significant positive trend exists

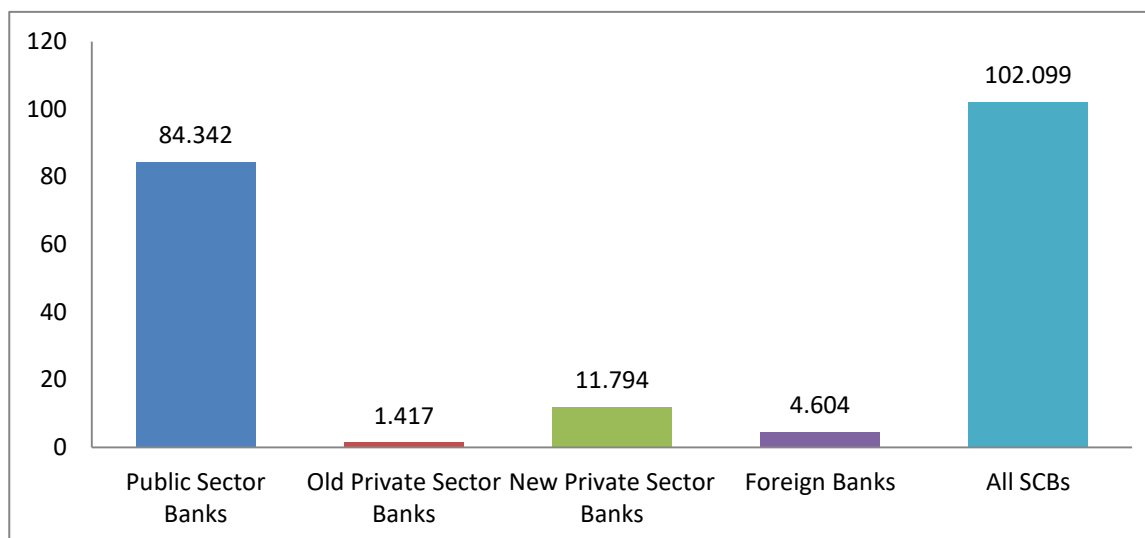
The results shown in the table 1 indicate that the 'p' value of 't' statistics for all the groups of SCBs is less than 5% level of significance. Hence it can be concluded that there exist significant long term trend in gross NPA for all the groups of SCBs. This long term trend in gross NPA is positive in all the cases. The significant positive trend is found to be highest in case of public sector banks (84.342) and lowest in case of old

private sector banks (1.417). New private sector banks (11.794) stand on the second position and foreign banks (4.604) are on the third position as far as the long term trend in gross NPA is concerned.

The 'p' value of 'F' statistic is found to be less than 5% level of significance in case of all the groups of SCBs. Hence it proves the statistical fitness of the model. The R² value in the result indicates the percentage of variance in the behaviour of gross NPAs which can be explained by the time behaviour of gross NPAs. For example in case of public sector banks 48.3 % of the long term behaviour of gross NPAs can be explained with the help of its time behaviour. Similarly in case of old private sector banks 27.7% of the annual trend of gross NPAs can be explained with the help of time variable.

The comparative annual trend of absolute GNPA is shown graphically as below:

Figure 1
Annual Trend in Gross NPAs (Amount in Rs. Billions)



3.1.2 Comparative Exponential Growth Analysis of Absolute Gross NPAs

The previous sub-section discussed about the long term trend in gross NPAs in absolute terms. This comparative analysis in absolute terms gets affected by the different size of the different groups of banks. Hence to eliminate the effect of difference in the size of different groups of banks, Annual Growth Rate of gross NPAs of different groups of banks have been calculated to make their comparative analysis. In the study, growth rate of gross NPAs have been calculated with the help of Semi- log Model. In Semi log Model, the dependent variable is the natural log of the gross NPAs and the time in years is the independent variable. The Semi-log Model can be expressed below as:-

$$\log y = \alpha + \beta (\text{time in years})$$

Where α is intercept and the slope coefficient β represents the growth rate of dependent variable w.r.t. time. The 'p' value of 't' statistic of the slope coefficient represents the significance of growth rate of dependent variable w.r.t. time. The results of Semi log Model w.r.t. gross NPAs of various groups of banks are shown below in table:

