

Forecasting Non Performing Assets for Indian Banking Sector

Rinku Sharma Dixit, Shailee L. Choudhary



Abstract: The Banking sector is considered backbone of the economy and has an essential role to play in the development of a nation. The persistent rise in Non-Performing Assets (NPAs) of the Indian banking sector now has become a cause for concern for the economy. The government in developing countries such as India push for financial inclusion, leading to increase in the risk associated with bank's asset. With this backdrop, this paper has been designed to analyze the problem of NPAs in the Indian banking system. This paper shall explore unique method to forecast the NPAs in Indian banking system in 2019 by using Tableau Software.

To enable the said research the following variables, such as, Interest rates in relation to inflation rates, GDP & per-capita income, the banking norms as given the RBI and BASEL norms and studying the existing Gross and net NPAs of banks; are used. The focus is to design a model that would play a pivotal role for forecasting the future NPAs with reference to the Indian banks.

Index Terms: Non Performing Assets(NPA), four key words or phrases in alphabetical order, separated by commas.

I. INTRODUCTION

The banking sector is developed for holding the financial assets for others, investing those financial assets in order to create more wealth and the regulation of those activities by government agencies.

The banking sector plays a significant role in economic transformation by provisioning the desired financial resources to sectors that need it. The banks retain with them the power to control the economy. The flow of money among people, businesses and countries occurs due to the presence of the Banking system in the economy. Banks fuel and ensure the smooth running of the economy. This is one of the most crucial aspect and the Indian banking sector has started to deliver results. There have been many schemes such as Jan-Dhan Yojana, Make in India Project, Direct benefit transfer. These schemes require expansion of the extent of services and capabilities to service the masses. India has realized the necessity to provision banking services to even the remotest areas and accommodate individuals from all sectors of the society. However, achieving this vision shall not be easy but rather challenging. The everlasting problem of NPA will be the prime issue with regard to expansion.

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* Correspondence Author

Dr. Rinku Sharma Dixit*, Department of Business Analytics & Data Sciences, New Delhi Institute of Management, New Delhi, India.

Prof. Shailee Choudhary, Department of Business Analytics & Data Sciences, New Delhi Institute of Management, New Delhi, India.

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II. NON PERFORMING ASSETS?

A. What are NPAs?

Non Performing Assets or NPAs is the term used for loan or advance whose principal or interest was not paid for a period of 90 days. Hence these are the loans or advances that are in arrears or default for the scheduled payments of either the principal or the interest. 90 days of nonpayment is considered as the standard, however the duration of the time may be less or more as consented in the terms and conditions by both parties.

Banks have to further classify the NPAs into the following categories of assets:

- Substandard assets: Assets that have remained NPA for a period less than or equal to 12 months.
- Doubtful assets: Assets that have remained in the substandard category for a period of 12 months are considered doubtful assets.
- Loss assets: These are considered uncollectable by the RBI. They are of little value and their continuation is warranted. Nonetheless they may have some salvage or recovery value

NPAs are listed in the balance sheets of banks. Banks categorize loans as nonperforming if the interest or principal is not paid for 90 days, which may happen while the term of the loan is on or at its maturity.

B. Types of NPAs

Although the most prevalent NPAs are term loans, yet there are six other ways in which loans and advances can be categorised as NPAs:

- Overdraft and cash credit (OD/CC) accounts left out-of-order for more than 90 days
- Agricultural advances whose interest or principal installment payments remains overdue for two crop or harvest seasons in case of short duration crops or one crop season in case of long duration crops
- Bills of purchases and discounts that remained overdue for more than 90 days.
- The expected payment of other accounts remains overdue for more than 90 days.
- If the stock statements are not submitted for 3 consecutive quarters for the cash-credit facility.
- If there is no activity recorded in the cash credit, EPC, overdraft or PCFC account for a period of more than 91 days.

Impact of NPAs on the Balance Sheet

Large number of NPAs are a trivial problem and unbalances the entire banking system of the country. This affects the confidence level of the Investors, Stock holders and Depositors and causes the rotation of money.

Effect of NPAs on Profitability

NPAs on one side reduce the profits of the Bank and on the other enhance the Losses. Banks provide additional provisions ranging from 25 % to 30% on NPAs, which directly impact the Bank's Profitability.

