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AN EMPIRICAL STUDY ON THE MOVEMENT OF NON-PERFORMING ASSETS (NPAS) IN INDIAN COMMERCIAL BANKS

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Abstract

Purpose: Indian economic growth and development rely greatly on the nation's financial institutions. The purpose of this research is to study the movements of NPAs in the Banking sector and to examine the impact of NPA Additions, Reductions, and Write-offs on bank NPAs. **Methodology:** This study compares the NPAs movements of the Statebank of India (SBI), and Bank of Maharastra (BOM) from Public Sector Banks (PSBs) and ICICI, Nainital Bank (NB) from Private Sector Banks (PSBs). The data consists of 15 years from 2007-08 to 2021-22. Data was gathered from annual reports and the RBI website. Compound annual growth rate (CAGR), and Descriptive statistics, were used for analysis. To test hypotheses ANOVA, t-test and Pannel Regression are calculated. **Findings:** The research found that there is an increasing trend in GNPA of all the SCBs. The increasing NPA additions put an additional burden on banks' profits and if profits are not sufficient to write off bad loans then the capital is used to write off. Mean GNPA growth rates were statistically significant across all time periods for SBI, NB, PSBs, PRSBs, and SCBs. Mean NNPA growth rates for SBI, BOM, ICICI, NB, and PRSBs were not statistically significant. There is no significant difference between sample banks and bank groups in Year-Over-Year Growth in % of GNPAs, and NNPAs. Panel Regression analysis also states that the Random Effect Model is appropriate to study the relationship among these variables. **Originality:** We promise that the work in this article is unique.

Keywords: Gross NPAs, Net NPAs, Public Sector Banks, Private Sector Banks, Scheduled Commercial Banks

1) INTRODUCTION

Every economy's growth is dependent on its financial system. Banking is the lifeblood of the economy since nothing else would function without it. Due to their essential role in sustaining a healthy economy, banks should be granted special rights. At the end of March 2001, the total amount of loans provided by Indian banks was 5.1 trillion, or 23.9% of India's GDP for that year. In September of 2022, the value reached 130.4 trillion dollars, or 50.3% of GDP **(Kaul, 2023)**. Indian economic growth and development rely greatly on the nation's financial institutions. In India, there are four types of scheduled commercial banks, viz., public, private, foreign, and rural regional. The Indian banking system relies on substantial quantities of money entering and exiting the country.

So far, the Reserve Bank's policy actions in 2021-22 and 2022-23 have been shaped by the rapidly shifting macro-financial environment, which has been impacted by several shocks, and the overarching aim of fostering a strong, resilient, and efficient financial system. The Indian banking system's robustness and endurance have been a major element in maintaining

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the country's relatively superior overall macro outlook, even as storm clouds gather over the global economy **(*Report on Trend and Progress of Banking in India 2021-22*, 2022).**

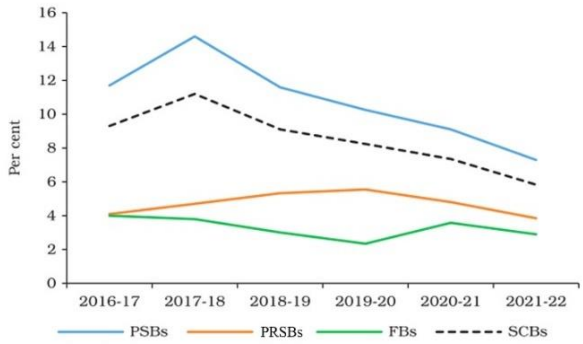

Figure 1: GNPA Ratio (at the end of March)

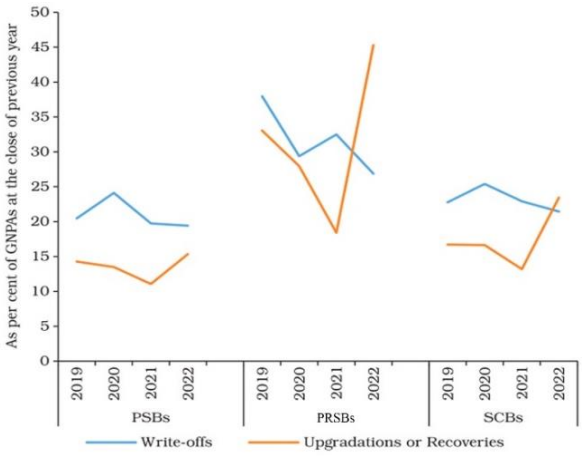

Figure 2: Reduction in GNPAs (at the end of March)

Source: Report on Trend and Progress of Banking in India 2021-22

NPAs have negative effects on loan deployment, banks' profitability (by increasing provisioning), banks' capital, and recovery costs. In 2017–18, the GNPA ratio of SCBs surged; by the end of September 2022, it will have dropped to 5%. Lower slippages and a drop in outstanding GNPAs due to recoveries, upgrades, and write-offs drove this decline. Written-off loans contributed heavily to PSBs' NPA decline in 2021-22, whereas loan upgrades were the dominant factor in PVBs' asset quality improvement that year. Written-off loans contributed heavily to PSBs' NPA decline in 2021-22, whereas loan upgrades were the dominant factor in PVBs' asset quality improvement that year **(*Report on Trend and Progress of Banking in India 2021-22*, 2022)**.