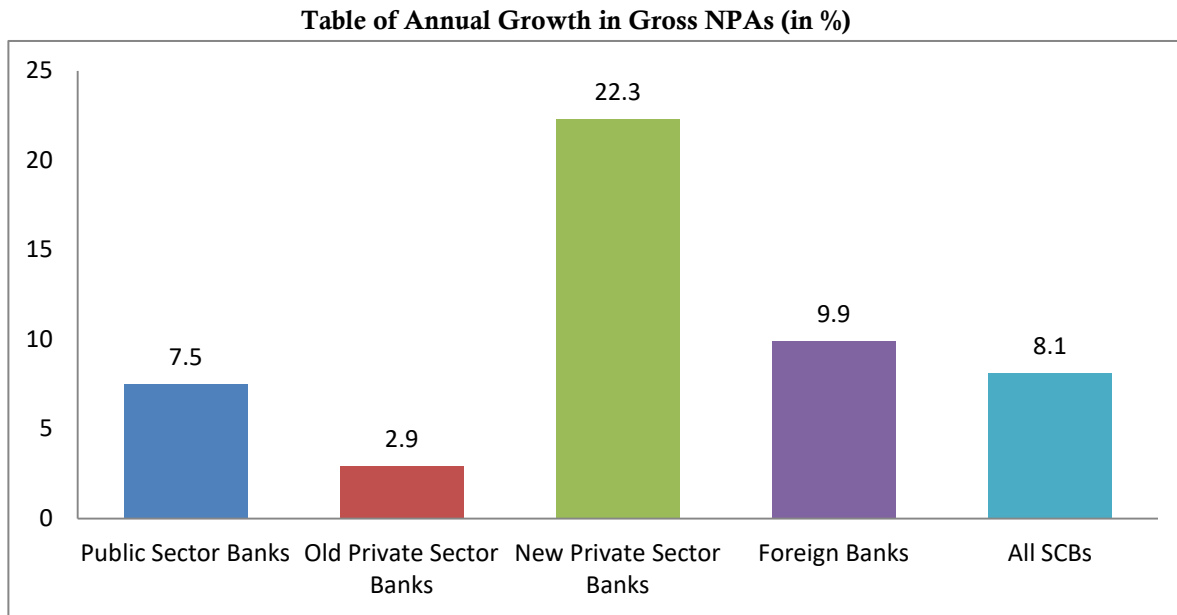
Table 2
Table of Annual Growth in Gross NPAs (in %)

Bank Group	Dependent Variable	Independent Variable	Exponential Growth Rate	t Statistic (p value)	F Statistic (p value)	R ²	Remarks
Public Sector Banks	Gross NPA	Constant Time (In Years)	-144.862 7.5	-4.025 (0.001) 4.206 (0.001)	17.688 (0.001)	51%	Significant positive growth Exists
Old Private Sector Banks	Gross NPA	Constant Time (In Years)	-54.136 2.9	-2.312 (0.034) 2.470 (0.024)	6.099 (0.024)	26.4%	Significant positive growth exists
New Private Sector Banks	Gross NPA	Constant Time (In Years)	-443.908 22.3	-9.014 (0.000) 9.093 (0.000)	82.682 (0.000)	82.9%	Significant positive growth exists
Foreign Banks	Gross NPA	Constant Time (In Years)	-195.381 9.9	-7.130 (0.000) 7.261 (0.000)	52.723 (0.000)	75.6%	Significant positive growth exists
All SCBs	Gross NPA	Constant Time (In Years)	-156.499 8.1	-5.187 (0.000) 5.409 (0.000)	29.259 (0.000)	63.3%	Significant positive growth exists

