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Determinants of non-performing assets in banks and their impact on asset quality metrics: Evidence in India

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Abstract
The present study is aimed at exploring the causal relationship between different determinants of NPA and asset quality metrics representing non-performing assets in Indian banking industry. The data comprises of different parameters of NPA such as GNPA & NNPA about two public sector and two private banks. The data spans for a period of eight years from April 01, 2017 to March 31, 2025 and multiple regression technique has been applied to unfold the causal relationship. All the explanatory variables *viz*. recoveries; restructured loan; written-off assets and stressed assets have significant causal impact on gross & net non-performing assets during the window period of the study. The results purport that the banking industry may be able to curtail the prevalence of NPA by using a blend of independent variables documented in the study.

Keywords: Asset quality Metrics, NPA, Multiple Regression

Introduction

Prologue

Non-performing assets (NPAs) are a crucial measure of a bank's overall health and asset quality. In the banking industry, non-performing assets (NPAs) are loans or advances for which the borrower has not made payments for at least ninety days. The evaluation of NPAs is essential since they directly affect a bank's profitability, capital sufficiency, and general stability. Banks classify non-performing assets (NPAs) as Substandard Assets, Doubtful Assets, and Loss Assets based on the duration of default and the debt's recoverability. Rules for the identification, provisioning, and management of non-performing assets (NPAs) are established by international organizations like the Basel Committee on Banking Supervision (BCBS) and regulators like the Reserve Bank of India (RBI) in order to uphold financial discipline. Non-performing assets (NPAs) are a major issue for the banking sector since they directly impact a bank's profitability, liquidity, and creditworthiness. An NPA is created when a term loan borrower misses 90 days or more of principle or interest payments. An overdraft or cash credit facility account is classified as non-performing assets (NPA) if it is out of order for the same period of time.

The problem of non-performing assets (NPAs) in India came to light in the early 1990s when financial deregulation led to increased lending. However, inadequate risk assessment and inadequate credit monitoring led to an increase in defaults. The 2008 global financial crisis exacerbated the issue by affecting business repayments. The SARFAESI Act (2002), Corporate Debt Restructuring (CDR), and the Insolvency and Bankruptcy Code (IBC) are only a few of the regulatory measures that have been implemented throughout time to address the NPA situation.

The goal of India's banking sector reforms was to increase the efficiency of the banking system by incorporating international standards and implementing prudential criteria for revenue recognition, asset classification, and provisioning. By analyzing variables like GNP, NNP, R, RL, SA, and WA—where GNP and NNP are regarded as asset quality metrics, and R, RA, WA and SA are taken as NPA determinants—this proposed study acknowledges the concerning level of NPAs as one of the main reasons for pursuing structural adjustments and reform initiatives in the banking system.

GNA is the total amount of loans and advances that the bank has designated as nonperforming prior to any write-offs or provisions. If the borrower doesn't make principal or interest payments for a predetermined amount of time (typically ninety days), the loan is considered non-performing. The overall amount of bad loans in a bank's portfolio is summarized by GNA. A high GNA ratio implies that a greater percentage of the bank's advances are at risk of default and signals greater asset quality problems. Increased provisioning needs brought on by higher GNA ratios may have an effect on capital adequacy and profitability. Over time, regular GNA monitoring aids in evaluating the bank's credit quality.

After subtracting NPA provisions, NNA shows the true risk of loan defaults. Because it takes into account provisions that have already been set aside, it displays the percentage of NPAs that still represent a risk to the bank. After provisioning, NNA offers a more accurate picture of the true risk exposure from NPAs. A lower NNPA ratio is advantageous since it shows that the bank has made sufficient provisions for possible loan losses. A high NNA suggests inadequate provisioning, which might put the bank's financial stability and profitability at risk. The genuine quality of a bank's loan portfolio can be determined by keeping an eye on NNA ratios.

