**Educational Administration: Theory and Practice**
2024,30(5), 15356-15369
ISSN:2148-2403
https://kuey.net/

**Research Article**

# Impact of Gross Advances on Gross Non-Performing Assets: An Analysis of Scheduled Commercial Banks

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**Citation:** Dr. Asha Mathew, et al (2024), Impact Of Gross Advances On Gross Non-Performing Assets: An Analysis Of Scheduled Commercial Banks, *Educational Administration: Theory and Practice*, *30*(5), 15356-15369
Doi: 10.53555/kuey.v30i5.9016

**ARTICLE INFO** **ABSTRACT**

When banks have many non-performing assets, it indicates issues with borrowers. This affects bank finances, leading to lower profits and asset value, and a risk of insolvency. The impact extends beyond the banking sector, affecting the broader economy. High NPAs in banks show systemic challenges across industries. Addressing NPAs is crucial for financial stability and economic prosperity. Changes in global finance highlight the importance of understanding how lending growth affects bank asset quality. This study examines the link between bank loan growth, aggressive credit policies, poor loan appraisal, and increased loan defaults. It also explores the relationship between NPAs and Gross Advances. Trends in NPAs over 10 years are analyzed for selected commercial banks, including public, private, and foreign banks.

***Key Words:*** Non Performing Assets, Banks, Gross Advances

## INTRODUCTION

Banks play a crucial role in the functioning of modern economies. They act as intermediaries, mobilizing savings, extending credit, facilitating payments, and managing risks. This encompasses a wide range of activities, from accepting deposits and providing loans to offering a variety of financial services to individuals and businesses.The banking sector is constantly evolving, driven by technological advancements, changing regulations, and evolving consumer behavior. The rise of digital banking, for instance, has transformed how customers interact with their banks, while increasing regulatory scrutiny aims to ensure financial stability and protect consumers. Non-performing loans (NPLs) pose a significant challenge to the health of the banking system. High NPAs impact bank profitability, asset quality, and liquidity, and can have detrimental effects on the overall economy. Addressing the issue of NPAs is critical for maintaining a stable and resilient banking sector.

***History of Banking***: The origins of commercial banking in India can be traced back to the early 18th century with the establishment of the three Presidency Banks: the Bank of Bengal (1809), the Bank of Madras (1843), and the Bank of Bombay (1868). These institutions, formed under British rule, played a pivotal role in funding colonial ventures and laying the foundation for the modern Indian banking system.Between 1865 and 1913, a wave of private banks emerged in India, many of which have stood the test of time. While some, like the Union Bank (founded in 1839), succumbed to economic downturns, others, such as the Allahabad Bank (established in 1865), thrived. The Punjab National Bank, notable for being solely managed by Indians, emerged as a prominent institution and continues to be one of the largest banks in the country. This period also witnessed the establishment of several other significant banks, including the Central Bank of India (1911), Bank of Baroda (1908), Canara Bank (1906), Indian Bank (1907), and Bank of Mysore (1913). Prior to 1935, the Indian banking landscape was dominated by privately owned banks. This era was characterized by a high rate of bank failures and instances of exploitation of vulnerable borrowers. A significant turning point arrived with the establishment of the Reserve Bank of India (RBI) in 1935, based on the recommendations of the Hilton Young Commission. The RBI assumed crucial responsibilities, including managing public debt, overseeing currency issuance, and regulating the banking sector. It was tasked with developing a sound credit and monetary system, ensuring financial stability, and safeguarding the nation's reserves. The Banking