The results of Semi-log model shown in the above table reveal that p value of 't' statistic is less than 5% level of significance for all groups of banks indicating thereby significant annual growth of gross NPAs of all groups of banks. This annual growth is positive in all cases however the quantum of growth varies. The results indicate that new private sector banks (22.3) show the highest annual growth of gross NPAs whereas foreign banks (9.9), public sector banks (7.5) and old private sector banks (2.9) stand on the second, third and fourth position respectively. The p value of 'F' statistic is less than 5% level of significance in all cases showing the statistical fitness of the model in all cases.

The R² value in the result indicates the percentage of variance in the growth rate of gross NPAs which can be explained by the time behaviour of gross NPAs. For example in case of public sector banks 51 % of the growth of gross NPAs can be explained with the help of its time behaviour. Similarly in case of old private sector banks 26.4% of the annual growth of gross NPAs can be explained with the help of time variable. The annual growth rate of gross NPAs of various groups of banks is presented graphically as below:

Figure 2



3.1.3 Comparative Descriptive Analysis of Relative Gross NPAs

The data of relative gross NPAs constitute the gross NPA to gross advances ratio of different groups of banks over a period of time. This ratio establishes the relationship between gross NPAs & gross advances thus showing more clear picture of the comparative NPAs of different groups of banks with different level of advances. The descriptive analysis of the data of gross NPA to gross advances ratio has been done which shows the following results.

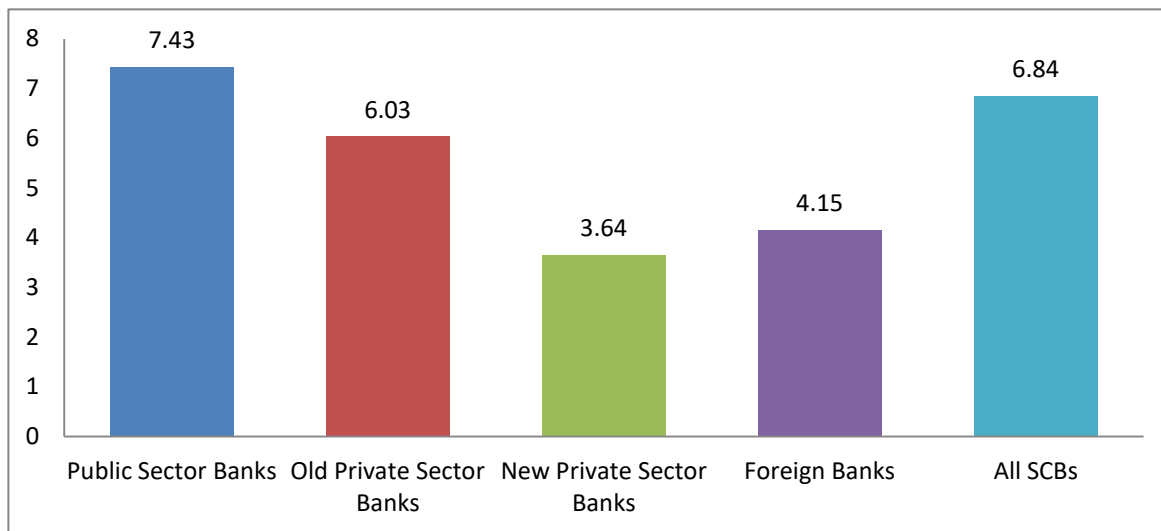
Table 3
Descriptive Statistics of Ratio of Gross NPA to Gross Advances

The results shown in the table indicate that public sector banks (7.43) have the highest average ratio of