The process of recovering sums that have been designated as non-performing assets (NPAs) or are past due but are still being collected is known as recoveries in AUCA (Advances under Collection Accounts). AUCA usually covers loans that are recovering and can encompass a variety of advances, such as those that have been restructured or previously written off but still have the possibility to be recovered. AUCA stands for advances that are presently being pursued for collection, meaning that the bank is actively attempting to collect the unpaid balances from borrowers who have fallen behind on their payments. It is a crucial component of a bank's asset management strategy since it shows the bank's attempts to recover money and lower non-performing assets.

Loans that have had their original terms altered by the bank because of the borrower's financial issues are known as restructured loans. This could entail decreasing the interest rate, extending the loan period, or making other accommodations to facilitate repayment. Restructuring can prevent loan defaults by taking into account the borrower's financial circumstances, although it is frequently an indication of credit stress. A high percentage of restructured loans could be a sign of systemic problems with the bank's loan portfolio. Because restructured loans frequently represent debtors in precarious financial situations, they incur a higher credit risk. If the borrower is still unable to fulfill even the new terms, restructured loans may eventually become non-performing assets (NPAs).

The total of a bank's written-off assets, restructured loans, and gross non-performing assets is referred to as stressed assets. It is a more complete indicator that offers an all-encompassing picture of the credit risk in a bank's portfolio. Stressed assets provide a more comprehensive view than GNPA alone by displaying the entire percentage of loans at risk in the bank's portfolio. If the trend continues, a high stressed assets ratio suggests significant credit risk and possible solvency problems. Stakeholders can better grasp the overall asset quality of the bank by keeping an eye on stressed assets. Stronger risk management strategies or a capital infusion may be required due to high levels of stressed assets.

The RBI, the government, financial institutions, and even banks have expressed alarm over the extraordinary increase in non-performing assets. NPA levels are influenced by a number of internal and environmental variables. In order to address the impending issue of managing non-performing assets, this study aims to investigate the factors that contribute to non-performing assets in a subset of public and private sector banks. Therefore, the study's current objective is to analyze a thorough analysis of non-performing assets (NPAs) and provide suitable strategies to lower their level, especially in specific banks by managing both sector banks efficiently.

Review of Literature

In order to assess current trends, sector-specific distributions, and the effectiveness of management strategies in reducing NPAs, Bagalkote, K. D. (2024) [2] carried out a thorough examination of "Non-Performing Assets (NPAs)" in various countries' public banks as of 2024. The study examined "secondary data" from the "Reserve Bank of India (RBI)" between April 2023 and March 2024 using a descriptive analytical method. The need for targeted risk management techniques is highlighted by critical findings that show significant differences in NPA numbers and recovery rates among banks, with sector-specific shortcomings, especially in the SME sector.

The intricate relationship between "non-performing assets" and the "profitability" of public sector banks in India was examined by Ruban, H., and Murugesan, S. V. (2024) [11]. This study's primary goal was to look into how NPAs affected PSBs' "profitability" in India. Public sector banks (PSBs) play a crucial role in the nation's financial system, and the Indian banking industry has undergone substantial changes in recent decades. However, the issue of "Non-Performing Assets (NPAs)" has emerged as a significant challenge for banks of all kinds during this development.

Ahmed *et al*. (2024) [1] focused on evaluating review papers from prestigious journals and looked at the operations of "Public Sector Banks (PSBs)" as a crucial indicator of the nation's economic health. By investigating intricate financial dynamics, it looked at certain PSBs and discovered information about their impact on economic well-being, flexibility in responding to market trends, and fiscal resilience. The study looked at important changes in the financial sector, such as technology developments and regulatory changes. An in-depth understanding of PSBs' contribution to economic resilience was provided by the examination of crucial variables like profitability, asset quality, and loan expansion.

Sasikala *et al*. (2024) [14] looked at SBI's asset quality before and after the merger. The standard of loans that banks maintain is related to the quality of assets. Loans that are currently being paid back on schedule make up the standard assets. The "Net NPA to Advances ratio," the "Net NPA to Total Assets ratio," and the ratio of total investments to total assets are the indicators used to assess SBI's asset quality. Paired sample t-tests and descriptive statistics have been used. The NPA decreased from Rs 110,854.7 crore in 2017-18 to Rs 27,965.71 crore in 2021-2022, according to the findings. The observed drop in NPAs has improved SBI's asset quality since the merger.