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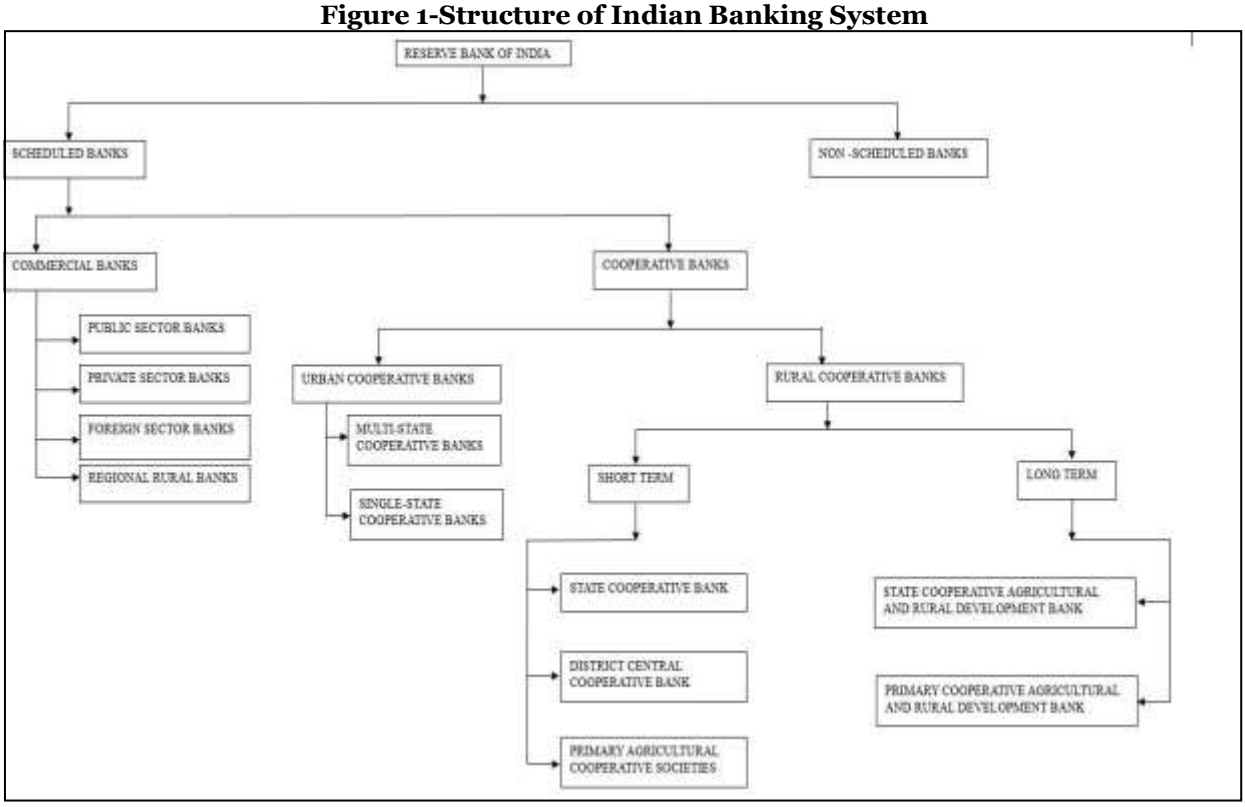
Companies Act of 1949, subsequently amended in 1965 as the Banking Regulation Act, aimed to streamline and regulate the operations of commercial banks.

***Post-Independence Reforms and the Rise of Nationalization :*** Following India's independence, the government embarked on a significant reform of the banking sector. The nationalization of the Imperial Bank of India in 1955, creating the State Bank of India, marked the beginning of this transformative phase. The primary objective was to expand access to banking services, particularly in rural areas.The period between 1951 and 1967 witnessed a substantial increase in the number of banks, leading to a reduction in the population served per bank branch. However, rural banking accessibility remained a significant challenge due to the concentration of bank branches in urban centers. Recognizing the need for greater financial inclusion, the government nationalized 14 major private banks in 1969, a move ratified by the Banking Companies Act of 1970. This was followed by the nationalization of six more banks in 1980. By the 1980s, a substantial portion of the Indian banking sector, approximately 90%, was under government ownership.To further enhance credit accessibility, the government introduced the Lead Bank Scheme in 1969 and established Regional Rural Banks in 1976 to cater specifically to the needs of small farmers.
*Challenges of Nationalization and the Dawn of Reforms:* While nationalization expanded banking reach, it also presented several challenges. The dominance of government-owned banks led to increased bureaucratic control, stifling competition and innovation. This resulted in inefficiencies in credit allocation, reduced investment, and declining profitability within the banking sector. Recognizing the need for a more competitive and efficient banking system, the government initiated significant reforms in 1992, based on the recommendations of the Narasimham Committee. These reforms aimed to deregulate the banking sector, enhance transparency, improve bank balance sheets, and strengthen regulatory frameworks.The entry of private and foreign banks in 1993 injected much-needed competition, leading to increased business lending and a reduction in non-performing loans. Public sector banks also witnessed a turnaround in their financial performance, transitioning from losses to profits.The Indian banking system has evolved into a sophisticated and intricate structure over several decades. Characterized by its unique features, it is categorized based on various factors, including operational scale, business models, and geographical reach. At the apex of this system stands the Reserve Bank of India (RBI), the central bank of the nation. The RBI exercises regulatory and supervisory authority over all banks operating within the country.