Effect of NPAs on Management of Liabilities- Owing to the high NPAs, banks are forced to reduce the interest rates on deposits and increase the interest rates on advances.

Effect of NPAs on the confidence of Share Holders- Shareholders aspire that their money remains in safe hands. They are interested in the enhancement of investment and market capitalization. High NPAs reduce the confidence level of the investor thereby affecting the Bank's share prices. Consequently banks stop pay-out of dividend to the shareholders, and this is definitely not in the interest of the investor.

Effect of NPAs on Public Confidence- Increase in NPAs leads to poor performance of the Banks. This affects the sentiments of the investors and also to loss of faith of the public, directly affecting the deposits in the bank.

Effects of High NPA's on Banks- Higher NPAs affect the revenue strength of the banks and leads to loss of confidence of depositors. Banks are considered the back-bone of any Country's economy. Following are some detailed effects:

- **Changes in Interest Rates-** Reduction in interest rates on the deposits in the banks directly affecting the poor public and their sentiments.
- **Levied charges of operations – With the above scenario,** banks recover their losses by levying charges operations which are provided free, such as:
 - Charges on SMS service
 - Charges on withdrawal limits from ATMs
 - Charges on withdrawal frequency
 - Charges on cash deposits in other branches
 - Charges on Internet transaction
- **Increase in Current account deficit**

NPA are the main cause for increase in the current account deficit. Interest rates, Loans, CRR, SLR etc are directly affected. This affects the economy and the Corporates.

• **Effect on the serious borrower-** Increasing NPAs affect the honest borrower who have commendable credentials and credit rankings.

C. Causes of NPA:

The various causes of NPA are as follows:

- Loans given to big companies without thorough analysis of their repaying capacity.
- Approximately 80% of NPAs are due to intentional defaulters.
- Loans to big organizations running in losses and on the verge of closing. This can be credited to corrupt officials with despicable intentions.
- Political and Government influence on Banks and the use of power by some politicians to sanction

loans for undeserving businessmen.

- Reliance on project report without conduct of field study.
- Non-follow up of the loan amount expenditure. Most intentional defaulters spend the loan amount in unproductive manner that will in no case contribute to growth of the business. A typical example in this case is DCHL, who took loans from several banks but spent the amount in by investing in IPL, purchasing luxury cars, awarding bonuses and so on.
- For sanctioning huge loans, banks form a consortium and a larger bank from the group leads. The smaller banks follow leader bank in sanctioning loans. Wrong decision by the leader leads the follower banks to suffer.
- Certain enterprises take loans but are unable to finish their projects. As a result, the lending bank gives further loans for completing the project hoping to recover their previous loans. But this in several cases, further aggravates the NPA problem.

Measures to reduce NPA: -

Following are some of the measures to reduce NPA's

- **Insolvency and Bankruptcy Code (IBC), 2016.** Through this banks either revive the businesses or liquidate them.
- Selling NPAs is the immediate solution. Since April 2017, this is how banks are reacting to NPAs.
- The top 20 businesses, among all defaulters, were responsible for NPAs worth Rs. 1.54 lakh crore. Hence concentration on them may eliminate the need for governments to rescue banks.
- Thorough inspection of the enterprise before sanctioning loans.
- Display of names of Defaulters publicly, will cause fear and shall act as a deterrent.
- After yielding loan, banks should constantly observe the company's repaying capacity. In case they assess that the business is heading towards bankruptcy, banks may decide to sell the assets before the loans turns into an NPA.
- Forming 'bad bank' and transferring NPAs to it. This will clear the NPAs from the bank on papers and relieve the stress from the banking system.

III. LITERATURE REVIEW

Review of literature covers a brief description about Non-Performing Assets research work conducted in India. Some of these studies have been reviewed in the following paragraphs in order to establish the research gap and need for the present study.

The **RBI** has conducted a study to examine the factors contributing to the growth of NPA's. The study covered 800 top NPAs accounts in 33 banks (RBI Bulletin, July 1999).

The study showed that the proportion of problem loans in the banks has always been very high which was at 17.91% of their gross advances on 31st March, 1989. After the introduction of prudential norms, it came down to 17.44% as on 31st March, 1999. The study also showed that the major factors which result in NPA's includes; diversion of funds for modernization, expansion, diversification, undertaking new projects etc. This report concluded that the reduction in the NPAs in the banking sector should be taken as a nation's priority to make the banking sector stronger.