Khan, A. A. (2024) [5] examined the relationship between

"Net NPAs and financial profitability" by examining the variables affecting profitability for "12" Indian public sector banks between 2011 and 2023. Three panel regression models—fixed, random, and PLS regression models—were used by the author. Along with net NPAs, the author used economic indices like GDP growth rate, inflation, and interest rate as well as bank-specific variables like deposits, CDR, and DER as explanatory variables. The results showed that the RE model is a reliable and effective strategy that is especially appropriate for Indian public sector banks.

Akshita *et al*. (2024) used time series data about non-performing assets (NPAs) in Indian banks. The RBI's publicly accessible data from 2000 to 2023, as reported in its annual reports, was used. It was used to estimate a time series model like ARIMA. The purpose of this study is to offer information that may help bankers and policymakers reduce and manage the risks associated with the consequences of non-performing assets (NPAs).

The study by Divya *et al*. (2025) [4] on Axis Bank's non-performing assets (NPAs), with a particular focus on its Podanur branch, highlights the significant progress the bank has made in managing and lowering its NPA levels during the previous five years. The decline in the "Gross and Net NPA" ratios indicated improved asset quality and better risk control procedures. Additionally, the steady increase in the "Provision Coverage Ratio (PCR)" demonstrated Axis Bank's commitment to managing credit risks. The analysis of Axis Bank's non-performing assets (NPA) ratio revealed that the bank has managed to maintain a relatively low level when compared to its rivals in the banking industry.

Ravesia *et al*. (2024) [9]examined the range of credit facilities offered by private sector banks in India, examining the dynamics of lending practices, the impact of regulatory frameworks, and the role of technological improvements in improving loan accessibility. Policymakers, financial institutions, and anybody else interested in understanding the intricacies of credit facilities in the Indian banking industry were the target audience for the research. The analysis emphasized the significance of financial accessibility, economic growth, and the overall stability of the banking industry.

According to Sunitha (2024) [15], private banks perform better than their public equivalents in terms of deposits, total assets, operating profit, and particularly non-performing assets (NPAs). The private banking industry has received a lot of attention. Commercially operating private banks were more profitable than public sector banks, but performance metrics showed no discernible differences between the two kinds of organizations. Non-trading private banks show no appreciable differences in profitability or performance when compared to public sector banks. Overall, foreign banks outperformed private banks, while there was a noticeable ownership effect between the two groups.

Ramu *et al*. (2024) [8] looked into how nonperforming assets affected banks' performance, concentrating on HDFC Bank and ICICI Bank. Using secondary data from 2019 to 2023, the analysis focused on key measures such as the Gross NPA Ratio, Net NPA Ratio, Provision Ratio, and Problem Asset Ratio. When compared to ICICI Bank, the data shows that HDFC Bank performs better, as seen by lower NPAs and a more cautious approach to provisioning.

Bajaj *et al*. (2024) [3] found that the effect of priority sector loans on non-performing assets varied significantly throughout banks. A lower recovery rate for illiquid collateral is suggested by the negative correlation between collateral and recovery, particularly with reference to private sector banks. A financial institution is well-positioned to manage its portfolio if it has a sizable net interest margin, a noteworthy ratio of liquid to secured collateral, and an appropriate mix of long-term and short-term loans that are in line with its asset-liability management strategy.

In spite of several studies, there still exist some evident gaps as lack of detailed studies on the impact of NPA determinants like recoveries through AUCA, restructured loans, written off assets and stressed assets on financial performance and profitability.

Objective of the study

To explore the impact of selected NPA determinants on profitability and asset quality metrics of sample banks.