Groups of Banks	Mean	S.D.	Minimum	Maximum
Public Sector Banks	7.43	5.45	1.97	17.84
Old Private Sector Banks	6.03	4.14	1.8	13.06
New Private Sector Banks	3.64	2.06	1.73	8.86
Foreign banks	4.15	1.83	1.75	7.59
All Scheduled Commercial Banks	6.84	4.88	2.25	15.68

gross NPA to gross Advances whereas the new private sector banks (3.64) have the lowest average ratio of gross NPA to gross advances. The old private sector banks (6.03) have the second highest average ratio & foreign banks (4.15) stand on the third position as far as the average ratio of gross NPA to gross advances is concerned. It is also shown graphically as below:

Figure 3
Mean of Ratio of Gross NPA to Gross Advances



3.2 Comparative Trend Analysis of Net NPAs

Net NPAs means NPAs arrived at after deducting provisions out of gross NPAs. Net NPAs are considered in two ways – one is net NPAs in absolute terms and another is net NPAs to net advances ratio in relative terms. The data of both types of net NPAs have been comparatively analyzed. In order to do comparative trend analysis of absolute net NPAs the statistical methods of ‘Annual Trend Analysis’ and ‘Exponential Growth Analysis’ have been used by the researcher. For analysing the data regarding net NPAs to net advances ratio the descriptive analysis has been done. In order to do comparative trend analysis of net NPAs this sub-section is further divided into three sub sub sections.

3.2.1 Comparative Trend Analysis of Absolute Net NPAs

The absolute data of net NPAs have been comparatively analyzed using Bi-variate Regression Model where the variables suggest net NPAs is dependent variable and the time in years is considered to be independent variable. The Bi-variate Regression Model can be represented as:

$$Y_i = \alpha + \beta X_i$$

Where α is the intercept & β represents the presence of long term trend in the behaviour of dependent variable. The statistical significance of the presence of long term trend is tested with the help of ‘t’ statistic in the Regression Model. ‘F’ statistics have been calculated to verify the statistical fitness of the model. The results of Bi-variate Regression Model for net NPAs are shown below in the table.

Table 4
Table of Annual Trend in Net NPAs (Amount in Rs. Billions)

Bank Group	Dependent Variable	Independent Variable	Regression Coefficient	t Statistic (p value)	F Statistic (p value)	R ²	Remarks
Public Sector Banks	Net NPA	Constant	-98983.066	-3.791 (0.001)	14.489 (0.001)	46.0%	Significant positive trend exists
		Time (In Years)	49.549	3.806 (0.001)			
Old Private Sector Banks	Net NPA	Constant	-213.654	-0.257 (0.800)	0.079 (0.782)	0.5%	No significant trend exists
		Time	0.116	0.281			

		(In Years)		(0.782)			
New Private Sector Banks	Net NPA	Constant	-7258.560	-6.227 (0.000)	39.111	69.7%	Significant positive trend exists
		Time (In Years)	3.634	6.254 (0.000)	(0.000)		
Foreign Banks	Net NPA	Constant	-2262.010	-4.272 (0.001)	18.474	52.1%	Significant positive trend exists
		Time (In Years)	1.135	4.298 (0.000)	(0.000)		
All SCBs	Net NPA	Constant	-108761.507	-3.994 (0.001)	16.093	48.6%	Significant positive trend exists
		Time (In Years)	54.456	4.012 (0.001)	(0.001)		

The results shown in the table indicate that the 'p' value of 't' statistics for all the groups of SCBs except old private sector banks is less than 5% level of significance. Hence it can be concluded that there exist significant long term trend in net NPAs for all the groups of SCBs except old private sector banks. This significant long term trend in net NPAs is positive in all the cases. The significant positive trend is found to be highest in case of public sector banks (49.549). New private sector banks (3.634) stand on the second position and foreign banks (1.135) are on the third position as far as the long term trend in net NPAs is concerned.