In paper [7], the author tried to analyze the actual causes of NPAs which are failures of the market, intentional defaults, lack of follow-ups, supervision and cooperation from banks, poor legal framework, lack of entrepreneurial skills, and diversion of funds.

In paper [8] the authors have analysed the trend and pattern in growth of NPA in education loan scheme in Odisha. The causes were found by questionnaire and survey of the defaulters by students of different colleges. The paper also suggests methods to overcome this problem.

In paper [9], the authors have made a study to analyze the causes of NPAs in working capital loans of Urban Co-operative banks. They surveyed the debtors through questionnaires. The reasons were analyzed and recommendations suggested.

In paper [5], with the help of 6 years secondary, authors have tried to analyze how reform measures can be used for minimising the NPA in public sector banks. They have used the percentage method for analysis.

In paper [6], a study has been made on mismanagement or diversion of fund with reference to Odisha. These are two prime causes of NPA. The study considers primary data, collected from 50 bank officials through structured questionnaire, analyzed by percentage method.

In paper [10], authors have adopted empirical approach to analyze the Indian commercial banks' NPAs by regression analysis. The study evaluates as to how the nonperforming shows how loans are influenced by three major sets of economic and financial factors which are terms of credit, bank size induced risk preferences and macroeconomic shocks.

In paper [11] a study has been conducted on Non-Performing Assets In State Bank Of Mysore. The NPA's were classified on Thirty days past due, ninety days overdue, and out of order. The data was collected about farmers through a method called Monitoring method, using application forms submitted at the time of applying for loan. In the study, data was collected using questionnaire and Chi-square test was used for 'out of order'.

In paper [12] the concept of NPAs has been analyzed, by the authors along with the components of loan assets in public sector, private sector and other foreign banks. They have studied secondary data using exploratory and diagnostic approach.

Paper [13] details the current trends of NPAs and the preventive measures to control NPA in the Indian Banking sector using secondary data.

In paper [14] a study was conducted to pave the way to the academic as well as general public about the overall efficiency at which the PSU and private banks are serving. For

this descriptive research design was used to understand the financial performance of PSU and private sector banks.

As per reports published by the **Reserve Bank of India (RBI)**, the gross NPAs in Indian banks, specifically the Public Sector Banks, are valued at around Rs 400,000 crore, which accounts for 90% of the total NPA in India, while the remaining 10% can be attributed to the private sector banks. It is found from the past studies that, majority of Indian studies have been carried out to evaluate the NPA's. However, still there is a problem of increasing NPA in banking sector. In the present paper, Regression and time series model will be used to analyze the current scenario of NPA in Indian banking sector.

IV. RESEARCH OBJECTIVE

While going through the previous research papers, the researcher has observed and understood the following research gaps:

- Most of the researchers have conducted their research using Linear Regression or Time Series analysis on Excel.
- Data Visualization has not been used

Hence the objective of the current study is to assess NPA in the Banking sector. The detailed objectives is as below:

- To Forecast NPA for Commercial Bank, SBI and PNB of Indian Banking Sector
- Forecast data using Business Analytics Tool Tableau
- To Analyze relationship of Macroeconomic factors with respect to NPA

The motive behind performance evaluation of these banks is to assess the historical NPAs generated by the bank and reason behind increasing NPAs in Indian Banking sector.

V. RESEARCH METHODOLOGY

The Project focuses on the study of increasing NPA in Banking sector, stressing on the impact of the macro-economic factors.

A. Type of Research: Secondary

Secondary research or desk research is a research method that involves using already existing data. Existing data is summarized and collated to increase the overall effectiveness of research. Secondary research includes research material published in research reports and similar documents.

B. Period of the Study: 2010-2018

C. Nature and Scope of Data Collection:

In this study, it has been attempted to analyse the Non-Performing Assets in Indian Banking sector. In order to achieve the pre-determined objectives Secondary data has been collected for Gross NPA for the Year 2010-2018 for commercial banks, SBI and PNB.

Forecasting Non Performing Assets for Indian Banking Sector

Different statistical and financial tools are used to evaluate the performance of these Banks. Historical data is collected from annual reports, website Money Control, Trading economics. Macro-economic variables data were collected through secondary research and analysed.