**Figure 1-Structure of Indian Banking System**



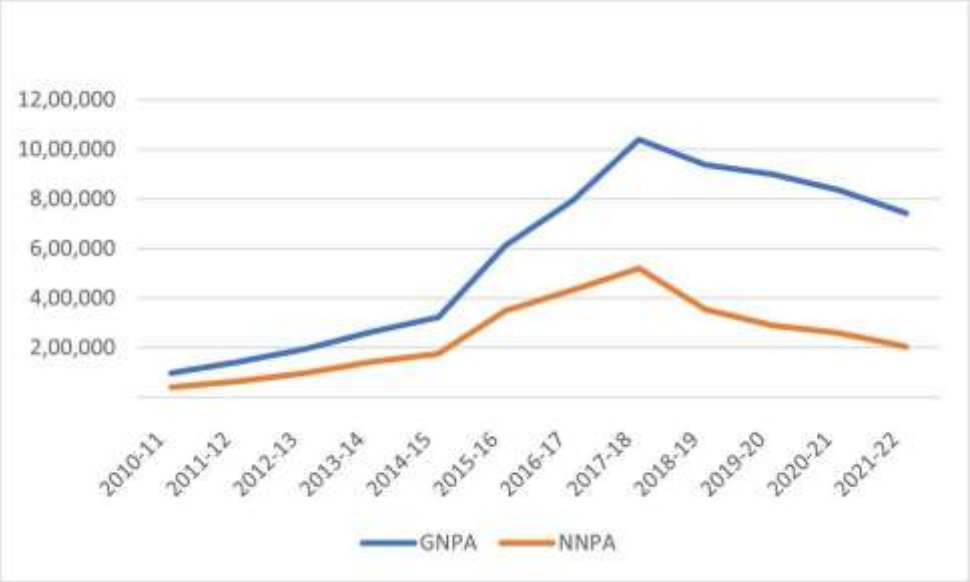

*Source:* RBI (2013) Banking structure in India- The way forward

***Non-Performing Assets:*** Non-Performing Assets (NPAs) are a critical concern for banks, reflecting the quality of their assets and their overall financial health. Rising NPAs pose a significant threat to bank stability and can have a detrimental impact on the broader economy.NPAs represent loans or advances where borrowers have failed to make timely payments of interest or principal.

***Gross NPA and Net NPA:*** Non-Performing Assets (NPAs) can be broadly categorized into two main types:

Gross NPA (GNPA) and Net NPA (NNPA). GNPA represents the total value of all loan assets classified as NPAs by the Reserve Bank of India (RBI) guidelines as of the balance sheet date. It serves as an indicator of the overall quality of a bank's loan portfolio, encompassing all nonstandard assets such as substandard, doubtful, and loss assets.In contrast, net NPA reflects the actual burden of NPAs on a bank's financial health after accounting for provisions made against these assets. Given the substantial volume of NPAs in Indian bank balance sheets and the often protracted recovery and write-off processes, the provisioning requirements mandated by the RBI can be considerable. Consequently, a significant difference typically exists between GNPA and NNPA.

**Figure 2- GNPA v/s NNPA of Banking sector**




*Source: RBI*

***Classification of Non-Performing Assets :*** Banks are required to further classify non-performing assets into three categories based on the duration of non-performance and the likelihood of recovering the dues.
*Substandard assets*: With effect from March 31, 2005, a substandard asset is defined as an asset that has been classified as Non-Performing Asset (NPA) for a period of 12 months or less. These assets exhibit well-defined credit weaknesses that jeopardize the timely repayment of the debt. They are characterized by a distinct possibility of incurring losses for the bank if the underlying deficiencies are not promptly addressed.
*Doubtful Assets :*Effective March 31, 2005, an asset is classified as doubtful if it has remained in the substandard category for 12 months or longer. A loan classified as doubtful exhibits all the weaknesses inherent in substandard assets, with the added characteristic that the likelihood of full collection or liquidation, based on currently known facts, conditions, and values, is highly questionable and improbable."
*Loss Assets:* A loss asset is characterized by an identified loss, determined by the bank, internal or external auditors, or the Reserve Bank of India (RBI) inspection. While not fully written off, these assets are deemed uncollected and of such negligible value that their continued classification as bankable assets is unwarranted. However, the possibility of some salvage or recovery remains.

***Methods for Resolving/ Recovery of Non-Performing Assets (NPAs) :*** Banks and financial institutions facing the burden of bad loans have several options for resolution, including

***One-Time Settlement (OTS)/Compromise Scheme:***
1. The Reserve Bank of India (RBI) issued guidelines for OTS schemes in March 2000, applicable to doubtful and previously substandard NPAs.
2. For NPAs up to ₹10 crore, the minimum recovery target is 100% of the outstanding balance.
3. For NPAs exceeding ₹10 crore, the Managing Director and CEO (MD & CEO) of the respective bank is required to personally oversee the settlement on a case-by-case basis.
4. The settlement amount is typically paid in a lump sum. However, if a lump sum payment is not feasible, borrowers are required to pay at least 25% upfront and the remaining balance within one year, with interest charged at the prevailing prime lending rate.

***Lok Adalats:***1. Established under the Legal Services Authority Act, 1987, Lok Adalats aim to facilitate the amicable settlement of disputes, including those involving NPAs in the doubtful and loss categories with an outstanding balance of ₹20 lakh.
2. These forums resolve disputes through conciliation, mediation, and compromise, thereby reducing the burden on courts.

3. Lok Adalats have been granted quasi-judicial status, and their awards are deemed to be civil court decrees, with no further appeal allowed.
4. Debt Recovery Tribunals (DRTs) are now empowered to organize Lok Adalats for NPAs exceeding ₹10 lakh.
5. While a popular method, banks often face challenges in bringing all parties together when Lok Adalats convene.

Table 1 presents the NPAs recovered by scheduled commercial banks through Lok Adalats for the five-year period from 2019-2023.

