Impact of Non-Performing Assets on Financial Performance of Selected Merged Indian Public Sector Banks

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Abstract

Purpose : The Government of India (GOI) restructured 13 public sector banks (PSBs) into five by amalgamation in recent years. The basis of their merger was not in the public domain. However, it was understood that the underlying reason was to obviate the need for repeated recapitalization of these banks due to the deterioration of their financials and the resultant erosion of their capital. The rising non-performing assets (NPAs) seemed to have impacted the financial performance of banks adversely, necessitating their restructuring. Therefore, the consolidation of the public sector banks aimed to make them bigger and stronger, enabling them to gain operational efficiency and access the market for their capital requirements. This study analyzed the impact of gross NPA (GNPA) on important financial ratios of public sector banks, including profitability ratios like ROA, ROE, and NIM, through correlation and regression analysis. An attempt was also made to find similarities in financial performance among different groups of amalgamated banks.

Methodology : The sample of two merged bank groups with Punjab National Bank and Union Bank of India as anchor banks were put to statistical tests on the basis of secondary data for the period from 2011–2020. Tools like ratio analysis, descriptive stats, Pearson correlation, and linear regression were used to evaluate the extent to which GNPA impacted the financial performance of PSBs.

Findings : The results indicated a negative correlation between the GNPA of PSBs and other key financial variables like CD ratio, NIM, ROA, ROE, and CAR. Also, the study highlighted the merger of weaker public sector banks with stronger ones.

Practical Implications : On the basis of the factors and model of our study, the Government of India can decide to restructure some more banks in the future by way of mergers with banks already restructured or through the privatization route as earlier announced by the Finance Minister in her Budget speech of 2021.

Originality : The earlier studies focused on finding the impact of financial indicators on the growth of NPAs; whereas, this study attempted to explore the negative effect of GNPA on the financial performance of banks.

Keywords : restructuring, PSBs, GNPA, merger, recapitalization

JEL Classification Codes : G20, G21, G28

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I ndian banking has witnessed a significant transformation over the years. The entire country now has a vast network of bank branches of public sector banks (PSBs) and private banks besides fintech companies. The share of PSBs is decreasing in credit dispensation among the Scheduled Commercial Banks. Having faced a bankruptcy-like situation by PSBs due to burgeoning NPAs and the resultant capitalization needs of these banks out of budgetary allocations, the government felt the need to reduce the number of PSBs by amalgamation to make them bigger.

After nationalization with a vast branch network across India, banks had easy access to household savings of the masses. Besides loans to traders, small-scale industry, and agriculture, banks innovated "Retail Banking" and "Corporate Loans" for bulk deployment of funds. As volumes of credit disbursements became large, banks started failing in credit monitoring to ensure the end use of the majority of such loans. With the easy availability of loans, the growing financial needs of society, and the consequent diversion of funds, bad loans surfaced with non-payment on due dates by the borrowers under various segments.

After the global crisis of 2008, the public sector banks with a majority government shareholding assumed the lead for the development of the economy by financing a huge number of infrastructure and service projects like roads, ports, airports, and hotels. These banks mainly financed the highly capital-intensive industrial sectors like iron and steel, cement, coal and iron ore mining, and power generation projects. Many of the promoters of new projects did not possess the requisite experience in the area of new investment/project. The spurt in advances of PSBs during this phase is described in Figure 1.