The 'p' value of 'F' statistic is found to be less than 5% level of significance in case of public sector banks, new private sector banks and foreign banks. Hence it proves the statistical fitness of the model in these cases. The R² value in the result indicates the percentage of variance in the behaviour of net NPAs which can be explained by the time behaviour of net NPAs. For example in case of public sector banks 46 % of the long term behaviour of net NPAs can be explained with the help of its time behaviour. Similarly in case of new private sector banks 69.7% of the annual trend of net NPAs can be explained with the help of time variable. The comparative annual trend of absolute net NPAs is shown graphically as below:

Figure 4
Annual Trend in Net NPAs (Amount in Rs. Billions)



3.2.2 Comparative Exponential Growth Analysis of Absolute Net NPAs

The previous sub-section discussed about the long term trend in net NPAs in absolute terms. This comparative analysis in absolute terms gets affected by the different size of the different groups of banks. Hence to eliminate the effect of difference in the size of different groups of banks, Annual Growth Rate of net NPAs of different groups of banks have been calculated to make their comparative analysis. In the study, growth rate of net NPAs have been calculated with the help of Semi- log Model. In Semi log Model, the dependent variable is the natural log of the net NPAs and the time in years is the independent variable. The Semi-log Model can be expressed below as:

$$\log y = \alpha + \beta (\text{time in years})$$

Where α is intercept and the slope coefficient β represents the growth rate of dependent variable w.r.t. time. The 'p' value of 't' statistic of the slope coefficient represents the significance of growth rate of dependent variable w.r.t. time. The results of Semi log Model w.r.t. net NPAs of various groups of banks are shown below in table 5:

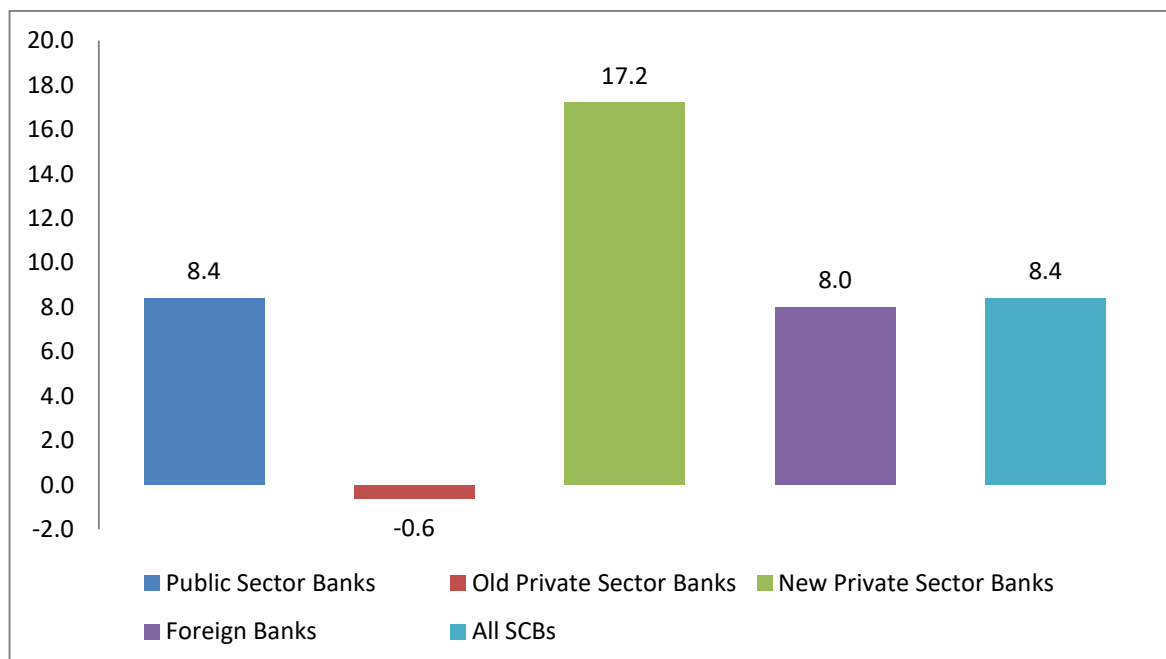
Table 5
Table of Annual Growth in Net NPAs (in %)