**Table 1-NPAs recovered by SCBs through Lok Adalat (Amount in ₹ crore)**

| Item | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| Number of Cases Referred | 40,87,555 | 59,86,790 | 19,49,249 | 85,06,741 | 1,42,49,462 |
| Amount Involved | 53,484 | 67,801 | 28,084 | 1,19,006 | 1,88,527 |
| Amount Recovered | 2,750 | 4,211 | 1,119 | 2,778 | 3,831 |
| Percentage of Amount recovered | 5.1 | 6.2 | 4 | 2.3 | 2 |

*Source: RBI Report on Trend and Progress of Banking in India, various issues*

***Debt Recovery Tribunals (DRTs) :*** Established under the Recovery of Debts Due to Banks and Financial Institutions Act, 1993 (RDB Act), Debt Recovery Tribunals (DRTs) are specialized courts designed to expedite the adjudication and recovery of debts owed to banks and financial institutions. The RDB Act also establishes Debt Recovery Appellate Tribunals (DRATs) to hear appeals against DRT decisions.

*Jurisdiction*: DRTs have jurisdiction over cases involving advances of ₹10 lakh and above. Cases with a value below ₹10 lakh are typically referred to civil courts.

*Appeal Process:* Appeals against DRT orders can only be filed with DRATs. However, DRATs require the appellant to deposit 75% of the disputed amount before entertaining the appeal. The DRAT may waive or reduce this deposit amount at its discretion.

*Evolution of Applicant Standing*: Initially, only lenders could file cases before DRTs. However, with the enactment of the Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest Act (SARFAESI) Act, borrowers were also granted the right to file applications.

Table 2 depicts the NPAs recovered by scheduled commercial banks through Debt Recovery Tribunals for the period spanning 2019-2023.

**Table 2- NPAs recovered by SCBs through DRTs (Amount in ₹ crore)**

| Item | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| Number of Cases Referred | 51,679 | 33,139 | 28,182 | 30,651 | 58,073 |
| Amount Involved | 2,68,413 | 2,05,032 | 2,25,361 | 68,956 | 4,02,636 |
| Amount Recovered | 10,552 | 9,986 | 8,113 | 12,035 | 36,924 |
| Percentage of Amount recovered | 3.9 | 4.9 | 3.6 | 17.5 | 9.2 |

*Source: RBI Report on Trend and Progress of Banking in India, various issues*

***Corporate Debt Restructuring*:** Introduced in 2001-02, the Corporate Debt Restructuring (CDR) mechanism aimed to provide a timely and transparent framework for restructuring corporate debts exceeding ₹20 crore. This mechanism was designed for companies outside the purview of the Board for Industrial and Financial Reconstruction (BIFR), Debt Recovery Tribunals (DRTs), or other legal proceedings. The primary objective of CDR was to enable corporates facing internal or external challenges to restructure their debts through a coordinated and orderly process involving debtor-creditor agreements and inter-creditor agreements. This approach aimed to preserve the viability of the company while minimizing losses to creditors and other stakeholders.

***Wilful Defaulters*:** Many borrowers have intentionally defaulted on loan repayments, often exploiting perceived loopholes in the legal system. The Reserve Bank of India (RBI) defines wilful default as the failure to meet loan obligations despite having the financial capacity to do so, or the misuse of loan funds for purposes other than those agreed upon in the financing agreement. Annually, the RBI publishes a list of borrowers with outstanding loans exceeding ₹1 crore against whom banks have filed recovery suits as of March 31st. This list is shared with the Securities and Exchange Board of India (SEBI) to restrict access to capital markets for wilful defaulters. Public sector banks are instructed to thoroughly investigate cases of wilful default exceeding ₹1 crore and pursue criminal charges when warranted. Consequently, wilful defaulters face severe repercussions, including a ban on obtaining new loans from financial institutions and a five-year restriction on promoters raising capital for new ventures from the date of their inclusion in the RBI's list.

***SARFAESI Act* :** The Securitization and Reconstruction of Financial Assets and Enforcement of Securities Interest Act (SARFAESI) of 2022 empowers secured creditors to recover dues without resorting to lengthy court proceedings. This legislation aims to improve loan recovery rates, reduce systemic risks, and address the issue of non-performing assets (NPAs). Key provisions include enabling securitization of assets, facilitating asset reconstruction through strategies like debt restructuring and corporate rehabilitation, and streamlining the enforcement of security interests. Secured creditors can issue notices to borrowers for repayment within sixty days, and upon default, proceed to enforce their security interests, subject to the consent of 75% of creditors in cases of multiple lenders. While empowering lenders, the Act excludes unsecured loans, those with a principal balance below ₹1 lakh, or where the outstanding principal is less than 20% of the original loan amount. The Act also facilitates the establishment of Asset Reconstruction Companies (ARCs) to acquire distressed assets from banks, enabling them to clean up their balance sheets and expedite debt recovery.