It can be observed that the advances grew more than double in a short span of four years from 2008–2012 and continued to rise even though PSBs did not have adequate appraisal teams to assess the viability of the greenfield projects. Also, these banks did not have long-term funds to finance the infrastructure and industrial projects with long gestation. When the repayment of such big-value loans commenced, the banks had to take cover under various debt restructuring schemes of RBI to defer the date of commercial operations (COD) to avoid slippage of loans to NPAs.
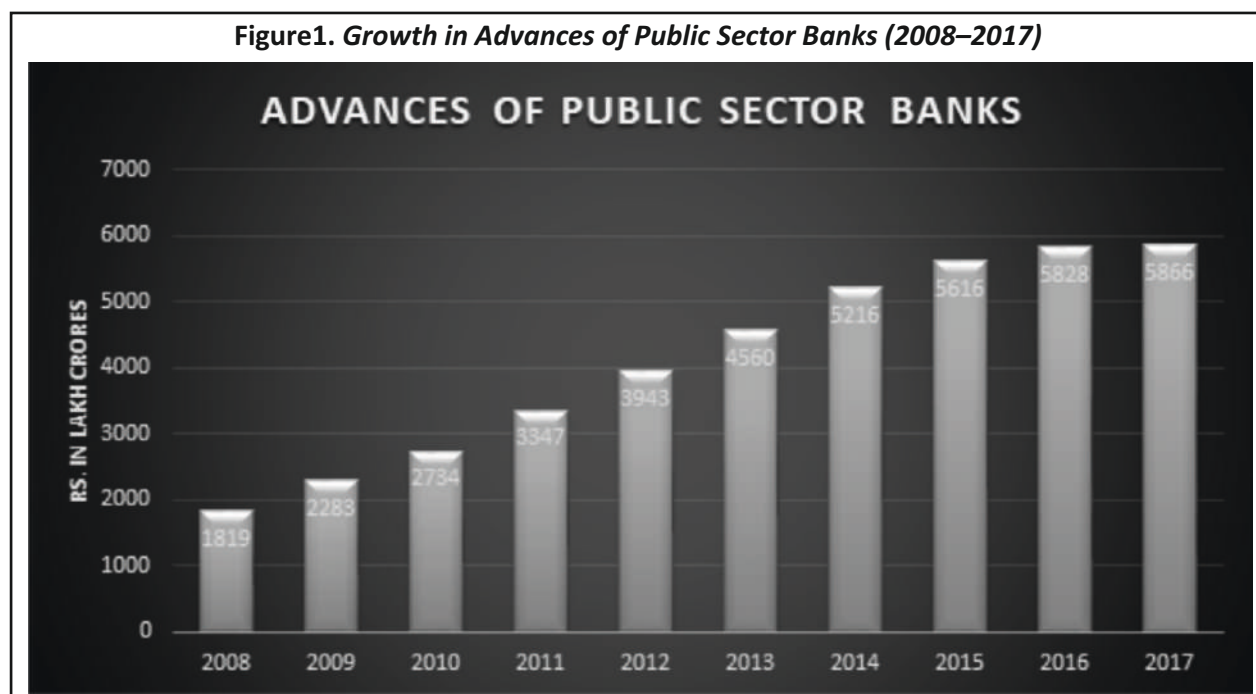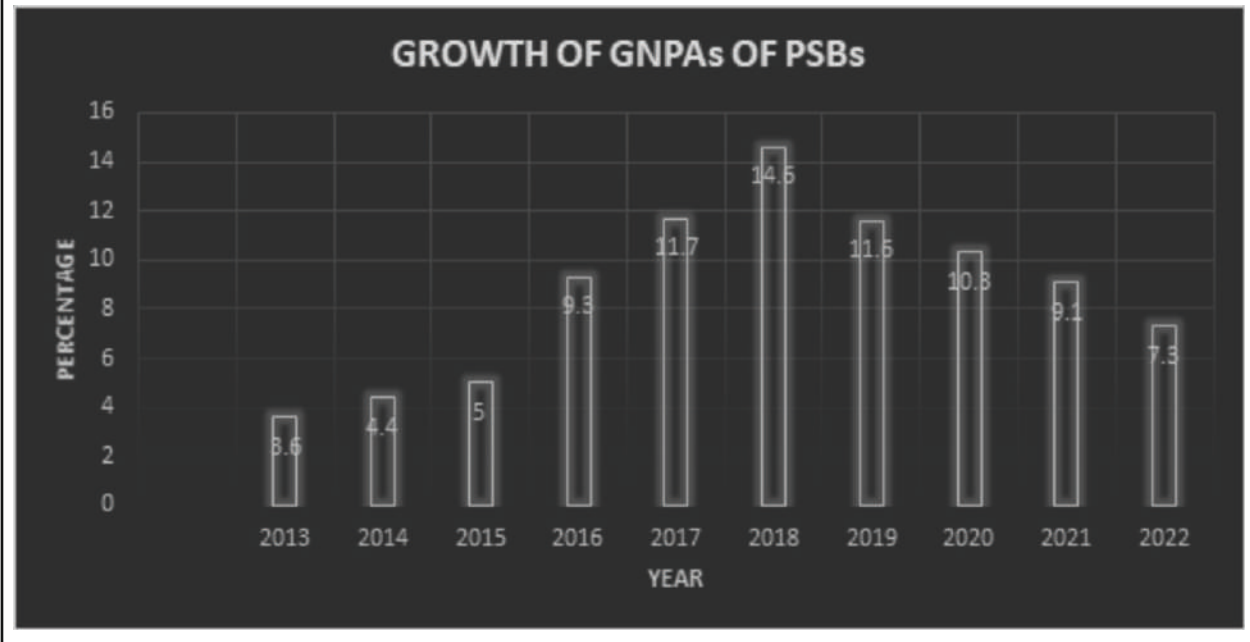
Figure1. *Growth in Advances of Public Sector Banks (2008–2017)*

Figure 2. *Growth in Non-Performing Loans of Public Sector Banks*

With the regulator issuing a diktat to stop forbearance and usher in the transparency of the health of loan portfolios by closing the restructuring window in 2015, there was a sharp rise in NPAs, as depicted in Figure 2.

It can be observed that GNPAs, which remained at less than 4% of gross advances in 2013, started looking up when the repayment of corporate loans started, and after the end of forbearance (withdrawal of Loan Restructuring Schemes) in 2015, rose to an alarming 14.6% of total loans of PSBs by 2018. There has been a steady decline in the GNPAs of public sector banks in subsequent years.

Recapitalization of Public Sector Banks

As banks could not book interest income on NPAs without actually recovering it from borrowers, there was no internal capital accretion by way of plowing back profits which vanished with the rising bad loans. The "Indradhanush" plan was announced in 2015 by GOI to revamp the PSBs. As part of the plan, a capitalization program was initiated to ensure that PSBs remain BASEL–III compliant.

Between FY 2013–14 and 2019–20, the government of India induced a massive ₹ 3.14 lakh crore in different PSBs. But for this, many PSBs would have faced an insolvency-like situation. Since the failure of a single bank may shake the faith of depositors (Creditors), it can also lead to a systemic failure. In a bid to improve the performance of PSBs, the government exercised one of the options of restructuring by merger/amalgamation of public sector banks.

The Amalgamation of Public Sector Banks

The stated major objective of the government for these mergers is to make PSBs bigger, stronger, and internationally competitive, which can access capital markets directly for their capital needs besides cost reductions by economies of scale. The government merged associate banks of SBI and Bhartiya Mahila Bank in

Table 1. *Restructuring of Public Sector Banks in 2020*

Anchor Bank	Amalgamating Banks	Business Size at the Time of Merger
Punjab National Bank	OBC and United Bank of India	₹ 17.94 lakh crore
Canara Bank	Syndicate Bank	₹ 15.20 lakh crore
Union Bank of India	Andhra Bank and Corporation Bank	₹ 14.59 lakh crore
Indian Bank	Allahabad Bank	₹ 8.08 lakh crore

Source : MOF, Government of India.

SBI in 2017 (SBI is now among the top 50 banks in the world). Similarly, Dena Bank and Vijaya Bank merged with Bank of Baroda with effect from April 1, 2019. Furthermore, undeterred by the criticism of merging PSBs, the finance minister announced mega-mergers effective April 1, 2020, as per Table 1.

Review of Literature

Most of the research studies on the financial performance of banks pertain to CAMELS rating, while some relate to post-merger benefits to the amalgamated entity. Similarly, many researchers have tried to study the NPA position of banks. However, they have confined themselves to the data pertaining to NPAs and elaborated on the reasons for the increase in NPAs. Also, the impact of macroeconomic factors on the generation of NPAs in the banking system is the subject of many studies.