D. Analytical Tools: Tableau software has used for:

- Forecasting NPA for 2019 for Commercial Banks, PNB and SBI
- Data Visualization through charts, graph, trend lines etc

VI. RESEARCH PROCESS:

Research is conducted as per the following steps:

- Data of Macro Economic Factors like Repo Rate, CPI (Monthly Data) and GDP of India were analysed in order to find out the impact of Non-Performing Assets.
- Annual data of Gross Non-Performing Assets is collected from SBI's Annual Report from 2010-2018. Based on which NPA for 2019 is forecasted using Tableau.
- The same Methodology was used for PNB and all the commercial Banks of India.
- Tableau is a reliable tool for visualization and forecasting

A. Data collection:

DATA- GDP & REPO RATE:

Year	GDP (In USD Billion)	REPO RATE
2018	2,689.99	6.5%
2017	2,597.49	6%
2016	2,274.2	6.25%
2015	2,1024	6.75%
2014	2,039.1	8%
2013	1,856.72	7.75%
2012	1,827.64	8%
2011	1,823.05	8.5%
2010	1,656.62	6.25%
2009	1,323.94	4.75%

CPI DATA (MONTHLY):

GROSS NON-PERFORMING ASSETS OF SBI(ANNUALLY):

PNB	
Year	Gross NPA (Rs. In Crore)
2019	To be Forecasted
2018	2,23,427.46
2017	1,12,342.99
2016	98,172.8
2015	56,725.34
2014	61,605.35
2013	51,189.39
2012	39,676.46
2011	25,326.29
2010	20,825.22

GROSS NON-PERFORMING ASSETS OF COMMERCIAL BANKS (ANNUALLY)

COMMERCIAL BANKS	
Year	Gross NPA (Rs. In Crore)
2019	To be Forecasted
2018	12,250.12
2017	8,062.15
2016	7,902.68
2015	6,116.07
2014	3,229.16
2013	2,630.15
2012	1,927.69
2011	1,369.68
2010	939.97

B. Relation with respect to NPA:

1) Gross Domestic Product (GDP)

GDP of a country refers to the total market value of all final goods and services produced by it in a given year. This is equal to the total spending by the consumer, investors and the government. GDP indicates the growth of an economy. With the growth of GDP, loans, and advances also grow hence NPAs are directly affected. When the economy is down corporates will not be able to pay back the debts thereby NPAs will increase.

2) Repo Rate

The rate at which the central bank of a country, RBI in case of India, lends money to commercial banks when they face deficit of funds, is called as the Repo Rate. It is generally related to the Bank's Prime lending rate and the reverse repo and MLR. It indicates the prevailing interest rate in the country. Interest rate and inflation have a cumulative effect on the economy and ability of the borrower to pay back. Hence, repo rate is a crucial factor impacting NPAs.

3) Inflation

It is a measure of the average price which consumers spend on a market-based "basket" of goods and services. Inflation based upon the consumer price index (CPI) is the main inflation indicator in most of the countries. In India, Inflation rate is based upon the Indian Consumer Price Index. As inflation rises it becomes cheap for borrowers to borrow money. Due to inflation, the purchasing power of consumers fall leading to a drop in the profit for the companies. These factors in combination lead to rise of NPA's.

C. FORECASTING 2019 NPA USING TABLEAU:

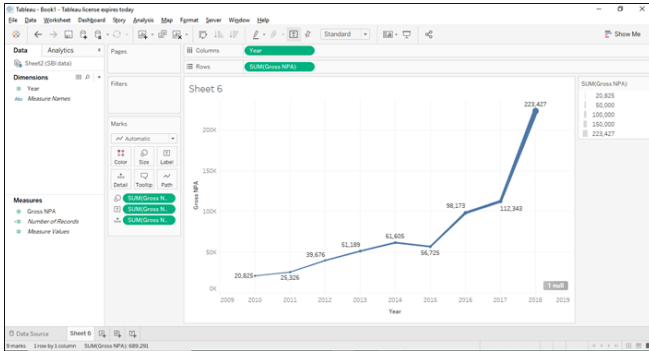
Tableau is used for visually analysing the data. Users can create and distribute an interactive and shareable dashboard, which depict the trends, variations, and density of the data in the form of graphs and charts.

Forecasting means predicting the future value of a measure. Various mathematical models have been used for forecasting. In this paper the model called **exponential smoothing** has been used. In this method recent observations are given relatively more weightage than older observations. It captures the trends evolving from the seasonality of the data and extrapolates them to produce values for the future.