**Table 3-NPAs recovered by SCBs through SARFAESI Act (Amount in ₹ crore)**

| Item | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| Number of Cases Referred | 2,35,437 | 1,05,523 | 57,331 | 2,49,645 | 1,85,397 |
| Amount Involved | 2,58,642 | 1,96,582 | 67,510 | 1,21,718 | 1,11,805 |
| Amount Recovered | 38,905 | 34,283 | 27,686 | 27,349 | 30,864 |
| Percentage of Amount recovered | 15 | 17.4 | 41 | 22.5 | 27.6 |

*Sources: Report on Trend and Progress of Banking in India, various issues*

Table 3 reveals a fluctuating trend in debt recovery cases. In 2019, 235,437 cases involving ₹2,58,642 crore were referred, resulting in a recovery rate of 15%. The following year saw a decline in both cases and the amount involved, yet a higher recovery rate of 17.4%. Notably, 2021 witnessed a significant decrease in cases referred while achieving an impressive recovery rate of 41%. However, 2022 saw a surge in cases to 249,645 with a reduced amount involved and a lower recovery rate of 22.5%. By 2023, both cases and the amount involved decreased, while maintaining a relatively high recovery rate of 27.6%.

***Insolvency and Bankruptcy Code (IBC):*** The Insolvency and Bankruptcy Code (IBC) of India, enacted in 2016, revolutionized the country's approach to resolving insolvency and bankruptcy cases. Aiming for swift and efficient resolution, the IBC provides a time-bound framework for addressing financial distress across various entities, including companies, partnerships, and individuals. Upon default, creditors gain control over debtors' assets and must navigate a 180-day resolution process. To ensure uninterrupted proceedings, debtors enjoy immunity from creditor claims during this period. Consolidating provisions from existing laws, the IBC establishes a common platform for all stakeholders. The National Company Law Tribunal (NCLT) adjudicates cases, while the Insolvency and Bankruptcy Board of India (IBBI) regulates the process. The IBC aims to foster an environment conducive to entrepreneurship, promote credit availability, and streamline operations in India. Table 4 reveals that in 2019, 1,152 cases involving ₹1,45,457 crore were referred under the IBC, resulting in a high recovery rate of 45.7%. The following year witnessed an increase in both cases and the amount involved, with a consistent recovery rate of 46.3%.

**Table 4-NPAs recovered by SCBs through IBC (Amount in ₹ crore)**

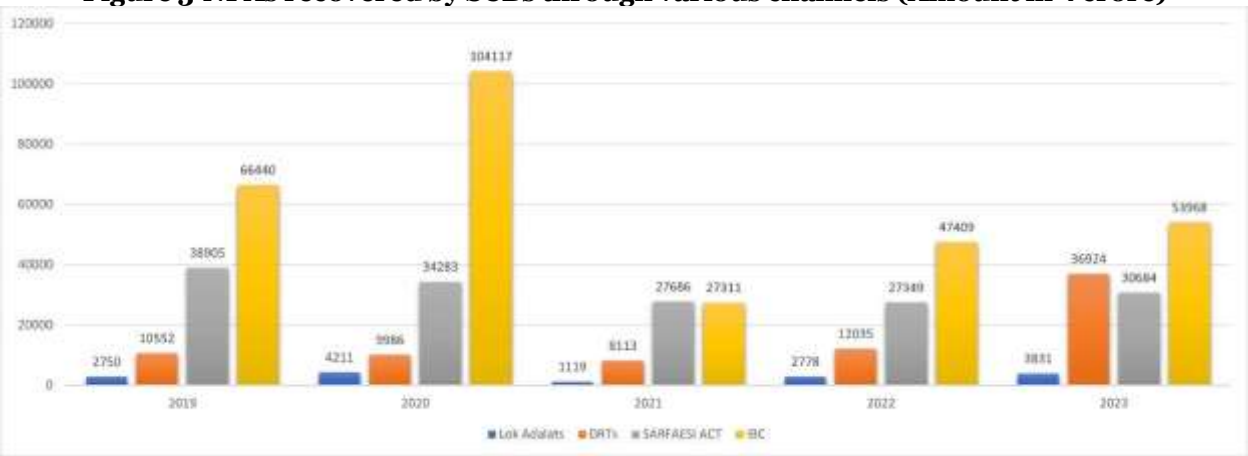
| Item | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|
| Number of Cases Referred | 1,152 | 1,986 | 536 | 891 | 1,261 |
| Amount Involved | 1,45,457 | 2,24,935 | 1,35,319 | 1,97,959 | 1,33,930 |

| | | | | | |
|---|---|---|---|---|---|
| Amount Recovered | 66,440 | 1,04,117 | 27,311 | 47,409 | 53,968 |
| Percentage of Amount recovered | 45.7 | 46.3 | 20.2 | 23.9 | 40.3 |

*Sources: Report on Trend and Progress of Banking in India, various issues*

In 2021, a notable decrease in both the number of cases referred and the amount involved under the IBC led to a lower recovery rate of 20.2%. While both the number of cases and the amount involved saw a slight increase in 2022, the recovery rate improved to 23.9%. By 2023, a further increase in both metrics was observed, resulting in a significant spike in the recovery rate to 40.3%.