Data and Methodology

Secondary data about four sample banks *viz*. SBI, HDFC Bank, ICICI and UCO bank have been compiled from cogent sources. The data spans for a period of eight years from April 01, 2017 to March 31, 2025. The study accommodates two dependent variables *viz*. gross non-performing assets and net non-performing assets relative to advances. Further, four independent variables *viz*. recoveries, restructured loans, written-off assets and stressed assets as determinants of non-performing assets in the banking industry have been used. To unfold the causal relationship, multiple regression technique has been applied. The regression models using different variables are as follows:

$$NNPA_t = \alpha_0 + \alpha_1 R_t + \alpha_2 RL_t + \alpha_3 WA_t + \alpha_4 SA_t + \varepsilon_t$$

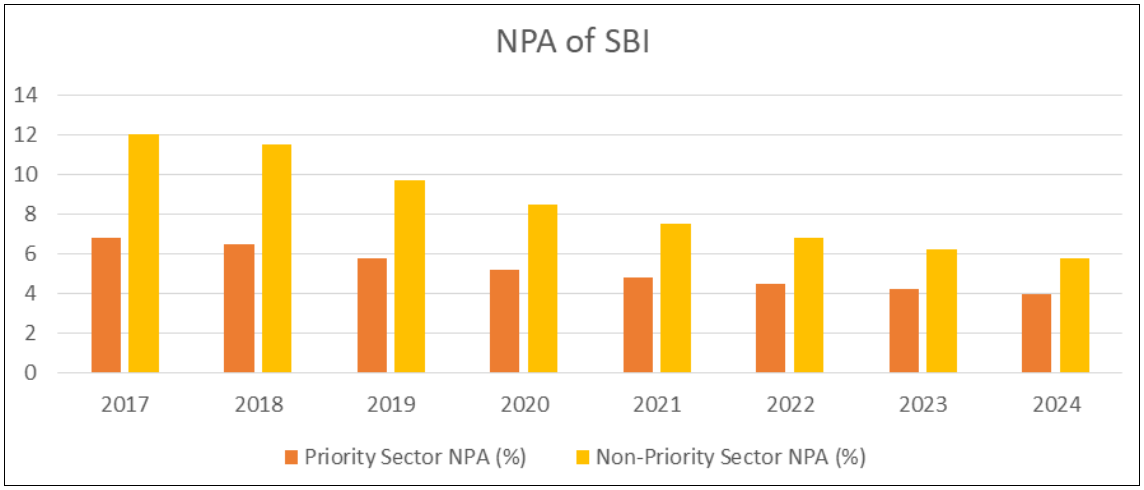
$$GNPA_t = \alpha_0 + \alpha_1 R_t + \alpha_2 RL_t + \alpha_3 WA_t + \alpha_4 SA_t + \varepsilon_t$$

Where,

GNPA as Gross Non-Performing Assets to Advances
NNPA as Net Non-Performing Assets to Advances
R as Recoveries in AUCA to Advances
RL as Restructured Loans to Advances
WA as Written-Off Assets to Advances
SA as Stressed Assets to Advances