Singh and Singla (2016) evaluated new private sector banks (HDFC Bank, Axis Bank, IndusInd Bank, Development Credit Bank, ICICI Bank, Kotak Mahindra Bank, and Yes Bank) using the CAMEL rating model. They found that private sector banks established earlier (like IndusInd Bank and ICICI Bank), in comparison to others, had better capital adequacy, better management efficiency, and better liquidity. Meghani et al. (2015) used 14 ratios in the CAMEL model. They observed that the average figures of Bank of Baroda were the best for six ratios, followed by Punjab National Bank for five ratios, and therefore, concluded that Bank of Baroda was the best bank in the selected public sector banks. Most researchers used such CAMELS analysis to compare the performance of select public and private sector banks or the after-the-merger effect on the financials of amalgamating banks.

Beck et al. (2013) studied the reasons for NPAs in a set of 75 countries. They concluded that a decline in global economic activity was banks' dominant risk for asset quality. Still, the same could not be expected to fully explain the rise of NPAs across different countries over different time horizons. Additional factors like the decline in stock prices, depreciation of the currencies, and rising interest rates negatively affected the asset quality, generating a pile of non-performing loans. Budhedeo and Pandya (2018) studied the financial performance of PSBs in two phases— Phase I being the period immediately following reforms (1995–96 to 2006–07) and Phase II coinciding with the post-global financial crisis period (2007–08 to 2016–17). The study concluded that all indicators of financial performance of the PSB group showed positive trends during the first phase, whereas falling trends were observed over the second phase. Ari et al. (2019) found a close relationship between NPL problems (elevated and unresolved NPLs) and the intensity of post-crisis recessions. It is also established that unabated credit growth and high corporate debt with short maturity are key risk factors for the growth of NPLs.

Syed and Tripathi (2020) studied the impact of macroeconomic factors like inflation, growth rate, interest rate, unemployment, and exchange rate vulnerabilities on NPAs of PSBs, private and foreign banks. It was found that for PSBs, all factors were significant; for private banks, inflation, growth rate, and interest rate were significant. However, foreign banks were impacted more by exchange rate fluctuations. Anita et al. (2022) empirically evaluated the relationship between the macroeconomic performance and banking system across SAARC

countries for 2008–2019. They observed slower economic growth, low inflation, and sluggish money supply growth to be responsible for high NPLs.

Contrary to this view, only a few studies confined to the impact of financial indicators on NPAs of banks or, conversely, the impact of NPAs on a single ratio like return on assets (ROA) or net profit of the bank concerned. Ahmad and Jegadeeshwaran (2013) analyzed data for five years by mean, CAGR, and net NPAs of nationalized banks to find their varied efficiency in managing NPAs. Murari (2014) observed that the ratio of gross NPAs to total advances of public and private banks declined from 12.4%–2.1% during 2001–2013 due to better management. Gupta and Jaiswal (2020) studied three public sector banks (SBI, Bank of Baroda, and PNB) and three private sector banks (HDFC Bank, ICICI Bank, and Axis Bank). They established that private sector banks were more successful in controlling the NPAs than their public sector counterparts. Khurana and Khosla (2019) observed that the feeble impact of NPAs on allocative efficiency pointed toward their weak impact on cost efficiency. It is derived that the increasing NPAs are forcing banks to reduce their input costs and therefore contributing meagerly to improve the cost efficiency of commercial banks in India. Arasu et al. (2019) studied the gross and net NPA of 10 public and private sector banks from April 2014–March 2018 and found a significant negative relationship between NPA with ROA of public and private sector banks.

Valliammal and Manivannan (2018) studied the impact of NPAs of the banks only on the net profit of selected banks. It was found that there was a significant impact of NPAs on profitability. Gulati (2018) analyzed secondary data regarding profitability and NPAs of different banking groups for a period of 20 years, viz., from 1997–98 to 2016–17. To study the impact of NPAs on profitability, the researcher used the statistical technique of linear regression. It was concluded that the highest impact of NPA on profitability was observed in public sector banks, whereas the effect was lower in other banking groups. Wajid et al. (2019) concluded in their study of the merger of the Bank of Rajasthan with ICICI Bank that profitability ratios like ROA and ROE exhibited an increasing trend in the post-merger period. The same improving trend was observed in efficiency ratios selected for the study, which included interest income and operating profit as a percentage of working funds.

Need of the Study and Research Gap

There are no studies available to establish the impact of GNPAs on the financial performance of PSBs in recent years and to explore the possible basis of their merger in different groups. This study investigates two major bank groups, with Punjab National Bank and Union Bank of India as anchor banks. It fills this research gap by evaluating the impact of GNPA on key financial ratios. The ratios on which the impact of GNPA is assessed represent liquidity, profitability, and operational efficiency, making a comprehensive analysis supplemented by statistical validity.

Objectives of Study

Many studies are available, as discussed in the Review of Literature, on CAMELS rating of banks or the impact of a single financial ratio (mainly ROA) on NPAs of public and private sector banks. However, no study is available to evaluate the impact of GNPA on important financial ratios of public sector banks in recent years.

Accordingly, the objectives of our study are:

✆ To study the impact of GNPA on the financial performance of selected restructured (merged) public sector banks.

✆ To understand the financial strength of individual banks in groups of restructured public sector banks and the basis of their merger.

Research Methodology and Analysis

For study purposes, GNPA was taken as the independent variable. Other variables employed in our study were CD ratio, CASA, NIM, non-interest income (NII), ROA, ROE, cost of funds, capital adequacy ratio (CAR), and cost to income (CTI).