2) REVIEW OF LITERATURE

To explore the problem in depth, we endeavoured to collect data from previous research and relevant studies conducted in the field of the impact of NPAs on the banking industry. The literature review has been presented succinctly and accurately.

Nonperforming assets in agriculture loans were analysed by **(Hawaldar et al., 2020)**. According to a case study conducted in India, there is no discernible change in the way banks handle non-performing assets or the pre- and post-sanctioning of agricultural loans. Debt relief policies stated by political parties are to blame for an increase in nonperforming loans and willful default by borrowers.

(Kaur & Kumar, 2018) research, NPAs in the priority sector were greater in public and private banks before the crisis but declined afterwards. The study also showed that the crisis

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didn't affect the banking sector because nonperforming loans went down after the crisis ended. Nonperforming asset growth was more rapid in the private sector than in the public sector. NPA in non-priority industries was shown to be declining in public sector banks during the pre-crisis period, whereas it was increasing in private sector banks. After the crisis was passed, NPA growth accelerated. 2001-02 to 2007-08, or the "pre-crisis" years. Crisis-free years after 2008-09 through 2013-14.

(Banerjee, Verma, & Jaiswal, 2018) looked into nonperforming loans and recommended that financial institutions strengthen their credit recovery practices. They also urged that improved strategy development and execution should be prioritised. Banks should evaluate their customers' risk tolerance before extending credit to them. India's banking industry as a whole is negatively impacted by the prevalence of NPAs, hence the country's government should establish stringent regulations for the resolution or reduction of these problems.

(Sree Latha Reddy & Sivaram Naidu, 2017) found that GNPAs at all SCBs have been on the rise in recent years. There has been a decrease in standard assets and an increase in provisions. The rising provisions are placing more pressure on banks' profits, and if profits aren't enough to write off bad loans, capital is utilised instead. Because of this, the bank's capital structure is deteriorating and recapitalization is necessary. Research also shows that NNPA directly affects ROA and ROE. NNPA has an inverse relationship with both return on equity and return on assets. In terms of administrative costs, earnings, and time spent settling and following up, NPA affects a bank's operational, financial, and management efficiency. There is no simple answer to the problem of NPA.

Impact of demonetization on nonperforming assets of Indian banks, **(Meher, 2017)**, zeroes in on the potential effects of demonetization on this pressing problem in the banking sector. According to the findings, demonetization has had a favourable effect in the short run, with existing NPAs of banks decreasing by a small amount.

(Miyan, 2017) NPAs decreased over the study period, as he expected, but they remain significantly greater in public sector banks than in private ones, according to his research. Return on assets is also declining, with public sector banks faring worse than private ones.

(Swain, Sahoo, & Mishra, 2017) study determined that blocked funds had a substantial impact on the efficiency of banks. The government has created various recovery methods, including Lok Adalats, DRT, and the SARFAESI Act. The SARFAESI Act is the most effective measure for recovering NPA compared to other reforms. In contrast to delinquent NPAs, however, recovered amounts are grossly insufficient.

(Mishra, 2016) compared the NPAs in the priority and non-priority sectors over 10 years and found that the former accounted for more than half of the overall NPAs from 2006 to 2011, while the latter climbed in percentage terms from 2011 to 2015 to account for as much as 65.2% of the total NPAs. Nonetheless, annual gross NPA growth was also occurring. Although priority sector NPA as a percentage was falling, it was steadily rising in absolute terms. Despite a surge in NPAs, the priority sector nonetheless contributed to the country's socioeconomic progress.

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According to the **(Dahiya & Bhatia, 2016)** study's findings, financial institutions should use both official and informal channels to gather information about borrowers' creditworthiness and the efficient use of bank loans. Unless corrective measures are taken on time, NPA rates will continue to rise. Reducing nonperforming assets (NPA) should be a national goal as a means of strengthening the banking system and better preparing it to address the challenges posed by globalisation.

(Singh, 2016) According to his research, nonperforming loans are more prevalent in public sector banks even though the government has taken several measures to eliminate NPA. Nonperforming assets at international banks are lower than at Indian banks. There is no way to eliminate NPAs. The larger the borrower, the greater the risk of nonperforming loans. Reduced government priority landing is preferable. Getting through this is the biggest obstacle to getting better. Nonperforming assets (NPAs) are bad for the growth of the Indian economy and the profitability of banks.

(Gautami, Tirumalaiah, & Kumar, 2015) studied on "Factors Influencing NPAs in Commercial Banks: An Empirical Study," They found that there was no substantial difference in bankers' and borrowers' perceptions of the variables influencing non-performing assets (NPAs) in the sampled banks.

(Baijal, 2015) researcher analysed the systemic causes for the large quantity of NPAs in agriculture, as well as potential solutions. The problem of nonperforming assets could not be handled entirely through needless measures such as farm loan forgiveness, etc. It should be addressed by employing innovative technologies and machines that are effective at minimising NPAs.

(Narula & Singla, 2014) discovered that both Gross NPAs and Net NPAs are increasing annually. Total advances and net profit are rising annually. There is a positive correlation between NPA, total advances, and net income. This pairing is inappropriate. This occurs owing to poor bank management. NPA and Profitability have a positive correlation due to the bank's poor selection of borrowers. The liquidity of the bank is harmed. As non-performing assets (NPAs) have increased, banks are unable to make additional loans due to limited capital. To control NPA, they advised that both pre- and post-disbursement controls should be robust. Reducing NPA requires effective management. Appropriate borrower selection and follow-up are required to obtain repayments.