**Figure 3-NPAs recovered by SCBs through various channels (Amount in ₹ crore)**




*Source: RBI*

Figure 3 depicts the amount recovered by Scheduled commercial banks through various channels such as Lok Adalat's, Debt Recovery Tribunals, SARFAESI Act, Insolvency and Bankruptcy Code etc. The ranking of recovery channel shifts across years. While SARFAESI Act and DRTs occasionally lead in recovery amount in certain years, overall IBC consistently maintains its position as the primary driver of NPA resolution. It consistently records the highest recovery amounts, indicating its significance in Resolving NPAs within the banking sector.

## Various Committee Reports on NPA

***Narasimham Committee Report (1991)*:** The growth of the financial sector represents a significant achievement, notably contributing to an increase in the national savings rate, particularly among households. To evaluate the current structure and components of the financial system, a committee was established. The committee's primary objective was to formulate recommendations for enhancing the efficiency and effectiveness of the system, with a specific focus on improving the economic operations, accountability, and profitability of commercial banks and financial institutions.

***Verma Committee Report (2000)* :** The Reserve Bank of India, in collaboration with the Government of India, established a working group chaired by M.S. Verma. The primary objective of this group was to propose measures for the revival of weak public sector banks. The terms of reference included: (i) establishing criteria for identifying weak public sector banks; (ii) examining and analyzing the challenges faced by such banks; (iii) conducting a thorough case-by-case assessment of weak banks to identify those with potential for revival; and (iv) recommending strategic plans for the financial, organizational, and operational restructuring of weak public sector banks.

***Sunil Mehta Committee Report (2018)* :** A committee chaired by Sunil Mehta was established to recommend strategies for the expeditious resolution of stressed assets through the creation of Asset Reconstruction Companies (ARCs). The committee submitted its report, outlining a five-point plan known as "Project Sashakt" to effectively address the issue.

### This plan encompasses:

- SME Resolution Approach: For loans up to ₹50 crores, aiming for resolution within 90 days.
- Bank-Led Resolution Approach**:** For loans between ₹50 crores and ₹500 crores, with banks responsible for devising resolution plans within 180 days.
- ARC-Led Resolution Approach: For loans exceeding ₹500 crores, to be resolved through the engagement of ARCs.

**Furthermore, the committee recommended:**

- Utilizing the National Company Law Tribunal (NCLT) for resolving stressed assets.
- Establishing a platform for trading both performing and non-performing assets.

***K. V Kammath Committee (2020) :*** The Kamath Committee was established to address the restructuring of loans impacted by the COVID-19 pandemic. Numerous businesses, previously financially sound, suffered significant setbacks during this period. The accumulation of debt posed a substantial risk of these assets transitioning into Non-Performing Assets (NPAs). Following petitions filed by various businesses, the Supreme Court directed the Reserve Bank of India (RBI) to establish an expert committee. The committee's objectives included:

- Identifying appropriate financial parameters for restructuring loans.
- Recommending sector-specific ranges for these parameters.
- Validating the restructuring processes for borrowers with aggregate loan exposures of ₹1,500 crore and above.

***Factors Contributing to NPA Formation:***

- Credit Risk**:** Inherent risk associated with lending, where borrowers may default on their loan obligations.
- Economic Downturns: Economic slowdowns can increase the likelihood of loan defaults.
- Poor Credit Underwriting: Inadequate assessment of borrower creditworthiness.
- Fraudulent Activities: Deceptive practices by borrowers can lead to loan losses.

***Impact of NPAs:***

- Reduced Profitability**:** NPAs directly impact a bank's profitability by reducing income and increasing provisions for loan losses.
- Weakened Balance Sheet: High NPAs erode asset quality and can impair a bank's capital adequacy.
- Liquidity Issues: Difficulties in meeting liquidity demands due to impaired loan assets.
- Systemic Risks: High NPAs in the banking sector can pose systemic risks to the financial system.

**Objectives*:*** 1. To investigate the correlation between Gross Non-Performing Assets (GNPA) and Gross Advances.
2. To analyze temporal trends in GNPA within public sector banks, private sector banks, and foreign banks over the period 2014-2023.
3. To analyze temporal trends in GNPA within scheduled commercial banks over the period 2014-2023.

**Hypothesis:**

$H_{01}$ – Gross advance has no significant impact on Gross Non-Performing Assets $H_{11}$ – Gross advance has significant impact on Gross-Non-Performing Assets

## MATERIALS AND METHODS:

This study relies entirely on secondary data sourced from the Reserve Bank of India website. Data on Gross Non-Performing Assets (GNPA) is collected at two levels:

- Bank Group-wise**:** Aggregates are provided for public sector, private sector, and foreign banks across different time periods.
- Bank-wise: Data on GNPA levels is available for individual banks within each sector.

The collected data is subjected to rigorous econometric and statistical analysis. Initially, econometric models are developed and subsequently analyzed using the EViews software. Additionally, Excel tools are employed to conduct trend analysis. This study utilizes a panel data approach, examining the relationship between GNPA and gross advances over the period 2014-2023.