The financial performance of six PSBs was analyzed using analytical tools like ratio analysis, descriptive statistics, correlation, and regression analysis. These banks were divided into the PNB group and the Union Bank of India group, named after the anchor banks. The secondary data for analysis were obtained from the Reserve Bank of India, economic papers, and economic websites like Moneycontrol.com for the relevant period of 2011–2020, when significant credit growth with a resultant increase in non-performing assets occurred. The financial performance was evaluated to the date of amalgamation of different banks in two groups.

Analysis of Financial Ratios and Descriptive Statistics of the PNB Group

Punjab National Bank (Anchor Bank), Oriental Bank of Commerce, and United Bank of India were amalgamated with effect from April 1, 2020.

It can be observed from Table 2 that the gross NPA of PNB, which was only 1.79% in 2011, reached an alarming proportion of 18.38% in 2018. The CD ratio also decreased by 10% to around 67% in the years before the merger. NIM, which was a healthy 3.50% in 2011, came down to 2.01%. The two most important financial ratios indicating the bank's profitability (ROA and ROE) touched a low of –1.60% and –29.54%, respectively, in 2018 under the impact of rising GNPAs. Capital adequacy ratio (CAR) also hit a low of 9.20% in 2018 despite the government's recapitalization of 40,933 crores between 2013–14 and 2019–20.

It can be observed from Table 3 that the gross NPA of OBC, which was only 1.98% in 2011, reached a high of 17.63% in 2018. CASA ratio, which represents low-cost deposits for a bank, had consistently been hovering over a poor range of 25–30% for the entire study period. Similarly, ROA and ROE, which were above the benchmark values of 1% and 15% in 2011, touched a low of –2.31% and –45.33%, respectively, in 2018 under the impact of

Table 2. *Financial Ratios of PNB (2011–2020)*

										(Figures in Percentage)
Year	Gross NPA	Credit Deposit Ratio	Current & Savings Deposits (CASA)	Net Interest Margin (NIM)	Non-Interest Income	Return on Assets (ROA)	Return on Equity (ROE)	Cost of Funds	CAR	Cost to Income
2011	1.79	77.38	38.45	3.50	1.07	1.34	22.60	4.95	12.42	41.27
2012	3.15	77.39	35.34	3.21	1.00	1.19	19.80	6.06	12.63	39.75
2013	4.27	78.86	39.16	3.17	0.90	1.00	15.70	6.38	12.72	42.81
2014	5.25	77.38	38.30	3.14	0.89	0.64	9.75	5.82	11.52	45.06
2015	6.55	75.90	36.66	2.87	1.02	0.53	8.17	5.69	12.21	46.74
2016	12.90	74.55	37.17	2.41	0.94	–0.61	–10.27	5.54	11.28	46.79
2017	12.53	67.47	41.82	2.16	1.29	0.19	3.30	5.06	11.66	39.17
2018	18.38	67.54	40.99	2.01	1.20	–1.60	–29.54	4.84	9.20	56.75
2019	15.50	67.79	42.16	2.23	0.96	–1.25	–23.24	4.82	9.73	47.03
2020	14.21	67.04	42.97	2.17	1.16	0.04	0.63	4.95	14.15	56.47

Table 3. *Financial Ratios of OBC (2011–2020)*

										(Figures in Percentage)
Year	Gross NPA	Credit Deposit Ratio	Current & Savings Deposits (CASA)	Net Interest Margin (NIM)	Non-Interest Income	Return on Assets (ROA)	Return on Equity (ROE)	Cost of Funds	CAR	Cost to Income
2011	1.98	68.97	24.56	2.80	0.64	1.03	15.55	5.86	14.23	27.85
2012	3.17	71.80	24.13	2.49	0.73	0.67	9.91	7.58	12.69	25.29
2013	3.21	73.31	24.55	2.49	0.87	0.71	10.74	7.54	12.04	25.97
2014	3.99	71.88	24.31	2.44	0.92	0.56	8.70	7.22	11.01	28.30
2015	5.18	71.20	24.20	2.26	0.94	0.23	3.65	7.22	11.41	29.10
2016	9.57	71.26	25.22	2.29	0.75	0.07	1.09	6.89	11.76	32.00
2017	13.73	71.90	30.50	1.99	1.12	–0.46	–7.53	5.97	11.64	41.38
2018	17.63	65.77	31.68	1.85	1.15	–2.31	–45.33	5.72	10.50	65.23
2019	12.66	68.53	29.40	2.18	1.06	0.02	0.36	5.33	12.73	39.50
2020	12.67	68.65	30.61	2.08	1.19	–0.83	–12.71	5.53	11.55	N. A

rising GNPAs. The cost of funds continued to be high since 2012. Capital adequacy also took a hit and came down to a low of 10.50%, and cost to income, which is an important ratio for determining a bank's profitability, rose to a high of 65.23% in 2018 under the impact of NPAs. It can be easily understood that the financial performance of OBC was quite worse than PNB over a 10-year period before the merger.

From Table 4, it can be observed that the GNPA of the United Bank of India was the worst in the group. From a low of 2.51% in 2011, it touched 24.10% in 2018, indicating that one-fourth of bank advances were bad assets. Whereas the CD ratio reached a low of 48.32% in 2018, ROA and ROE reached lows of –4.17% and –69.49%,

Table 4. *Financial Ratios of United Bank of India (2011–2020)*

										(Figures in Percentage)
Year	Gross NPA	Credit Deposit Ratio	Current & Savings Deposits (CASA)	Net Interest Margin (NIM)	Non-Interest Income	Return on Assets (ROA)	Return on Equity (ROE)	Cost of Funds	CAR	Cost to Income
2011	2.51	68.73	40.78	2.60	0.76	0.66	11.74	5.51	13.05	32.70
2012	3.41	70.74	40.77	2.58	0.76	0.70	11.93	6.22	12.69	29.67
2013	4.25	68.46	39.65	2.30	0.98	0.38	6.84	6.78	11.66	30.64
2014	10.47	58.98	36.98	2.14	1.01	–0.99	–21.73	7.25	9.81	42.20
2015	9.49	61.35	42.05	2.01	1.41	0.21	4.61	6.72	10.57	33.71
2016	13.26	58.47	41.92	1.81	1.16	–0.22	–4.83	6.59	10.08	35.33
2017	15.53	52.10	47.33	1.43	1.62	0.16	3.33	6.03	11.14	33.53
2018	24.10	48.32	48.44	1.04	1.55	–1.04	–18.19	5.23	12.62	48.89
2019	16.48	49.60	51.45	1.33	1.61	–1.60	–22.97	4.88	13.00	60.99
2020	13.40	49.07	50.92	1.96	1.70	–4.17	–69.49	4.81	5.56	N. A