Education loans in India increased from 57 billion INR in 2005 to INR 437 billion in 2011, a 43.05 % rise in defaulters, according to a report by **(Varghese & Manoj, 2013)** titled Education Loan and Non-performing Assets: An Empirical Analysis. In 2011, there were 116 defaulters, down from 160 the year before. Investing in one's education is one of the best ways to cultivate HR.

Among the authors were **(Shenbagavalli, Senthilkumar, & Ramachandran, 2013)** Plan for handling public sector banks' nonperforming assets. The study authors analysed the factors that lead to nonperforming loans (NPAs) and proposed strategies to deal with this problem. Banks with nonperforming assets were urged to take measures such as conducting a thorough

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review of the company's financials. In-person meeting and inspection allows for questions and concerns to be addressed directly. An efficient loan monitoring Management Information System (MIS) can help find sick borrowers and accounts.

(Shalini, 2013) discovered through her research that farmers' loan repayment rates are affected by several different variables. Twenty variables were examined throughout the investigation. Only 16 of the 20 variables are related to farmers' ability to repay loans, while the other 4 have no bearing on their success. Telephone interviews were used for this purpose.

(Singh, 2013) found that nonperforming loans were the most significant indication of bank health. NPAs are high when there are many borrowers in default. Banks' productivity and profits are hampered by the excessive NPA rate. There is no way for a bank to have no nonperforming assets. The bank ought to provide financing for deserving borrowers. In addition, she argued that broad loan cancellations send the incorrect message to potential debtors and should be limited. These kinds of actions cause widespread deliberate default.

(Pradhan, 2012) discovered that the borrowers intentionally defaulted, and misappropriated the loan funds, and the judicial system contributed to the loan's nonperforming status. Since legal action takes more time, nonperforming assets (NPAs) tend to increase rather than decrease while negotiating a settlement with a bank. They also recommended checking technical feasibility and economic sustainability before approving a loan, as well as thorough processing and assessment of the loan amount. Nearly 82% of debtors deliberately stop making payments. The accurate evaluation of credit needs is essential.

3) OBJECTIVES OF THE STUDY

- To study the movements of NPAs in Scheduled Commercial Banks.
- To evaluate the growth rates of GNPAs and NNPAs in selected PSBs and PRBs.
- To examine the impact of NPA Additions, Reductions, and Write-offs on bank NPAs.

4) METHODOLOGY

This study compares the NPAs movements of Statebank of India (SBI), and Bank of Maharastra (BOM) from Public Sector Banks (PSBs) and ICICI, Nainital Bank (NB) from Private Sector Banks (PSBs). The data consists of 15 years from 2007-08 to 2021-22. Data was gathered from annual reports and the RBI website. By using Ms-Excel's Compound annual growth rate (CAGR), Descriptive statistics were used for analysis. To test hypotheses, SPSS v.27 (ANOVA, t-test) and by using STATA v.17 (Pannel Regression) are calculated.

4.1 Criteria for Selection of Sample Banks

The sample (SBI, ICICI) was selected based on the highest net worth of the banks under the PSBs & PRBs. The sample (BOM, NB) was selected based on the lowest net worth of the banks under the PSBs & PRBs. As SBI merged with all their subsidiaries the data collected pre-merger period is the sum of SBI & its subsidiaries.

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5) RESULTS & DISCUSSION

Table 1: CAGR of Gross NPAs Additions

Bank	2007-08 to 2011-12 (%)	2012-13 to 2016-17 (%)	2017-18 to 2021-22 (%)	Overall Result 2007-08 to 2021-22 (%)
SBI	29.20	21.27	-31.03	6.69
BOM	28.28	62.39	-17.57	15.47
ICICI	-4.14	56.38	-7.60	11.66
NB	16.22	8.78	24.53	17.17
PSBs	31.06	22.28	-22.12	12.44
PRSBs	5.22	41.69	3.16	20.52
SCBs	25.18	24.65	-14.05	14.97

Source: Authors Computations

Table 1 & Chart -1 shows the CAGR of gross NPAs additions for different banks and bank groups in India for various time periods. Bad debts at SBI, BOM, ICICI, and PSBs fell over the last five years (2017-18 to 2021-22), as measured by the CAGR of gross NPAs additions. This could be the result of successful efforts to recover money, write-offs, or a decrease in new slip-ups. Gross NPAs at NB, PRSBs, and SCBs all increased at a CAGR over the past five years.

Increasing defaults, diminished recoveries, or larger reserves may be to blame. In the second five-year period (2012-2013 to 2016-2017), BOM had the greatest CAGR of gross NPA additions (62.39%). This suggests that bad debts developed at a rapid rate during this time, which may have impacted profitability and capital adequacy. NB has the highest CAGR of gross NPA additions over the past five years (2017-18 to 2021-22), at 24.53 %. This indicates that its nonperforming loans (NPLs) rose fast over this time period, which may have posed a danger to the company's asset quality and solvency. Comparing the first five years (2007-08 to 2011-12), ICICI had the lowest CAGR for the addition of gross NPAs -4.14%.

During this period, it appears that bad debts declined, which bodes well for future profitability and stability. In the most recent five-year period (2017-18 to 2021-22), SBI has the lowest compound annual growth rate (CAGR) of gross nonperforming assets (NPAs), at -31.03%. This indicates that bad debts fell significantly throughout this period, which may have improved the company's profitability and resiliency.