D. Forecasting 2019 NPA for SBI, PNB and Commercial Banks

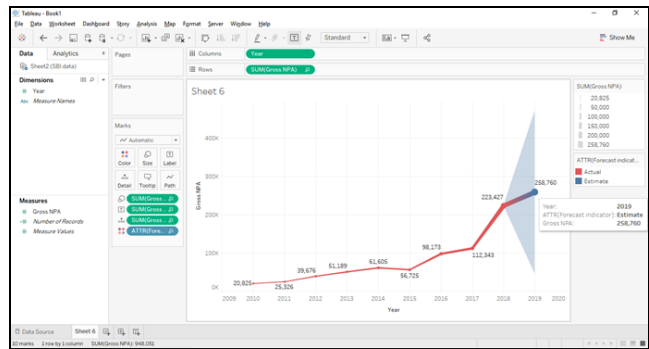
The data collected for SBI, PNB and Commercial Banks was imported in Tableau. Thereafter Trend Charts for depicting the Gross NPA performance over the years were created. Finally the Forecast Tool was implemented to forecast the NPA for 2019. The Trend Charts and the respective Forecast Charts for the three cases are depicted below.

SBI- Trend Chart for Gross NPA



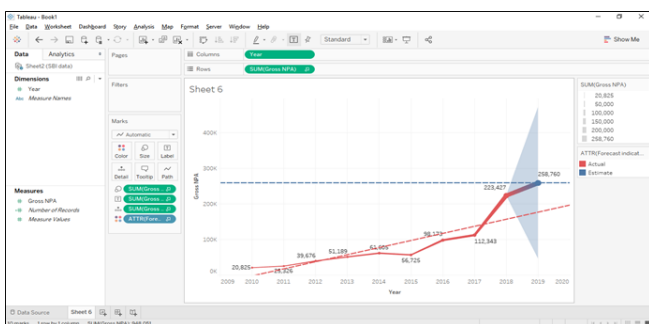
From the above chart we can see that NPAs are increasing Year on Year from Rs 20,825.00 crore in year 2009 to Rs 223,427 Crore in year 2018. There are various reasons for increasing NPA in India that we have discussed earlier.

SBI- Forecasted Trend Chart for Gross NPA-2019

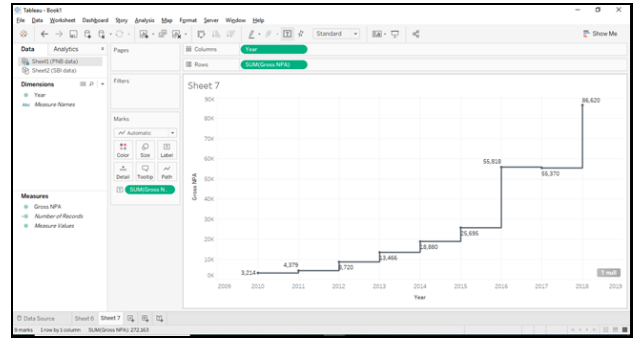


From the above Chart we can see that Tableau has forecasted NPA for the year 2019 for SBI as Rs.258,760 crore. The NPAs have increased from Rs. 20,825 crores in year 2010 to Rs. 258,760 crores in year 2019. It nearly is 15.8% higher than 2018. For the better visualization we have added trend lines in the chart.

SBI- Forecasted Trend Chart for Gross NPA-2019 with Trend Line

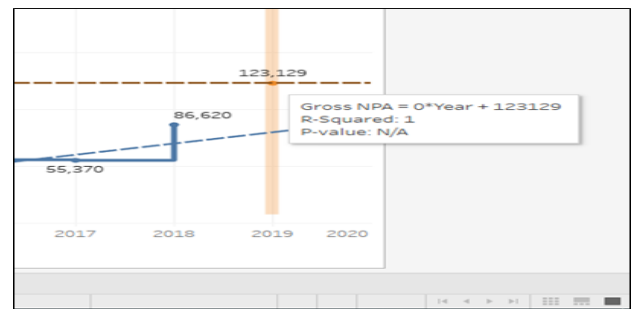
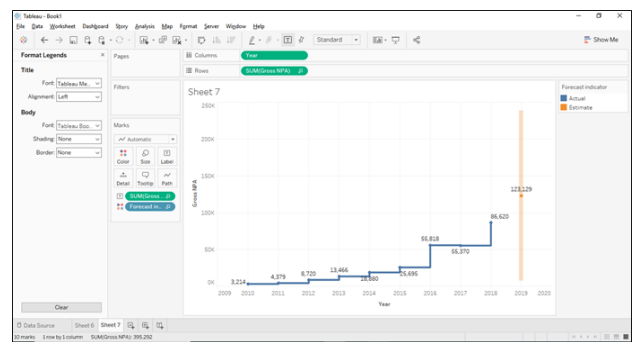