Table 5. *Mean Values of Descriptive Statistics of PNB Group (2011–2020)*

| | | | | | | | | | | (Figures in Percentage) |
Name of Bank	GNPA	CD Radio	CASA	NIM	Non-Interest Income	ROA	ROE	Cost of Funds	CAR	Cost to Income
PNB	9.45	73.13	39.30	2.69	1.04	0.15	1.72	5.41	11.75	46.18
OBC	8.38	70.33	26.92	2.29	0.94	–0.03	–1.56	6.49	11.96	34.96
UNITED BANK	11.29	58.58	44.03	1.92	1.26	–0.59	–9.88	6.00	11.02	38.63

respectively, in 2020 (before the merger). The bank never achieved the ideal ROA ratio of 1% and ROE of 15% in the 10 years from 2011–2020. This can be construed that United Bank of India was the weakest in the group in terms of its financial performance. The CAR of the bank came down sharply to 5.56%, bringing the bank to near bankruptcy because of very high NPAs and the resultant provisioning requirements. This happened despite the Government of India infusing ₹ 11,504 crore in the bank toward recapitalization between 2013–14 and 2019–20.

It can be substantiated from Table 5 that GNPAs impacted the financial ratios of all three banks, as evidenced by their lower NIM, ROA, ROE, and higher cost of funds. The performance of PNB was the best in the group followed by OBC. United Bank of India was the worst performer in the group. With a high mean GNPA of 11.29%, it had a low NIM of 1.92%, ROA and ROE of –0.59 and –9.88%, respectively, and a mean CAR of 11.02% for 10 years.

Analysis of Financial Ratios and Descriptive Statistics of the Union Bank of India Group

Union Bank of India, Corporation Bank, and Andhra Bank were amalgamated with effect from April 1, 2020. It is depicted in Table 6 that the GNPA of Union Bank of India, which was only 2.37% in 2011, reached a level of

Table 6. *Financial Ratios of Union Bank of India (2011–2020)*

| | | | | | | | | | | (Figures in Percentage) |
Year	Gross NPA	Credit Deposit Ratio	Current & Savings Deposits (CASA)	NIM	Non-Interest Income	Return on Assets (ROA)	Return on Equity (ROE)	Cost of Funds	CAR	Cost to Income
2011	2.37	74.58	31.76	2.88	0.95	1.05	17.96	5.18	12.95	33.38
2012	3.16	79.81	31.28	2.73	0.98	0.79	13.05	6.24	11.85	31.75
2013	2.98	78.90	30.95	2.63	0.89	0.79	13.52	6.66	11.45	28.67
2014	4.08	76.96	29.50	2.37	0.85	0.52	9.48	6.99	10.80	27.99
2015	4.96	80.68	29.24	2.30	0.96	0.49	9.32	6.96	10.22	28.60
2016	8.70	78.01	32.35	2.11	0.92	0.35	6.34	6.58	10.56	29.56
2017	11.16	76.21	34.00	2.08	1.16	0.13	2.37	6.01	11.79	35.38
2018	15.73	70.69	34.09	1.98	1.06	–1.07	–21.39	5.38	11.46	51.78
2019	14.98	71.39	36.10	2.08	0.91	–0.59	–11.43	5.23	11.78	45.76
2020	14.15	69.91	35.59	2.19	1.01	–0.53	–9.62	5.36	12.81	46.11

Table 7. *Financial Ratios of Corporation Bank (2011–2020)*

(Figures in Percentage)

Year	Gross NPA	Credit Deposit Ratio	Current & Savings Deposits (CASA)	Net Interest Margin (NIM)	Non-Interest Income	Return on Assets (ROA)	Return on Equity (ROE)	Cost of Funds	Capital Adequacy	Cost to Income
2011	0.91	74.39	25.95	2.30	0.98	1.21	21.89	5.28	14.11	26.77
2012	1.26	73.80	22.12	2.05	0.97	1.06	19.54	6.97	13.00	21.59
2013	1.72	71.51	21.68	1.92	0.90	0.88	16.08	7.23	12.33	21.24
2014	3.42	70.88	20.33	1.82	0.79	0.29	5.72	7.36	11.65	24.83
2015	4.81	72.77	19.72	1.82	0.66	0.28	5.68	7.44	11.09	23.61
2016	9.98	68.39	22.14	1.84	0.75	–0.23	–4.64	7.09	10.56	30.64
2017	11.70	63.64	26.47	1.84	1.28	0.23	4.66	6.75	11.32	30.93
2018	17.35	65.39	29.52	2.06	0.98	–1.67	–34.42	5.91	9.23	56.19
2019	15.35	65.69	31.59	2.53	0.86	–3.14	–46.21	5.08	12.30	78.38
2020	13.80	62.04	30.57	2.36	1.69	–1.13	–15.78	5.46	11.53	N.A

15.73% in 2018. ROA and ROE, which were above the benchmark rates of 1% and 15%, respectively, in 2011, declined to a low of –1.07% and –21.39% in subsequent years. These ratios turned negative when NPAs were highest during 2018–2020. The CD ratio of the bank was also low at around 70% in the years before the merger.

From Table 7, it can be observed that from a low of 0.91% in 2011, GNPA touched a high of 17.35% in 2018. The ROA and ROE were highly negative at –1.67% and –34.42 % and –3.14% and –46.21% during high NPAs in 2018 and 2019, respectively. Capital adequacy touched a low of 9.23% in 2018, and the cost-to-income ratio hit an alarmingly high rate of 78.38% in 2019.