Over the entire 15-year period (2007-08 to 2021-22), SBI's CAGR of gross NPAs additions was the lowest, at 6.69%. This may have helped the company maintain its viability and market share by indicating that its bad debts grew at a slow and steady rate over time.

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Table 2: CAGR of Gross NPAs Reductions

Bank	2007-08 to 2011-12 (%)	2012-13 to 2016-17 (%)	2017-18 to 2021-22 (%)	Overall Result 2007-08 to 2021-22 (%)
SBI	18.01	4.95	16.92	7.49
BOM	19.71	-0.16	-5.66	11.26
ICICI	58.49	24.53	12.69	32.83
NB	12.46	15.56	37.40	19.63
PSBs	16.32	9.01	2.84	10.05
PRSBs	10.10	24.76	17.00	23.53
SCBs	15.42	11.11	8.82	13.86

Source: Authors Computations

Table 2 shows the CAGR of gross NPAs reductions for different banks and bank groups in India for various time periods. The gross NPAs of SBI, ICICI, NB, and PSBs dropped at a higher CAGR over the last five years (2017-18 to 2021-22).

This could be the result of successful efforts to recover money, write-offs, or a decrease in new slip-ups. BOM's bad debts fell at a slower rate or even climbed during the past five years, as measured by its negative CAGR of Gross NPAs decreases. Increasing defaults, diminished recoveries, or larger reserves may be to blame. In the first five years (2007–08 to 2011–12), ICICI had the highest CAGR for reductions in Gross NPAs.

This indicates that bad debts declined rapidly throughout this time period, which speaks well for the company's future profitability and financial stability. In the previous five years (2017-18 to 2021-22), NB's Gross NPAs decreased at a CAGR of 37.40%. This may indicate that the company's performance and resiliency improved as a consequence of a significant decline in bad debts over this period.

In the second five-year period (2012-2013 to 2016-2017), BOM had the lowest CAGR of reductions in Gross NPA assets -0.16%. This indicates that its bad debts were virtually unchanged over this time frame, which may have had a detrimental effect on its profitability and capital adequacy.

During the preceding five years, PSBs' Gross NPAs dropped at a CAGR of 2.84% (2017-18 to 2021-22). The modest decline in bad debts throughout this time period raises concerns about the company's asset quality and solvency. Over the full 15-year period (2007-08 to 2021-22), ICICI had the highest CAGR of Gross NPA reductions at 32.83%. This suggests that its bad debts decreased at a steady and rapid rate over time, which may have contributed to its continued success and market dominance.

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Table 3: CAGR of Gross NPAs Write-off

Bank	2007-08 to 2011-12 (%)	2012-13 to 2016-17 (%)	2017-18 to 2021-22 (%)	Overall Result 2007-08 to 2021-22 (%)
SBI	76.10*	35.66	-13.32	45.22*
BOM	**	72.66**	4.85	36.17**
ICICI	***	49.26	3.93	21.57***
NB	0.00**	23.39	54.83	108.94**
PSBs	83.02	62.72	-1.56	57.38
PRSBs	350.90	38.09	11.54	98.97
SCBs	43.68	56.86	1.94	42.15

Source: Authors Computations

**** During 2007-08 SBI Gross NPAs write-off is NIL.***

***** During 2007-08 to 2013-14 BOM & NB Gross NPAs write-off is NIL.***

****** From 2007-08 to 2010-11 ICICI Gross NPAs write-off is NIL.***

The CAGR of Gross NPAs written down by major banks and bank groups in India is shown in

Table 3 Over the five-year period from 2017-18 to 2021-22, the Gross NPAs written down by SBI, BOM, ICICI, and PSBs fell at a CAGR below zero. More successful recoveries, stricter regulations for write-offs, and fewer fresh slipups are all possibilities. Over the previous five years, NB, PRSB, and SCB gross nonperforming assets have grown at a compound annual growth rate. This could be due to further slippages, slower recoveries, or an increase in the need for provisioning. The CAGR of Gross NPAs was highest for PRSBs in the first five years (2007-08 to 2011-12). This interest rate was 350.90%. This indicates that the amount it could write off increased at a fast rate throughout this time, which could have reduced its tax burden and improved its profitability. During the most recent five-year period (2017-18 to 2021-22), NB's Gross NPAs were written down at a compound annual growth rate of 54.83%. As a result, the company's asset quality and capital adequacy may have weakened during that time as the amount written off increased dramatically. SBI's Gross NPAs write-off has the lowest CAGR over the past five years (2017-18 to 2021-22).

This indicates that the level of bad debt during this time was substantially smaller, which could have boosted its efficiency and toughness. BOM had the lowest CAGR of gross NPAs write-off in the second five-year period (2012-2013 to 2016-2017), at a negative 0.16%. This indicates that the write-off amount for the company was relatively constant over this time period, which could have a deleterious effect on its profitability and solvency. The Gross NPA CAGR for PRSBs was highest between 2007-08 and 2021-22. This may have contributed to its success and market dominance because it indicates that the amount of money set aside for long-term write-offs was always growing. ICICI has the lowest CAGR of Gross NPAs write-off (21.57%) for the entire 15-year period (2007-08 to 2021-22). Because of this, it is possible that the company's capital and reputation were preserved even though the amount written off steadily increased over time.