Bank Group	Dependent Variable	Independent Variable	Exponential Growth Rate	t Statistic (p value)	F Statistic (p value)	R ²	Remarks
Public Sector Banks	Net NPA	Constant	-162.997	-3.605 (0.002)	13.921	45%	Significant positive growth Exists
		Time (In Years)	8.4	3.731 (0.002)	(0.002)		
Old Private Sector Banks	Net NPA	Constant	14.229	0.341 (0.737)	0.074	0.4%	No Significant growth Exists
		Time (In Years)	-0.6	-0.272 (0.789)	(0.789)		
New Private Sector Banks	Net NPA	Constant	-342.789	-7.551 (0.000)	58.024	77.3%	Significant positive growth Exists
		Time (In Years)	17.2	7.617 (0.000)	(0.000)		
Foreign Banks	Net NPA	Constant	-158.627	-5.464 (0.000)	30.789	64.4%	Significant positive growth Exists
		Time (In Years)	8.0	5.549 (0.000)	(0.000)		
All SCBs	Net NPA	Constant	-163.379	-4.210 (0.001)	19.031	52.8%	Significant positive growth Exists
		Time (In Years)	8.4	4.363 (0.000)	(0.000)		

The results of Semi-log model shown in the above table 5 reveal that p value of 't' statistic is less than 5% level of significance for all groups of banks except old private sector banks indicating thereby significant annual growth of net NPAs of all groups of banks except old private sector banks. This significant annual growth is positive in case of public sector banks, new private sector banks and foreign banks however the quantum of growth varies. The results indicate that new private sector banks (17.2) show the highest annual growth of net NPAs whereas public sector banks (8.4) and foreign banks (8.0) stand on the second and third position respectively. The old private sector banks (-0.6) show negative annual growth of no statistical significance. 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 showing the statistical fitness of the model in these cases.

The R^2 value in the result indicates the percentage of variance in the growth rate of net NPAs which can be explained by the time behaviour of net NPAs. For example in case of public sector banks 45 % of the growth of net NPAs can be explained with the help of its time behaviour. Similarly in case of new private sector banks 77.3% of the annual growth of net NPAs can be explained with the help of time variable. The annual growth rate of net NPAs of various groups of banks is presented graphically as below:

Figure 5
Annual Growth in Net NPAs (in %)



3.2.3 Comparative Descriptive Analysis of Relative Net NPAs

The data of relative net NPAs constitute the net NPAs to net advances ratio of different groups of banks over a period of time. This ratio establishes the relationship between net NPAs & net advances thus showing more clear picture of the comparative NPAs of different groups of banks with different levels of advances. The descriptive analysis of the data of net NPAs to net advances ratio has been done which shows the following results.