It can be observed from Table 8 that the GNPA of Andhra Bank, which was only 1.38% in 2011, touched a high of 17.09% in 2018 and continued to be high in 2019 and 2020. The ROA and ROE turned negative from 2018 and touched a high of –1.46% and –30.76%, respectively, due to the impact of high NPAs and continued thereafter. The cost of funds and the cost to income for the bank were also high.

Table 8. *Financial Ratios of Andhra Bank (2011–2020)*

(Figures in Percentage)

Year	Gross NPA	Credit Deposit Ratio	Current & Savings Deposits (CASA)	Net Interest Margin (NIM)	Non-Interest Income	Return on Assets (ROA)	Return on Equity (ROE)	Cost of Funds	CAR	Cost to Income
2011	1.38	77.52	29.06	3.23	0.90	1.36	23.24	5.53	14.38	41.40
2012	2.12	78.62	26.40	3.22	0.74	1.19	19.25	7.09	13.18	39.06
2013	3.71	79.46	25.65	2.77	0.77	0.99	16.19	7.35	11.76	42.40
2014	5.29	75.89	24.81	2.38	0.85	0.29	5.07	7.28	10.78	45.56
2015	5.31	81.25	27.35	2.57	0.85	0.38	6.79	7.27	10.63	45.37
2016	8.39	75.04	26.08	2.76	0.81	0.28	5.13	6.95	11.58	42.49
2017	12.25	70.02	29.33	2.62	1.09	0.08	1.56	6.44	12.38	44.03

2018	17.09	71.64	31.05	2.72	1.02	–1.46	–30.76	5.41	11.00	38.43
2019	16.21	72.25	31.39	2.73	0.83	–1.09	–23.23	5.36	13.68	42.61
2020	16.07	74.19	34.55	2.83	1.11	–0.50	–10.43	5.60	11.12	47.67

Table 9. *Mean Values of Descriptive Statistics of Union Bank Group*

(Figures in Percentage)

	Mean Values as per Descriptive Statistics (2011–2020)									
Name of Bank	GNPA	CD Radio	CASA	NIM	Non-Interest Income	ROA `	ROE	Cost of Funds	CAR	Cost to Income
Union Bank	8.23	75.71	32.49	2.33	0.97	0.19	2.96	6.06	11.57	35.90
Corporation Bank	8.03	68.85	25.01	2.05	0.99	–0.22	–2.75	6.46	11.71	34.91
Andhra Bank	8.78	75.59	28.57	2.78	0.90	0.15	1.28	6.43	12.05	42.37

It can be observed from Table 9 that higher GNPAs impacted all financial ratios (dependent variables) of the three banks. The mean performance of Union Bank was better than the other banks in the group with the highest CD ratio, CASA, ROA, and ROE. The cost of funds was also the lowest. Corporation Bank had the lowest mean for CD ratio, CASA, NIM, ROA, and ROE and the highest cost of funds in the group. This bank had the lowest CD ratio besides a lower proportion of cheaper CASA funds. GNPA impacted the financials of all banks as reflected in their ROA, ROE, and CAR. Corporation Bank was a weaker bank than Union Bank of India in respect of CD ratio, CASA deposits, NIM, ROA, ROE, and cost of funds. Similarly, Andhra Bank also exhibited higher GNPA, lower CASA deposit ratio, lower non-interest income, lower ROA and ROE, and higher cost-to-income ratio.

Results of Correlation & Regression Analysis

The ratio and descriptive analysis of different banks of PNB and Union Bank Group is statistically supported by correlation and linear regression analysis as under:

Table 10. *Correlation Values of Dependent Variables of PNB and Union Bank Group (2011–2020)*

	Independent Variable : Gross NPA as Percentage of Gross Advances								
	Dependent Variables								
Name of Bank	CD Radio	CASA	NIM	Non-Interest Income	ROA `	ROE	Cost of Funds	CAR	Cost to Income
PNB	–0.900	0.691	–0.977	0.473	–0.939	–0.930	–0.658	–0.540	0.693
OBC	–0.632	0.942	–0.928	0.810	–0.905	–0.873	–0.705	–0.510	0.905
United Bank	–0.923	0.694	–0.965	0.812	–0.487	–0.483	–0.426	–0.115	0.685
Union Bank	–0.796	0.869	–0.854	0.470	–0.963	–0.956	–0.580	0.159	0.878
Corporation Bank	–0.897	0.776	0.345	0.373	–0.872	–0.904	–0.493	–0.668	0.820
Andhra Bank	–0.802	0.773	–0.350	0.659	–0.948	–0.941	–0.651	–0.222	–0.151

Table 11. *Regression Analysis of GNPA on Dependent Variables of PNB, OBC, and United Bank of India (2011–2020)*

	PNB			OBC			United Bank of India		
	R^2	*F*-value	Sig.	R^2	*F*-value	Sig.	R^2	*F*-value	Sig.
CD Ratio	0.810	**34.141**	**.000**	0.400	**5.334**	**0.050**	0.852	**46.224**	**0.000**
CASA	0.477	**7.310**	**.027**	0.887	**62.539**	**0.000**	0.482	**7.441**	**0.026**
NIM	0.954	**165.803**	**0.000**	0.862	**49.917**	**0.000**	0.931	**107.524**	**0.000**
NII	0.223	2.300	0.168	0.657	**15.304**	**0.004**	0.659	**15.442**	**0.004**
ROA	0.882	**60.057**	**0.000**	0.819	**36.126**	**0.000**	0.237	2.481	0.154
ROE	0.865	**51.349**	**0.000**	0.763	**25.694**	**0.001**	0.233	2.437	0.157
COF	0.434	**6.124**	**0.038**	0.497	**7.911**	**0.023**	0.181	1.773	0.220
CAR	0.291	3.289	0.107	0.260	2.812	0.132	0.013	0.107	0.752
CTI	0.480	**7.398**	**0.026**	0.820	**31.830**	**0.001**	0.470	**6.205**	**0.042**

Note. *F* - Table Value (1, 8) 5.32.