***Methodology***

***Panel Data* :** Panel data, also known as longitudinal or repeated measures data, combines cross-sectional and time series dimensions. It comprises observations on multiple entities (individuals, firms, countries, etc.) over multiple time periods. This structure allows for the analysis of how variables change over time for the same entities. Time periods can be regular or irregular, depending on the study design. The data typically includes dependent and independent variables, as well as time-varying variables, individual-specific characteristics, and time-invariant variables. The linear panel data model, a statistical framework for analyzing panel datasets, accounts for both cross-sectional and time series variations. It can effectively capture individual-specific effects and time-specific trends, providing valuable insights into the relationships between variables within the panel.

The general form of the linear panel data model can be written as: $Y_{it} = \alpha + \beta X_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$

where: $Y_{it}$ is the dependent variable for entity I at time t $\alpha$ is the intercept term

$X_{it}$ is a vector of independent variables for entity I at time t

$\beta$ is a vector of coefficients associated with the independent variables.
$\alpha_i$ represents the individual specific effects, capturing unobserved heterogeneity across entities that are constant over time.
$\gamma_t$ represents the time specific effects, capturing common time-related factors that affect all entities in panel
$\varepsilon_{it}$ is the error term, representing the idiosyncratic or random component of the model.
The individual specific effects $\alpha_i$ and time specific effects $\gamma_t$ are typically included to account for unobserved heterogeneity and common time related factors, respectively. These effects can be captured using fixed effects, random effects or other alternative specifications, depending on the assumptions and objectives of analysis.
*Panel Data Regression Model :* The selection of the panel data regression model was made from among three estimation methods: pooled OLS, fixed effects, and random effects. For this empirical investigation, the chosen panel data model is
$GNPA_{it} = \beta_0 + \beta_1 (GA)_{it} + \varepsilon_{it}$

$\beta_0$ = constant $\beta_1$ = coefficient of explanatory variable $GNPA_{it}$ = The Gross NPA for bank I in time t, with determinant as
$GA_{it}$ = The Gross advances of bank I in time t $\varepsilon_{it}$ = The error term

### *Random Effects Model*

Random effects models assume the presence of unobservable individual-specific effects that influence the dependent variable. These effects are assumed to be randomly distributed across the individuals in the panel data. The model addresses the issue of varying error variances across individuals or time periods. Crucially, random effects models assume that these individual-specific effects are uncorrelated with the independent variables. This distinguishes them from fixed effects models, where these effects are assumed to be correlated with the explanatory variables. When the assumption of uncorrelated individual-specific effects holds true, random effects models offer more efficient estimation results compared to fixed effects models.The functional form of random effect model is, $Y_{it} = \alpha + X'_{it}\beta + (\mu_i + \nu_{it})$

Hence $\mu_i$ is an individual specific random heterogeneity with mean zero and variance $\sigma^2_\mu$ as well, as the remainder disturbances $\nu_{it}$ have mean zero and variance $\sigma^2_\nu$, therefore $\mu_i \sim IID\ \sigma^2_\mu)$, $\nu_{it} \sim IID\ (0, \sigma^2_\nu)$ and regressors are assumed to be independent on both the $\mu_i$ and $\nu_{it}$ for every I and t. A random effect model reduces the number of parameters to be estimated but fails to produce consistent results when individual specific random effect is correlated with any regressors.
*Fixed Effects Model :* It is used to analyze how explanatory variables influence dependent variables that change over time for each firm within a sector. It's particularly valuable for panel data, where repeated observations are made on individual entities over time, and unobserved or observed individual-specific factors might impact the outcome.When unobserved firm-specific effects or omitted variables are correlated with one or more regressors, the fixed-effects model becomes crucial. By effectively controlling for these omitted variable biases, it provides a more accurate estimate of the true relationship between the variables. A key assumption of the fixed-effects model is that unobserved individual effects are time-invariant. This implies that any observed changes in the outcome variable over time must be attributed to factors other than these constant characteristics. By removing the influence of these time-invariant individual effects from the explanatory variables, the model isolates the true impact of the predictors.The fixed-effects model also assumes that while the intercept may differ across individuals, the slope coefficients of the regressors remain constant. This means the effect of the explanatory variables on the outcome is consistent across individuals. The functional form of the fixed-effects model is:
$Y_{it} = (\alpha + \mu_i) + x'_{it}\beta + \nu_{it}$

Hence $\mu_i$ is the time invariant unobserved individual specific effect and the remainder disturbances stochastic with $\nu_{it}$, independent and identically distributed (IID) with mean zero and variance $\sigma^2_\nu$. Therefore, regressors are independent of the $\nu_{it}$ for the every i and t. In fixed effect model $\mu_i$ is assumed to be correlated with regressors. However, the model suffers from loss of degrees of freedom

***Model Selection:*** When analyzing panel data, both fixed-effects and random-effects models should be considered. The choice between these methodologies hinges on the assumed relationship between the regressors and the unobserved individual-specific effects.