PNB- Trend Chart for Gross NPA



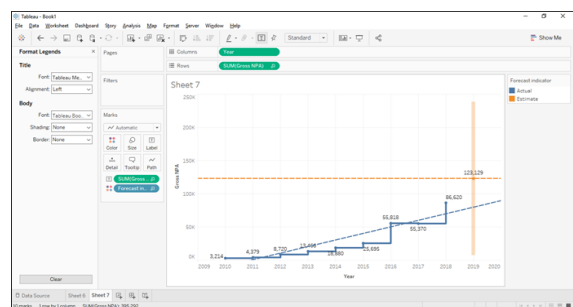
As per the above chart we can clearly see that NPAs for PNB are keep on increasing though the pace was slow in the years 2010 to 2012. However, the Pace increases in the later years.

PNB- Forecasted Trend Chart for Gross NPA-2019



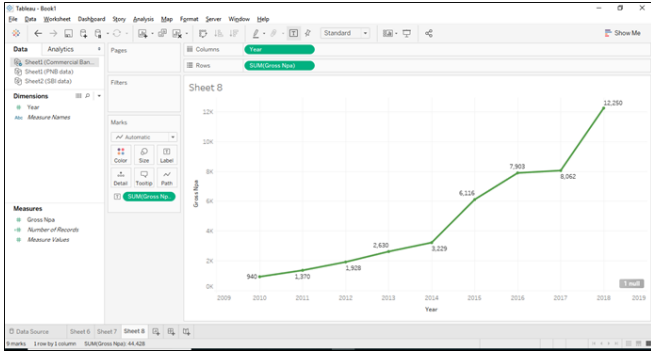
The above chart clearly shows the Forecasted NPA for PNB in 2019 as Rs. 123,129 Crore. It has increased from Year 2009 Rs. 3,214 crores to Rs. 123,129 Crores in year 2019. The forecasted amount for year 2019 is nearly 42% higher than NPAs in 2018

PNB- Forecasted Trend Chart for Gross NPA-2019 with Trend Line

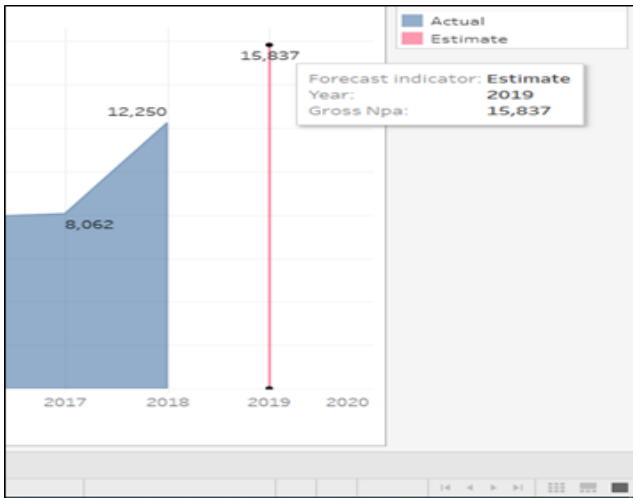
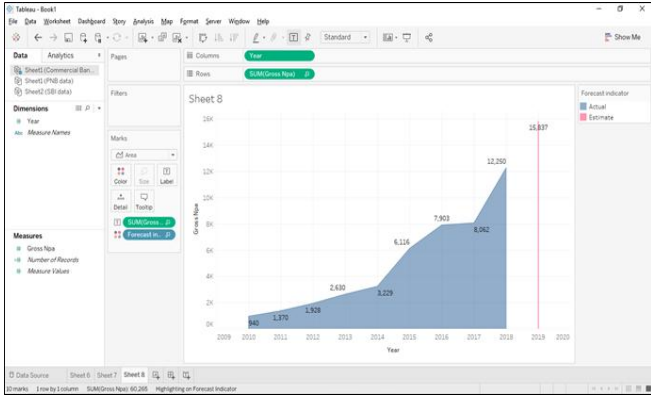


Forecasting Non Performing Assets for Indian Banking Sector

Commercial Banks- Trend Chart for Gross NPA



Commercial Banks- Forecasted Trend Chart for Gross NPA-2019



The NPAs forecasted for Year 2019 are Rs. 15,837 which is approximately 29% higher than NPAs in Year 2018.