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Table 4: CAGR of Gross NPAs Closing

Bank	2007-08 to 2011-12 (%)	2012-13 to 2016-17 (%)	2017-18 to 2021-22 (%)	Overall Result 2007-08 to 2021-22 (%)
SBI	25.51	23.15	-12.90	14.11
BOM	11.10	72.13	-21.98	13.80
ICICI	4.57	34.42	-8.96	10.37
NB	10.83	19.55	25.50	24.92
PSBs	23.84	32.92	-9.55	18.89
PRSBs	7.62	34.63	6.93	19.18
SCBs	20.47	32.48	-6.48	18.77

Source: Authors Computations

Table 4 shows the CAGR of gross NPAs closing for different banks and bank groups in India for various time periods. The Gross NPAs of SBI, BOM, ICICI, and PSBs fell over the last five years (2017-18 to 2021-22), with a negative compound annual growth rate (CAGR). Possible causes include fewer new defaults, fewer write-offs, and enhanced recovery efforts. Positive CAGR of Gross NPAs closed by NB, PRSBs, and SCBs during the past five years indicates an increase in total NPAs. Higher defaults, fewer recoveries, or more stringent provisioning needs could be to blame. With a CAGR of 72.13% between 2012-13 and 2016-17, BOM closed the most gross nonperforming loans (NPAs).

This suggests that its bad debts increased at a very rapid rate during this time, which may have impacted its profitability and capital adequacy. In the most recent five-year period (2017-18 to 2021-22), NB has the highest CAGR of closing Gross NPAs. This suggests that its bad debts continued to increase at a rapid clip at that time, which may have threatened its asset quality and solvency. As of the first five years (2007-08 to 2011-12), ICICI had the lowest CAGR of gross NPAs closing at 4.57%. Its earnings and financial stability may have improved as a result of the relatively low rate of growth in its outstanding bad debts throughout this time. The CAGR of closed Gross NPAs at SBI was the lowest over the past five years (2017-18 to 2021-22).

This suggests that it was able to drastically cut its bad loans during this time, which may have boosted its performance and resilience. Over the full 15-year period (2007-08 to 2021-22), PRSBs had the highest CAGR of gross NPAs closure (19.18%). This suggests that its bad debts have grown at a continuous and high rate over time, which could have harmed its financial stability and credibility. From 2007-08 to 2021-22, SBI had the smallest CAGR of closing gross nonperforming assets. This may have contributed to the company's long-term viability and market share by indicating that its outstanding bad debts rose at a low and constant rate.

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Table 5: CAGR of Net NPAs Closing Balance

Bank	2007-08 to 2011-12 (%)	2012-13 to 2016-17 (%)	2017-18 to 2021-22 (%)	Overall Result 2007-08 to 2021-22 (%)
SBI	18.92	28.10	-24.08	8.26
BOM	13.07	95.53	-33.26	11.36
ICICI	-11.82	62.43	-24.27	4.68
NB	*	19.37*	33.73	28.86*
PSBs	27.20	33.59	-19.38	15.49
PRSBs	-4.86	51.46	-7.44	14.62
SCBs	21.40	34.42	-17.08	15.11

Source: Authors Computations

**** During 2007-08 to 2014-15 NB Net NPAs Closing is NIL.***

Table 5 shows the CAGR of net NPAs closing balance for different banks and bank groups in India for various time periods. The net nonperforming assets (NPAs) of SBI, BOM, ICICI, and PSBs fell over the last five years (2017-18 to 2021-22), as seen by a negative CAGR. It's possible that better provisioning coverage or increased recovery efforts, write-offs, and reduced fresh slippages are to blame. Bad debts net of provisions held by NB, PRSBs, and SCBs all grew at a CAGR over the past five years. Possible causes include an increase in defaults, a decrease in recoveries, an increase in fresh slippages, or a decrease in provisioning coverage. In the second five-year period (2012-2013 to 2016-2017), BOM had the highest CAGR of net NPAs closing balance at 95.53%.

This suggests that, during this time period, its outstanding bad debts net of provisions grew at a very quick rate, which may have had an impact on its profitability and capital adequacy. In the last five years (2017-18 to 2021-22), NB has the greatest CAGR of net nonperforming assets (NPAs) at 33.73%. This suggests that its bad debts net of contingencies grew rapidly during this time, which may have threatened its asset quality and solvency. In the first five years (2007–08 to 2011–12), ICICI had the lowest CAGR of net nonperforming assets (NPAs) ending balance. The company's earnings and financial health may have benefited from the rapid drop in its bad debts after provisions during this time period. Net nonperforming assets at SBI grew at the slowest compound annual rate of growth (CAGR) throughout the most recent five-year period (2017-18 to 2021-22).

This suggests that its performance and resilience may have improved during this time because its outstanding bad debts net of provisions decreased dramatically. From 2007-08 to 2021-22, PRSBs had the greatest CAGR of net NPAs ending balance at 14.62%. This suggests that its outstanding bad debts after provisions increased at a continuous and high rate over time, which may have harmed its financial resources and credibility. Over the full 15-year period (2007-08 to 2021-22), ICICI had the lowest CAGR of net NPAs ending balance at 4.68%. This suggests that its long-term growth in bad debts net of provisions was moderate and consistent, which may have contributed to the company's viability and market share.

H_{01}: There is no significant difference between the sample mean YOY growth in % of GNPAs and hypothetical population mean YOY growth in % of GNPAs.