It can be observed from Table 10 that the GNPA—the independent variable of our study—has a negative correlation with CD ratio, NIM, ROA, ROE, cost of funds, and CAR of PNB and OBC, United Bank of India, Corporation Bank, and Andhra Bank. In the case of the Union Bank of India, there is a negative correlation between the CD ratio, NIM, ROA, ROE, and cost of funds.

The regression analysis of the independent variable: GNPA, on nine different dependent variables, is as under:

Table 11 depicts that as per the r^2 value for PNB, GNPA has an 81.0% impact on CD ratio, 47.7 % on CASA, 95.4% on NIM, 88.2% impact on ROA, 86.5% impact on ROE, 43.4% on the cost of funds, and 48.0% on the cost to income ratio and the relationship is significant ($p < 0.05$). It can also be observed from Table 11 that the *F* - value is greater than the *F* - critical value (5.32) in the case of CD ratio, CASA, NIM, ROA, ROE, cost of funds, and cost to income at a 5% level of significance with degrees of freedom ($V_1 = 1$ and $V_2 = 8$). Hence, these financial ratios (dependent variables) are significant with respect to GNPA (independent variable).

For OBC, Table 11 illustrates that GNPA has a 40% impact on CD ratio, 88.7% on CASA, 86.2 % on NIM, 65.7% impact on non-interest income, 81.9% on ROA, 76.3% impact on ROE, 49.7 % on the cost of funds, and 82% on the cost to income ratio and the relationship is significant ($p < 0.05$). It can be inferred from Table 11 that the *F* - value is greater than the *F* - critical value (5.32) in the case of CD ratio, CASA, NIM, non-interest income, ROA, ROE, cost of funds, and cost to income at a 5% level of significance with degrees of freedom ($V_1 = 1$ and $V_2 = 8$). Hence, these financial ratios (dependent variables) are significant with respect to GNPA (independent variable).

As per the r^2 value for United Bank of India, GNPA has an 85.2% impact on the CD ratio, 48.2 % on CASA, 93.1% on NIM, 65.9% impact on non-interest income, and 47% on the cost to income and relationship is significant ($p < 0.05$). It can be inferred from Table 11 that the *F* - value is greater than 5.32 (*F* - critical value) in the case of CD ratio, CASA, NIM, non-interest income, and cost to income at a 5% level of significance with degrees of freedom ($V_1 = 1$ and $V_2 = 8$). Hence, these financial ratios (dependent variables) are significant with respect to GNPA (independent variable).

It can be observed from Table 12 that in respect of Union Bank of India, as per the r^2 value, the GNPA has a 63.4% impact on the CD ratio, 75.4% on CASA, 72.9% on NIM, 92.8% on ROA, 91.4% on ROE, and 77.1% on cost to income, and the relationship is significant ($p < 0.05$). The *p*-values of ANOVA are below the tolerable

Table 12. *Regression Analysis of GNPA on Dependent Variables of Union Bank of India, Corporation Bank, Andhra Bank (2011–2020)*

	Union Bank of India			Corporation Bank			Andhra Bank		
	R^2	*F*-value	Sig.	R^2	*F*-value	Sig.	R^2	*F*-value	Sig.
CD RATIO	0.634	13.868	0.006	0.805	32.976	0.000	0.643	14.433	0.005
CASA	0.754	24.575	0.001	0.602	12.099	0.008	0.598	11.892	0.009
NIM	0.729	21.502	0.002	0.119	1.078	0.330	0.123	1.120	0.321
NII	0.221	2.271	0.170	0.139	1.295	0.288	0.434	6.144	0.038
ROA	0.928	102.724	0.000	0.761	25.420	0.001	0.900	71.670	0.000
ROE	0.914	85.208	0.000	0.816	35.579	0.000	0.885	61.498	0.000
COF	0.337	4.064	0.079	0.243	2.567	0.148	0.424	5.883	0.041
CAR	0.025	0.208	0.661	0.447	6.457	0.035	0.049	0.414	0.538
CTI	0.771	26.919	0.001	0.672	14.373	0.007	0.023	0.162	0.699

Note. *F* - Table Value (1, 8) 5.32.

significance level in respect of CD ratio, CASA, NIM, ROA, ROE, and cost to income. It can be inferred from Table 12 that the *F* - value is greater than the *F* - critical value of 5.32 in the case of CD ratio, CASA, NIM, ROA, ROE, and cost to income at a 5% level of significance with degrees of freedom ($V_1 = 1$ and $V_2 = 8$).

It is depicted by Table 12 that in respect of Corporation Bank, as per the r^2 value, the GNPA has an 80.5% impact on the CD ratio, 60.2% on CASA, 76.1% on ROA, 81.6% on ROE, 44.7 % on capital adequacy, and 67.2% on the cost to income, and the relationship is significant ($p < 0.05$). The *p*-values of ANOVA are below the tolerable significance level in respect of CD ratio, CASA, ROA, ROE, capital adequacy, and cost to income. It can be inferred from Table 12 that the *F* - value is greater than the *F* - critical value in the case of CD ratio, CASA, ROA, ROE, capital adequacy, and cost to income at a 5% level of significance with degrees of freedom ($V_1 = 1$ and $V_2 = 8$).

In respect of Andhra Bank, as per the r^2 value, the GNPA has a 64.3% on CD ratio, 59.8% on CASA, 43.4% on non-interest income, 90% on ROA, 88.5% on ROE, and 42.4% on the cost of funds, and the relationship is significant ($p < 0.05$). It can be inferred from Table 12 that the *F* - value is greater than the *F* - critical value in the case of CD ratio, CASA, non-interest income, ROA, ROE, and cost of funds at a 5% level of significance with degrees of freedom ($V_1 = 1$ and $V_2 = 8$).