VII. RESULTS & DISCUSSIONS

Combined Forecasted Result			
Year	SBI	PNB	Commercial Banks
2018	2,23,427	86,620.05	12,250
2019(Forecasted)	2,58,760	1,23,129	15,837
% change	15.8%	42.1%	29.3%

From the above table we can clearly compare the results and observe that percentage change in PNB's NPAs (2018 to 2019) is more than Commercial Banks and SBI. Between the two well-known public sector banks SBI and PNB, SBI seems to be performing better than PNB as per the above table.

VIII. CONCLUSIONS

This paper forecasts NPAs for Indian Banking sector with special emphasis on SBI and PNB. It has been predicted that if the current path was followed, the problem of NPAs would become a major problem with serious repercussions. As far as Indian Banking sector is concerned the Average Loans and advances for commercial Banks from year 2010 to year 2018 was Rs. 64,019.37 Crores while for SBI it was Rs. 11,97,927 crore and for PNB it was is Rs. 3,36,284.982 crores.

Gross Advances			
Year	Commercial Banks	SBI	PNB
2018	86,545.12	19,34,880.19	4,33,734.72
2017	84,767.05	15,71,078.38	4,19,493.15
2016	81,711.14	14,63,700.42	4,12,325.8
2015	75,606.66	13,00,026.39	3,80,534.4
2014	68,757.48	12,09,828.72	3,49,269.13
2013	59,718.2	10,45,616.55	3,08,725.21
2012	46,488.08	86,7578.89	2,93,774.76
2011	39,959.82	75,6719.45	2,42,106.67
2010	32,620.79	63,1914	1,86,601
Average	64,019.37111	11,97,927	3,36,284.982

The Forecasted NPA value for PNB in 2019 is Rs. 1,23,129 crores although the amount is less than other two banks. However, the pace of increasing NPA in PNB is higher than SBI and Commercial Banks. The results point that the banks must control NPAs to avoid the serious consequences in the future. The paper has elaborated various causes for NPAs and their possible resolutions that can possibly prevent a debt from turning into an NPA.

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AUTHORS PROFILE



Prof. (Dr.) Rinku Sharma Dixit, born and brought up in Delhi, India. She has completed her Ph.D (Computer Science) with specialization in Artificial Neural Networks for Pattern Recognition. She has completed her MCA, M. Tech (IT) and B.Sc (H) from Delhi, India. She has over 20 years of experience in academics and Industry. Her proficiency areas include

Artificial Intelligence, Artificial Neural Networks, Business Analytics, Databases, Networking, Machine Learning etc.

Dr. Dixit has authored various papers in reputed International and National Journals. She has been guiding Projects and Dissertations of Post Graduate and Ph.D students in Computer Science and Management. She has been on the panel of reviewers for a number of International Journals and International Conferences. She has been a resource person for a number of FDPs on various areas of research and technology as part of her academic career.



Prof. Shailee L. Choudhary, born and brought up in Delhi-NCR, India is currently pursuing her Ph.D (Computer Science) in Predicting Software Reliability from Bharathiar University, Coimbatore, India. She has completed her M.Tech (IT) and MCA(Gold Medalist) from India.

She has over 18 years of rich experience in Industry and Academics. She has been associated with organizations as Proxix Softron and HCL Infosystems as a Software Engineer. She was awarded the Faculty Excellence Award 2016 by Infosys. She has guided a number of M. Tech and MBA projects and dissertations.

Her proficiency areas include Business Analytics, Nature inspired algorithms , Data Mining and Visualisation , Machine Learning , Databases,Artificial Intelligence, Business Process Modelling etc. She has to her credit a number of papers published in reputed International and National Journals. She has been a resource person in a number of FDPs and MDPs on various emerging technologies as part of her academic pursuits.