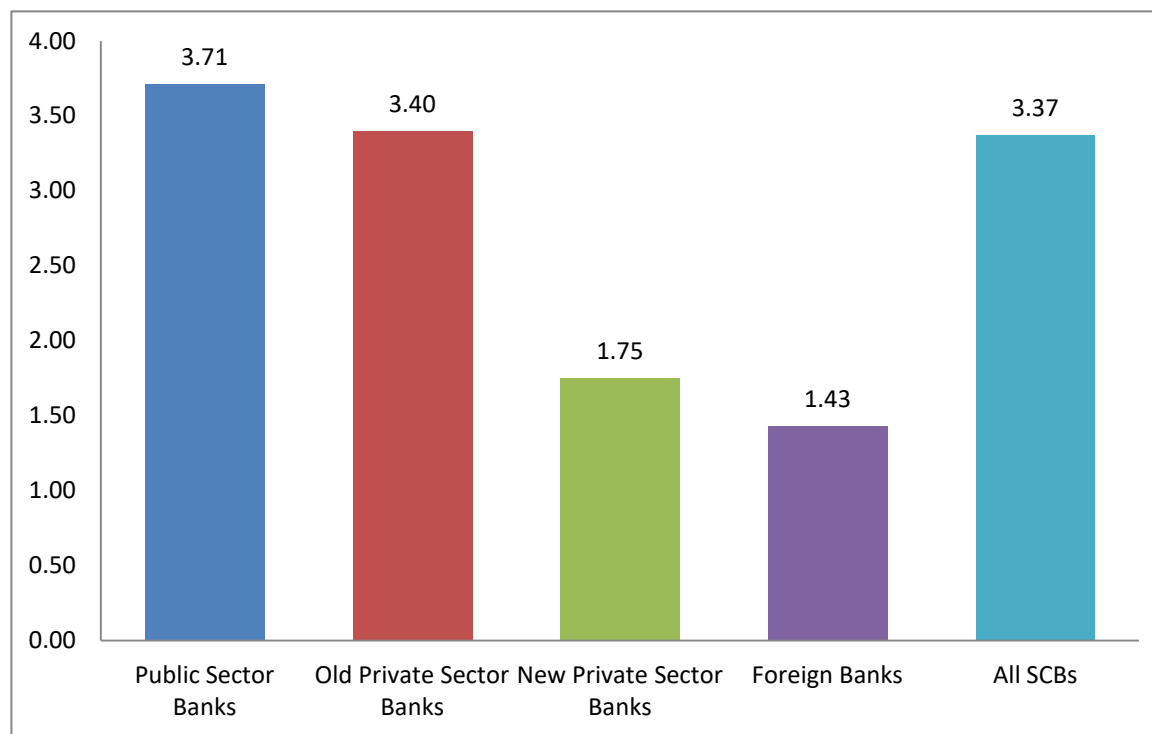
Table 6
Descriptive Statistics of Ratio of Net NPA to Net Advances

Bank Group	Mean	S.D.	Minimum	Maximum
Public Sector Banks	3.71	2.63	0.97	8.08
Old Private Sector Banks	3.40	2.9	0.94	9.18
New Private Sector Banks	1.75	1.32	0.42	4.94
Foreign banks	1.43	0.71	0.54	2.94
All SCBs	3.37	2.98	0.49	8.96

The results shown in the above table indicate that public sector banks (3.71) have the highest average ratio of net NPAs to net advances whereas foreign banks (1.43) have the lowest average ratio of net NPAs to

net advances. The old private sector banks (3.40) have the second highest average ratio & new private sector banks (1.75) stand on the third position as far as the average ratio of gross NPA to gross advances is concerned. It is evident that average net NPAs to net advances ratio of public sector banks(3.71) and of old private sector banks(3.40) is even more than the average net NPAs to net advances ratio of all scheduled commercial banks (3.37). It is also shown graphically as below:

Figure 6
Mean of Ratio of Net NPA to Net Advances



4. Findings

- 4.1** Bi-variate Regression model has been used to find the annual trends in gross NPAs. The results of this model show that significant positive trend exist in case of all groups of banks. The highest annual trend is found in case of public sector banks, their gross NPAs on an average increase every year by INR 84.342 billion. New private sector banks, foreign banks and old private sector banks stand on the second, third and fourth position respectively as far as the annual trend in gross NPAs is concerned. The gross NPAs of new private sector banks, foreign banks and old private sector banks on an average increase every year by INR 11.794 billion, INR 4.604 billion and INR 1.417 billion respectively. The R^2 values have shown that the highest impact of time on gross NPAs is in case of new private sector banks (89.1%) and the lowest impact of time on gross NPAs is in case of old private sector banks (27.7%).
- 4.2** In addition to the annual trend of gross NPAs, the annual growth of gross NPAs have been calculated using semi – log model. The results of this model have shown that there is significant positive growth in case of all groups of banks. The annual growth of gross NPAs is highest in case of new private sector banks. Foreign banks, public sector banks and old private sector banks stand on the second, third and fourth position respectively regarding annual growth of gross NPAs. The exponential growth rate analysis has shown that every year the gross NPAs of new private sector banks, foreign banks, public sector banks and old private sector banks grow by 22.3%, 9.9%, 7.5% and 2.9%

respectively. The R^2 values have shown the percentage of variance in the growth rate of gross NPAs which can be explained by time variable. The R^2 values are found to be 82.9%, 75.6%, 51% and 26.4% in case of new private sector banks, foreign banks, public sector banks and old private sector banks respectively.