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Table 6: Year-Over-Year Growth in% of GNPAs

Years	SBI	BOM	ICICI	NB	PSBs	PRSBs	SCBs
2021-22	-11.37	-31.52	-18.48	-19.86	-12.07	-8.47	-10.95
2020-21	-15.23	-35.98	0.03	21.39	-9.10	-5.75	-7.19
2019-20	-13.70	-20.70	-10.61	38.07	-8.28	14.14	-3.92
2018-19	-22.68	-16.86	-14.21	131.80	-17.43	41.96	-9.93
2017-18	25.65	7.24	26.28	1.95	30.80	38.76	31.31
2016-17	45.78	65.50	60.78	37.61	26.81	65.89	29.39
2015-16	65.92	62.23	73.71	54.20	93.90	64.74	89.26
2014-15	-7.90	123.86	43.68	26.69	21.99	38.97	22.30
2013-14	27.14	151.40	9.35	-9.16	38.34	16.48	36.24
2012-13	30.21	-12.30	1.40	117.04	40.03	12.27	35.79
2011-12	58.64	10.51	-5.57	44.54	57.83	2.89	45.86
2010-11	29.15	-2.98	5.84	-8.45	24.59	3.40	15.67
2009-10	27.80	51.52	-1.75	23.39	33.30	4.21	23.96
2008-09	18.97	4.19	27.31	2.43	11.14	30.23	21.34
2007-08	-	-	-	-	-	-	-
Mean	**18.46**	**25.44**	**14.13**	**32.98**	**23.70**	**22.84**	**22.80**
MAX	**65.92**	**151.40**	**73.71**	**131.80**	**93.90**	**65.89**	**89.26**
Min	**-22.68**	**-35.98**	**-18.48**	**-19.86**	**-17.43**	**-8.47**	**-10.95**
SD	**27.42**	**55.66**	**27.38**	**43.02**	**29.22**	**23.44**	**25.76**
t	2.427	1.648	1.860	2.764	2.924	3.513	3.190
df	13	13	13	13	13	13	13
Sig. (2-tailed)	0.031	**0.123**	**0.086**	0.016	0.012	0.004	0.007

Source: Authors Computations

Table 6 shows the Year-Over-Year growth in % of gross non-performing assets (GNPAs) for different banks and bank groups in India from 2007-08 to 2021-22. The table can be interpreted as follows:

The GNPA growth rates of SBI, BOM, ICICI, and PSBs were all negative over the last four years (2018-19 to 2021-22), indicating a reduction in bad debts throughout that time. Possible causes include fewer new defaults, fewer write-offs, and enhanced recovery efforts. Except for the years 2013-14 and 2010-11 for NB and the years 2019-20 and 2018-19 for SCBs, GNPA growth rates were positive across the board for NB, PRSBs, and SCBs. In other words, their ratio of bad debts rose throughout those times. Higher defaults, fewer recoveries, or more stringent provisioning needs could be to blame. Over the entire period (2007-08 to 2021-22), the mean growth rate of GNPAs in NB was 32.98% is the highest compared to other banks. This suggests that its bad debts increased at a steady and rapid pace over time, which could have drained its resources and damaged its credibility. For the entire period, ICICI's mean growth rate in GNPAs was the lowest, at 14.13%. This may have helped the company maintain its viability and market share by indicating that its bad debts grew at a slow and steady rate over time. In 2015-2016, PSBs' GNPA growth rate of 65.92% was the period's highest maximum. This points to a rapid growth in bad debts during that year, which could have affected the company's capacity to turn a profit and remain solvent. In 2018-2019,

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ICICI's -22.68% GNPA growth rate was the lowest of any of the major banks. This suggests that bad debts fell sharply during that year, which bodes well for the company's prospects. The period's biggest standard deviation in GNPA growth rates was 55.66%, recorded by BOM. This suggests that the quality and stability of its assets may have been threatened by its bad debts fluctuating substantially over time. The standard deviation of ICICI's GNPA growth rates for the entire time was the lowest of any of the major banks, coming in at just 27.38%. This suggests that its bad debts fluctuated within a reasonable range over the long period, which may have allowed it to preserve its capital and public trust. Mean GNPA growth rates were statistically significant across all time periods for SBI, NB, PSBs, PRSBs, and SCBs, as indicated by one-sample t-test p-values of 0.05 or below (the common significance level). That's why we can rule out the possibility that their average annual growth rates were all equal to zero and instead draw the conclusion that they were significantly different from zero. The average growth rates of GNPAs for BOM and ICICI were not statistically significant during the entire time period (p-values > 0.05). As a result, we cannot conclude that their mean growth rates were different from zero and must instead accept the null hypothesis that they were equal to zero.

H_{02}: There is no significant difference between the sample mean YOY growth in % of NNPAs and the hypothetical population mean YOY growth in % of NNPAs.