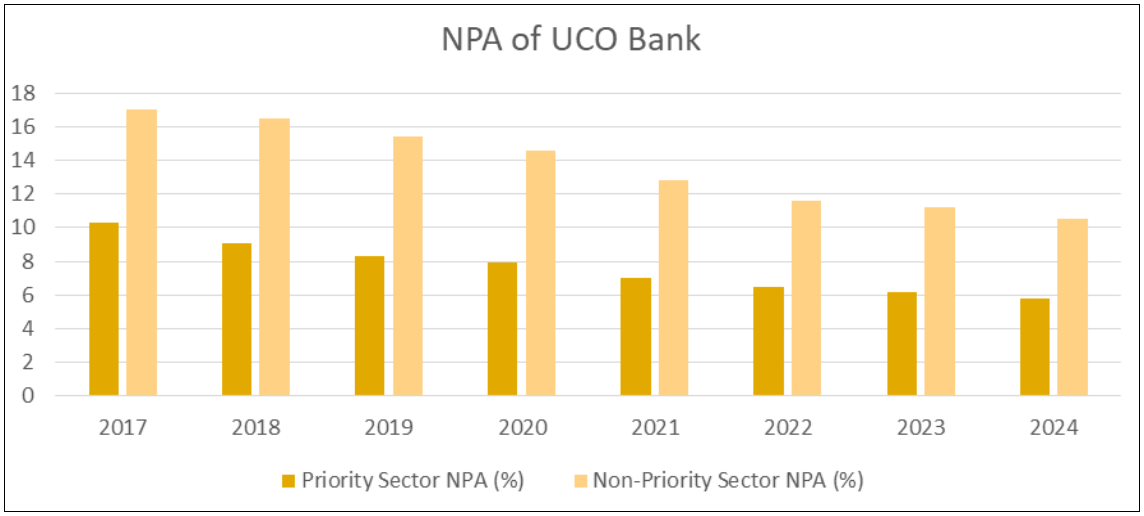
Empirical Results

The status of non-performing assets to both priority and non-priority sectors lending activities have been documented for the sample banks in figures 1-4. The level of non-performing assets have witnessed a declining trend during the window period of the study for state bank of India particularly to priority sectors. However, for non-priority sectors, there is also a declining trend but with a low magnitude compared to priority sectors during the period of study. The level of NPA of UCO bank has been depicted in Figure 2 and it is higher in case of priority sectors lending compared to non-priority sectors though with a declining trend during the study period.