For all banks, financial ratios (dependent variables) are significant with respect to GNPA (independent variable). We can say that the variation explained by the model is statistically significant ($p < 0.05$).

Summary of Regression Analysis

The impact of regression analysis on the financial parameters of different banks is depicted in Table 13. The

Table 13. *Impact of Independent Variable 'GNPA' on Financial Ratios*

	BANK					
Financial Ratio Impacted	PNB	OBC	United Bank of India	Union Bank of India	Corporation Bank	Andhra Bank
CD Ratio	✓	✓	✓	✓	✓	✓
CASA	✓	✓	✓	✓	✓	✓

NIM	✓	✓	✓	✓	---	—
Non-Interest Income	---	✓	✓	---	---	✓
ROA	✓	✓	---	✓	✓	✓
ROE	✓	✓	---	✓	✓	✓
Cost of Funds	✓	✓	---	---	---	✓
CAR	---	---	---	---	✓	---
Cost to Income	✓	✓	✓	✓	✓	---

regression analysis summary shows that GNPA (independent variable) has impacted most financial ratios (dependent variables) under the study of PNB, OBC, United Bank of India, Union Bank of India, Corporation Bank, and Andhra Bank.

Discussion, Conclusion, and Implications

It is established by ratio analysis, descriptive statistics, correlation, and regression analysis that gross non-performing assets of the six banks under study have adversely impacted their financials. The findings also substantiate the view that the GNPA is responsible for the deterioration of the financial ratios of banks and not vice versa, as many studies have tried to prove. The study's objective to find out the relative strengths/weaknesses of different banks leads to the conclusion that in the PNB group, the performance of Punjab National Bank was better during the study period. The other two banks—OBC and the United Bank of India—were not performing well over these years, and this may be the reason for their amalgamation with PNB. Therefore, it can be construed that a merger of two weak banks into one strong bank can make a bigger bank of international size and attract investors for investment to fulfill its capital requirements. Similarly, the performance of Union Bank of India is found to be better than Corporation Bank and Andhra Bank. Thus, we can conclude that, in this case, two weaker banks were merged with a better-managed bank to sustain the group.

The analysis of key financials with more parameters can be extended to more public and private banks. The impact of GNPA might have become mild in the last financial year 2021–22 due to the decline of bad assets of all banks. This could have been due to the restructuring of loan accounts permitted by RBI and banks' release of emergency lines of credit (COVID Relief) to avoid slippage of accounts to NPAs. The financial health of banks is on a revival streak, and for this reason, the government has not made any budgetary allocations for the capitalization of PSBs during 2021–22 and 2022–23. While presenting the FY 2020–21 budget, the Finance Minister indicated further restructuring of banks under its ownership. However, the government has initiated no move in this direction yet. It is known that governments make tough decisions after general elections. "Willingness of governments to undertake bank restructuring is inversely proportional to the proximity of the next general election date" (Sheng, 1991). Decisions regarding the further restructuring of banks can be taken at the opportune time by the government in power on the strength of the financial parameters discussed in this study. There is enormous scope for private sector banks' consolidation to make them bigger and internationally competitive. The government can orchestrate such restructuring of banks both in the public and private sectors to further its objective of consolidation of the banking industry. A study can be undertaken to identify weaker private banks and their merger into stronger banks, as the government had to step in to save many weak private banks like Yes Bank. Laxmi Vilas Bank was also allowed to be taken over by DBS India (a subsidiary of DBS Singapore) recently.

Before further consolidation of the banking industry takes place, due inspections of all banks in the country on periodic intervals must be carried out to avert surprises of an insolvency-like situation, as was observed for Cooperative Banks. In the USA, banks like Silicon Valley Bank (SVB) and other small banks have also gone down despite having been supported by the US government in the past. These banks failed due to inflation (rising interest rates) and bond valuation issues, besides poor regulation and supervision. It is observed by Michael S. Barr, the Fed's vice chair for supervision, that "Regulatory standards for SVB were too low, the supervision of SVB did not work with sufficient force and urgency, and contagion from the firm's failure posed systemic consequences not contemplated by the Federal Reserve's tailoring framework" (Smialek, 2023). Such issues are relevant to our banking industry due to the prevailing economic situation. The unending controversies relating to big industrial houses and their adverse impacts on stock markets in our country, the Russia-Ukraine war, and the resultant inflation and devaluation of currencies will remain a cause of concern. If NPAs rise again due to bad lending by the banks in a zeal to grow their loan book without any checks on the utilization of funds, all banks' financials are bound to be hit, as proved by our study. The government, therefore, needs to be proactive to catch early warning signals and take remedial steps before it is too late. Any bank failure in a country can cause systemic risk; therefore, all countries have been taking immediate measures to safeguard the interests of depositors. It is in the interest of all stakeholders to keep a healthy banking system to transform India into a $5 trillion economy soon.

Authors' Contribution

Dr. Babli Dhiman conceived the idea and developed qualitative and quantitative designs to undertake the empirical study. Parmod K. Sharma extracted research papers with high repute, and filtered these based on the title selected and the research gap. The concepts were developed relevant to the study design. The quantitative computations and statistical outputs were formatted by the corresponding author Parmod K. Sharma using SPSS, who also wrote the manuscript. Dr. Dhiman verified the analytical methods and supervised the study.

Limitations of Study and Scope for Further Research

This study covers only two groups of nationalized banks restructured in 2020 for the period from 2011–2020, indicating the deterioration of financial parameters of public sector banks due to gross non-performing assets. The study does not cover the impact of GNPA in the post-merger phase beyond 2020, and accordingly, the performance of banks in the post-merger period is not described. As the study relates to only public sector banks, there is future scope to analyze critically the financial performance of private sector banks as these are also affected by the malady of 'bad loans.' Private sector banks like Yes Bank and Lakshmi Vilas Bank surprised the stakeholders due to their non-transparent working. With the macroeconomic environment being uncertain due to inflation and rising interest rates, it is high time such studies are also undertaken to judge the financial health of private sector banks.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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