Table 7: Year-Over-Year Growth in% of NNPAs

Years	SBI	BOM	ICICI	NB*	PSBs	PRSBs	SCBs
2021-22	-24.03	-49.83	-23.98	-20.93	-21.23	-21.03	-20.86
2020-21	-29.04	-38.62	-8.12	12.38	-14.93	-0.55	-10.82
2019-20	-21.28	-9.08	-26.22	-7.71	-19.01	-17.27	-18.50
2018-19	-40.56	-52.71	-51.66	421.62	-37.26	4.55	-31.83
2017-18	14.36	-14.14	10.34	-3.19	18.63	34.74	20.25
2016-17	40.70	64.37	94.53	42.48	19.58	79.10	23.81
2015-16	84.81	65.56	107.23	-	100.30	88.82	98.94
2014-15	-10.85	128.33	89.68	-	22.44	59.43	23.26
2013-14	48.80	359.96	47.85	-	45.09	47.83	44.54
2012-13	38.86	-16.32	19.87	-	51.60	36.20	51.36
2011-12	36.82	-24.13	-22.70	-	64.73	-0.70	56.00
2010-11	15.28	-6.56	-37.33	-	21.63	-31.88	6.83
2009-10	18.04	143.63	-15.65	-	40.12	-12.22	23.96
2008-09	27.74	7.03	30.46	-	18.61	31.26	27.64
2007-08	-	-	-	-	-	-	-
Mean	**14.26**	**39.82**	**15.31**	**74.11**	**22.16**	**21.31**	**21.04**
MAX	**84.81**	**359.96**	**107.23**	**421.62**	**100.30**	**88.82**	**98.94**
Min	**-40.56**	**-52.71**	**-51.66**	**-20.93**	**-37.26**	**-31.88**	**-31.83**
SD	**34.25**	**107.20**	**50.05**	**156.67**	**36.00**	**36.87**	**33.97**
t	1.501	1.339	1.103	1.058	2.220	2.083	2.233
df	13	13	13	5	13	13	13
Sig. (2-tailed)	**0.157**	**0.203**	**0.290**	**0.339**	0.045	**0.058**	0.044

Source: Authors Computations

**** During 2007-08 to 2014-15 NB Net NPAs Closing is NIL.***

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Table 7 The table shows the Year-Over-Year growth in % of net non-performing assets (NNPAs) for different banks and bank groups in India from 2007-08 to 2021-22. The table can be interpreted as follows:

Negative NNPA growth rates were recorded by SBI, BOM, ICICI, and PSBs during the last four years (2018-19 to 2021-22), indicating a decline in bad loans net of provisions. It's possible that better provisioning coverage or increased recovery efforts, write-offs, and reduced fresh slippages are to blame. Except for 2019-2020 and 2017-2018, NB's NNPA growth rates were positive in the vast majority of years. As a result, its bad debts after provisions rose throughout those times. Possible causes include an increase in defaults, a decrease in recoveries, an increase in fresh slippages, or a decrease in provisioning coverage. Except for the years 2020-21, 2019-20, and 2010-11, PRSBs saw increases in NNPAs in the majority of years. This suggests that its net bad debts grew during these time periods. Possible causes include an increase in defaults, a decrease in recoveries, an increase in fresh slippages, or a decrease in provisioning coverage. For the last four years (2018-2019 to 2021-22), SCBs' NNPA growth rates were negative, indicating a decline in bad loans net of provisions. It's possible that better provisioning coverage or increased recovery efforts, write-offs, and reduced fresh slippages are to blame. The average annual growth rate of NNPAs in NB was 74.11 from 2016-17 to 2021-22. This suggests that, even after accounting for provisions, its bad debts expanded at a rapid clip over time, which could have harmed its financial standing. Throughout the whole time frame, SBI had the slowest average growth rate in NNPAs at 14.26%. This may have contributed to its long-term viability and market share by indicating that its bad debts net of provisions grew at a low and constant rate. In 2018-2019, BOM's NNPA growth rate of -52.71% was the lowest of any of the major banks. This suggests that bad debts net of provisions fell significantly during that year, which may bode well for the company's future success and resiliency. Over the entire period, NB's NNPA growth rates had the biggest standard deviation at 156.67%. This suggests that the quality and stability of its assets may have been threatened by the significant long-term fluctuations in its bad debts net of provisions.

The standard deviation of SBI's NNPA growth rates was the lowest across the board, at just 34.25%. This suggests that its bad debts after provisions fluctuated within a reasonable range over the long term, which may have allowed it to keep its capital and customer trust. In a one-sample t-test, the p-values for PSBs and SCBs were both below 0.05, indicating that their mean NNPA growth rates were statistically significant across the whole time period (the common significance level). That's why we can rule out the possibility that their average annual growth rates were all equal to zero and instead draw the conclusion that they were significantly different from zero. Mean NNPA growth rates for SBI, BOM, ICICI, NB*, and PRSBs were not statistically significant during the entire time ($p>0.05$). As a result, we cannot conclude that their mean growth rates were different from zero and must instead accept the null hypothesis that they were equal to zero.

H_{03}: There is no significant difference between Sample banks and bank group in Year-Over-Year Growth in% of GNPAs, NNPAs

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Table 8: ANOVA

Banks			Sum of Squares	df	Mean Square	F	Sig.	Null Hypothesis
ICICI, NB, PRBS	YOY Growth of GNPAs	Between Groups	2491.62	2	1245.81	1.102	0.342	Accepted
		Within Groups	44092.21	39	1130.57			
		Total	46583.83	41				
	YOY Growth of NNPAs	Between Groups	34321.35	2	17160.68	2.095	0.137	Accepted
		Within Groups	319470.85	39	8191.56			
		Total	353792.20	41				
SBI, BOM, PSBs	YOY Growth of GNPAs	Between Groups	369.94	2	184.97	0.110	0.897	Accepted
		Within Groups	65847.59	39	1688.40			
		Total	66217.53	41				
	YOY Growth of NNPAs	Between Groups	4795.14	2	2397.57	0.478	0.623	Accepted
		Within Groups	195457.32	39	5011.73			
		Total	200252.45	41				
PsBs, PRBs, SCBs	YOY Growth of GNPAs	Between Groups	7.36	2	3.68	0.005	0.995	Accepted
		Within Groups	28940.78	39	742.07			
		Total	28948.14	41				
	YOY Growth of NNPAs	Between Groups	9.65	2	4.83	0.004	0.996	Accepted
		Within Groups	53340.52	39	1367.71			
		Total	53350.17	41				