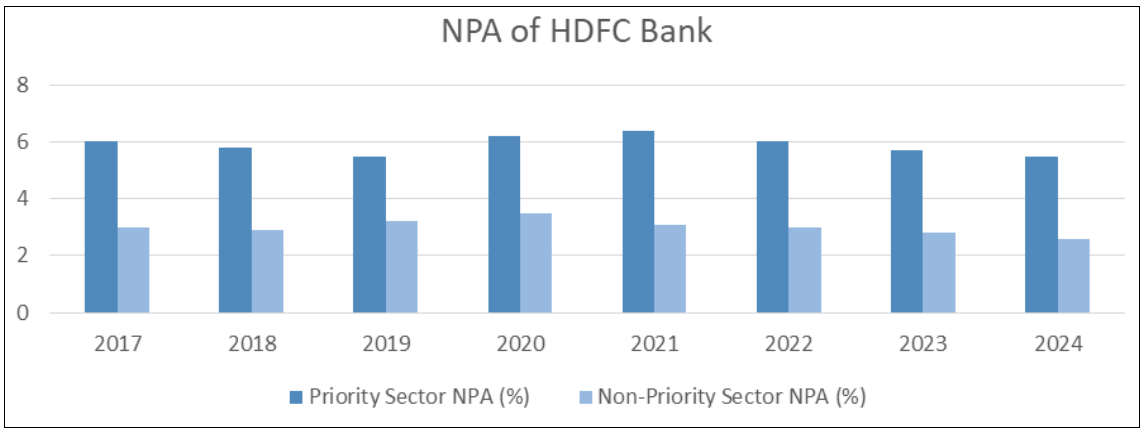
Source: Compiled

Fig 1: NPA of State Bank of India



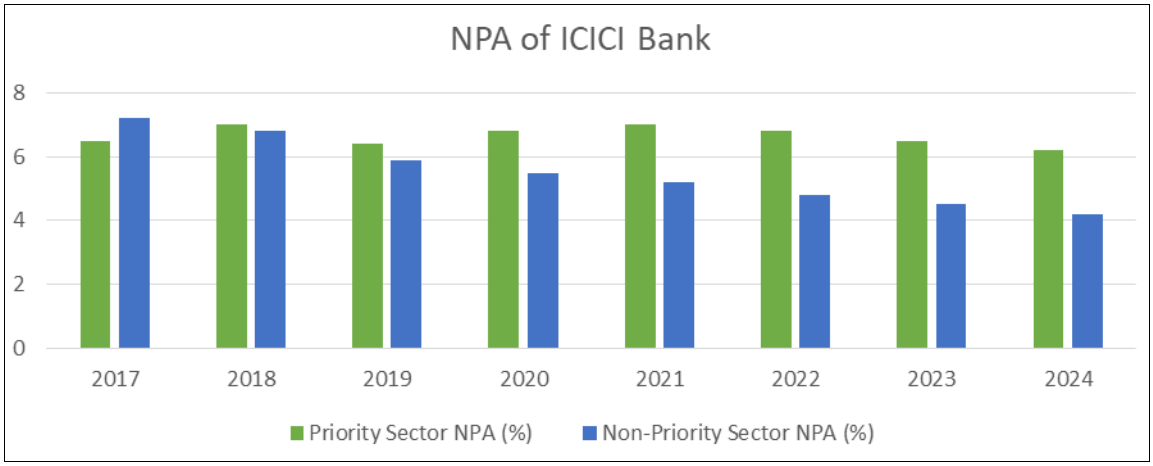
Source: Compiled

Fig 2: NPA of UCO Bank



Source: Compiled

Fig 3: NPA of HDFC Bank



Source: Compiled

Fig 4: NPA of ICICI Bank

The sample private banks have different footing about NPA during the study period. The prevalence of NPA in ICICI bank for priority sectors and non-priority sectors are almost same and exhibits mixed trend. It asserts about the aggressive policy of lending at the end of ICICI bank. However in HDFC bank, the NPA of priority sector is much higher compared to non-priority sector. The steps and policies related to control the NPA appears to be effective in HDFC bank.

Table 1: Estimates of the Regression Model of Banks for GNPA

Model 1		**R Square**	**Adj. R Square**	**Std. Error**	**Durbin- Watson**
		0.934	0.915	0.09321	2.686
Variables	**Description**	**Co-efficient**	**Standard Error**	**t-Statistics**	**Probability**
α_0	Constant	-4.352	0.467	-8.149	0.043
α_1	Recoveries	-1.037	0.312	-5.226	0.009
α_2	Restructured Loan	0.814	0.599	2.311	0.044
α_3	Written-off Assets	-0.955	0.357	-2.109	0.018
α_4	Stressed Assets	0.867	0.411	2.005	0.047

Source: Computed

Table 2: Estimates of the Regression Model of Banks for NNPA

Model 2		**R Square**	**Adj. R Square**	**Std. Error**	**Durbin- Watson**
		0.929	0.916	0.08254	3.011
Variables	**Description**	**Co-efficient**	**Standard Error**	**t-Statistics**	**Probability**
α_0	Constant	-3.524	0.522	-7.722	0.025
α_1	Recoveries	-1.005	0.457	-4.869	0.017
α_2	Restructured Loan	0.924	0.635	2.452	0.034
α_3	Written-off Assets	-0.914	0.425	-2.008	0.022
α_4	Stressed Assets	0.913	0.547	1.958	0.031

Source: Computed

The outputs of regression analysis have been documented in Table 1 for gross non-performing assets. The R^2 value is 0.934 which asserts that 93.4% of changes in GNPA have been explained by independent variables. All the variables such as recoveries; restructured loan; written-off assets and stressed assets have significant causal impact on gross non-performing assets during the window period of the study. The P-values are also statistically significant for all the variables.

The outputs of regression analysis have been documented in Table 2 for net non-performing assets. The R^2 value is 0.929 which asserts that 92.9% of changes in NNPA have been explained by independent variables. All the variables such as recoveries; restructured loan; written-off assets and stressed assets have significant causal impact on gross non-performing assets during the window period of the study. Changes in recoveries and written-off assets tends to reduce the NPA which is in consonance with the theoretical foundations. The P-values are also statistically significant for all the variables.

Epilogue

The present study is aimed at exploring the causal relationship between different determinants of NPA and asset quality metrics representing non-performing assets in Indian banking industry. The data comprises of different parameters of NPA such as GNPA & NNPA about two public sector and two private banks. The data spans for a period of eight years from April 01, 2017 to March 31, 2025 and multiple regression technique has been applied to unfold the causal relationship. All the explanatory variables *viz*. recoveries; restructured loan; written-off assets and stressed assets have significant causal impact on gross & net non-performing assets during the window period of the study. The results purport that the banking industry may be able to curtail the prevalence of NPA by using a blend of

independent variables documented in the study.

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