- 4.3** The descriptive analysis of gross NPAs to gross advances ratio of different groups of banks have shown that the average ratio of gross NPAs to gross advances is highest in case of public sector banks (7.43) and lowest in case of new private sector banks (3.64). Old private sector banks (6.03) stand on the second and foreign banks (4.15) stand on the third position. It indicates that for every loans and advances of INR 100 the gross NPA are INR 7.43 in case of public sector banks, INR 6.03 in case of old private sector banks, INR 4.15 in case of foreign banks and INR 3.64 in case of new private sector banks. It means although new private sector banks have the highest annual growth in NPAs i.e. 22.3% (as mentioned in the previous finding) yet when this growth in NPAs is considered along with advances it makes the picture clear that in case of new private sector banks, not only NPAs have grown fast rather their loans and advances have also increased, and that too at a speed higher than that of NPAs. It means new private sector banks are most efficient in managing their gross NPAs. Foreign banks, old private sector banks and public sector banks stand on the second, third and fourth position respectively regarding their efficiency in managing their gross NPAs.
- 4.4** In this research, the annual trend of net NPAs of different groups of banks have also been calculated and found that significant positive trend exist for net NPAs of public sector banks, new private sector banks and foreign banks. This annual trend shows that on an average every year the net NPAs of public sector banks, new private sector banks and foreign banks increase by INR 49.549 billion, INR 3.634 billion and INR 1.135 billion respectively. It is found that in case of old private sector banks, statistically no significant trend exists. The R^2 values show that the impact of time on net NPAs is highest in case of new private sector banks (69.7%), second highest on foreign banks (52.1%) and third highest on public sector banks (46%). Time has shown no significant impact on net NPAs of old private sector banks.
- 4.5** In addition to the annual trend of net NPAs, the annual growth in net NPAs have also been calculated. It shows that the highest annual growth of net NPAs is in case of new private sector banks (17.2%) followed by public sector banks (8.4%) and foreign banks (8%). It is found that there is no significant growth in net NPAs of old private sector banks. In fact the annual growth in net NPAs of old private sector banks is negative (-0.6) but that is having no statistical significance.
- 4.6** The descriptive analysis of net NPAs to net advances ratio has shown that for every loans and advances of INR 100 the net NPAs of public sector banks, old private sector banks, new private sector banks and foreign banks are INR 3.71, INR 3.40, INR 1.75 and INR 1.43 respectively. It means although the annual growth in net NPAs of public sector banks is less than new private sector banks as discussed in the previous finding yet when their net NPAs are considered in relation to the net advances it becomes clear that public sector banks are most inefficient regarding their net NPAs management. It is found that foreign banks are most efficient regarding the management of their net NPAs as on one side the annual growth in their net NPAs is comparatively less as discussed in previous finding and on the other side their average net NPA to net advances ratio is least as disclosed in this point earlier. Regarding the efficiency in managing net NPAs the results of trend analysis have shown that new private sector banks and old private sector banks stand on the second and third position respectively.

5 . Conclusion

On the basis of comparative analysis of trends of NPAs of various groups of SCBs over a period of 20 years, the various groups of banks can be ranked from most efficient to least efficient regarding their NPA management with respect to gross NPAs and net NPAs as follows:-

Gross NPAs	Net NPAs
1. New Private Sector Banks	1. Foreign Banks
2. Foreign Banks	2. New Private Sector Banks
3. Old Private Sector Banks	3. Old Private Sector Banks
4. Public Sector Banks	4. Public Sector Banks

6. References

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