Source: Authors Computations

For Year-Over-Year (YOY) Growth of GNPAs & NNPAs among Sample banks and bank groups the p-value is greater than 0.05. This means that we cannot reject the null hypothesis and we have to accept that there is no significant difference between sample banks and bank groups in the Year-Over-Year Growth in% of GNPAs, and NNPAs.

Panel Data Regression Analysis

To get a more robust result, we have performed a panel data regression, where GNPAs Closing is taken as the dependent variable and GNPAs Additions, GNPAs Reductions, and GNPAs Write-off is taken as independent variables. The equations used for all the four cases are as follows:

For Fixed Effect Panel Regression:

$$GNPA = \beta_0 + \beta_1 GNPAs_{Additions} + \beta_2 GNPAs_{Reductions} + \beta_3 GNPAs_{Write\ off} + \varepsilon \ \ldots\ldots \ (Eq.1)$$

Where; **GNPA** = Gross Non-Performing Assets Closing, **ε** = error term

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For Random Effect Panel Regression:

$$GNPA = \beta_0 + \beta_1 GNPAs_{Additions} + \beta_2 GNPAs_{Reductions} + \beta_3 GNPAs_{Write\ off} + \varepsilon + \mu \ldots\ldots (Eq.2)$$

Whare; **GNPA** = Gross Non-Performing Assets Closing, **ε** = within entity error term, μ = between entity error term

H_{04}: The preferred model is random effects on GNPAs during the study period.

H_{a4}: The preferred model is fixed effects on GNPAs during the study period.

The result of, the fixed effect model and random effect model is shown below:

Random Effect Model shows a positive relationship between GNPA additions, and GNPA reductions on GNPAs Closing as expected. R-square is 0.9778 higher positive to this model. 'rho' is known as the intraclass correlation 0% of the variance is due to differences across panels. The z-statistics of GNPA additions and GNPA Witeoff variables are significant at 1% ($p < 0.01$) and chi-square also significant at 1% ($p < 0.01$).

Fixed Effect Model shows a positive relationship between GNPA additions, and GNPA reductions on GNPAs Closing as expected. R-square is 0.9780 higher positive to this model. 'rho' is known as the intraclass correlation 28.87% of the variance is due to differences across panels. The t-statistics of GNPA additions and GNPA Witeoff variables are significant at 1% ($p < 0.01$) and F-statistic is also significant at 1% ($p < 0.01$).

As we know, the null hypothesis of the Hausman Test is Random Effect Model is appropriate and, in this case, the probability value is greater than 0.05, therefore, we cannot reject the null hypothesis. Hence, we can say that the Random Effect Model is appropriate to study the relationship among these variables. Therefore, we can say that, beyond doubt, GNPAs Closing of different sample banks (taken here) is positively affected by the level of GNPA additions, GNPA reductions and GNPA write-offs.

6) CONCLUSION

Indian banks have long struggled with the effects of nonperforming assets. It's an issue for the economy as a whole, not just the banking system. Since Indian banks rely heavily on interest income from loans made, NPAs have a direct effect on the bank's bottom line. According to the results of this research, the amount of nonperforming loans is notably higher in public sector banks. The analysis finds that the GNPA of all SCBs is on an upward trend. Standard assets are decreasing while additions are rising. Increasing NPA additions place a greater drain on bank earnings, and if profits are insufficient to write down bad loans, capital is utilised instead. This degrades the bank's capital structure, necessitating a recapitalization.

Mean GNPA growth rates were statistically significant across all time periods for SBI, NB, PSBs, PRSBs, and SCBs. Mean NNPA growth rates for SBI, BOM, ICICI, NB, and PRSBs were not statistically significant. There is no significant difference between sample banks and

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bank groups in Year-Over-Year Growth in% of GNPAs, and NNPAs. Panel Regression analysis also states that the Random Effect Model is appropriate to study the relationship among these variables. Therefore, we can say that, beyond doubt, GNPAs Closing of different sample banks (taken here) is positively affected by the level of GNPA additions, GNPA reductions and GNPA write-offs. There is no simple answer to the problem of NPA. As quickly as feasible, the government, the RBI, and the banks must come up with an acceptable strategy to minimise NPAs and prevent shortfalls. We should thank the government for programmes like the Debt Recovery Tribunals (DRTs) and the Lok Adalats as well as laws like the SARFAESI Act of 2002 and the Insolvency and Bankruptcy Code (IBC, 2016). Last but not least, it is important to realise that completely eradicating NPAs is impossible. However, proactive mechanisms may be devised to limit NPAs to a manageable level.

LIMITATIONS

1) During post-merger Banking sector suffered from COVID-19 was ignored in this study.
2) As SBI merged with all their subsidiaries the data collected pre-merger period is the sum of SBI & its subsidiaries.

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