- Random-effects models are appropriate when the unobserved individual effects are uncorrelated with the regressors.
- Fixed-effects models are more suitable when the unobserved individual effects are correlated with the regressors. This correlation can lead to biased estimates in the random-effects model.

The Hausman test is a crucial statistical tool in econometrics for determining the appropriate model specification in the presence of potential endogeneity. It helps decide between using a fixed-effects or a random-effects model for panel data analysis.

- The null hypothesis of the Hausman test states that the random-effects estimator is consistent.

- If the Hausman test provides a significant result (p-value < 0.05), it rejects the null hypothesis. This indicates that the random-effects estimator is likely biased, and the fixed-effects model is the preferred choice.
- If the null hypothesis is not rejected, it suggests that the random-effects estimator is consistent, and the random-effects model is more appropriate.

The Hausman test is a widely recognized and reliable statistical test for assessing the orthogonality between the common effects and the regressors.

*Redundant Fixed Effects Test :* To determine the influence of cross-sectional fixed effects on study results, a redundancy test is conducted within a fixed cross-sectional scenario. In panel data analysis, especially when dealing with large datasets and numerous variables, it's crucial to identify and address redundant fixed effects to mitigate multicollinearity issues. Redundant fixed effects arise when two or more variables in the model are highly correlated, hindering accurate estimation of model coefficients. Identifying and addressing these redundant effects is essential for ensuring the reliability and robustness of the regression results.

This test often employs cross-validation techniques to evaluate the model's performance with and without specific fixed effects variables. Cross-validation helps identify the most predictive set of variables and enhances the model's generalizability.

## RESULTS AND DISCUSSIONS

***Panel Data Analysis***

The panel data model for the empirical investigation has been specified as

$GNPA_{it} = \beta_0 + \beta_1 (GA)_{it} + \varepsilon_{it}$

Where:

$\beta_0$ = constant

$\beta_1$ = coefficient of Gross advances $GNPA_{it}$ = The Gross Non-performing assets for bank i in time t

$GA_{it}$ = The Gross advance of bank i in time t $\varepsilon_{it}$ = The error term

*Random Effect Model :* To assess whether Gross advance has a significant impact on Gross Non- performing asset, Random effect regression model is estimated. The results of the empirical model using Random effect model is shown in table 4.1

**Table 5-Random Effect model**

| Variables | Coefficient | Standard Error | t- Statistic | Probability |
|---|---|---|---|---|
| C | -2.605021 | 0.428212 | -6.083486 | 0.0000 |
| LOG(GA) | 0.934087 | 0.041921 | 22.28198 | 0.0000 |
| R- squared: 0.419871 Adjusted R-squared: 0.419011 F-Statistic: 488.5337 Probability: 0.0000 | | | | |

Hence the relation between the dependent variable GNPA and the independent variable GA (Gross advances) can be modelled as follows

LOG(GNPA) = -2.605021+0.934087*LOG(GA)

From the result it is clear that GA have a direct association with Gross NPA as p value is less than 0.05 for independent variable Gross advance.\

***Correlated Random Hausman Test :***

It is used to identify or determine whether or not random effects are affecting the model results. The hypothesis to be tested and the decision ruleare given on table below:

$H_0$: Random effects model is appropriate

$H_1$: Fixed effects model is appropriate

The Hausman test is used to choose whether the fixed effect model or Random effect model is appropriate for the data set

**Table 6- The Hausman test**

| Test Summary | Chi-Sq. Statistic | Chi-Sq d. f | Probability |
|---|---|---|---|
| Cross-section random | 10.619787 | 1 | 0.0011 |

From the test result it is clear that the p value of Hausman test is less than 0.05, the null hypothesis ($H_0$: RE

model is appropriate) is rejected. Therefore, Random effect model is not suitable for the data set. It can be found that random effects are not influencing study results hence the fixed effect model is more appropriate. This implies that fixed effects and not random effects are determining the impact of gross advances on gross non-performing assets

### *Fixed Effects Model*

The second model, fixed effects model explains the relationship between Gross non- performing assets and gross advances. The Hausman test result to check the suitability of FE and RE models for the dataset, showed that p value of Hausman test is < 0.05, and so rejected the null hypothesis, which makes alternative hypothesis being fixed effects model appropriatefor the data. The hypothesis for the test formulated is:
$H_0$: Gross advance has no significant impact on GNPA$H_1$: Gross advance has significant impact on GNPA
The results of the empirical model using the fixed effects method in table below show the relationship between GNPA and Gross advances

**Table 7- Fixed Effects model**

| Variables | Coefficient | Standard Error | t- Statistic | Probability |
|---|---|---|---|---|
| C | -0.277389 | 0.824758 | -0.336328 | 0.7367 |
| LOG(GA) | 0.704878 | 0.081881 | 8.608604 | 0.0000 |

R- squared: 0.920654
Adjusted R- squared: 0.908934 F-Statistic: 78.55397
Probability: 0.0000

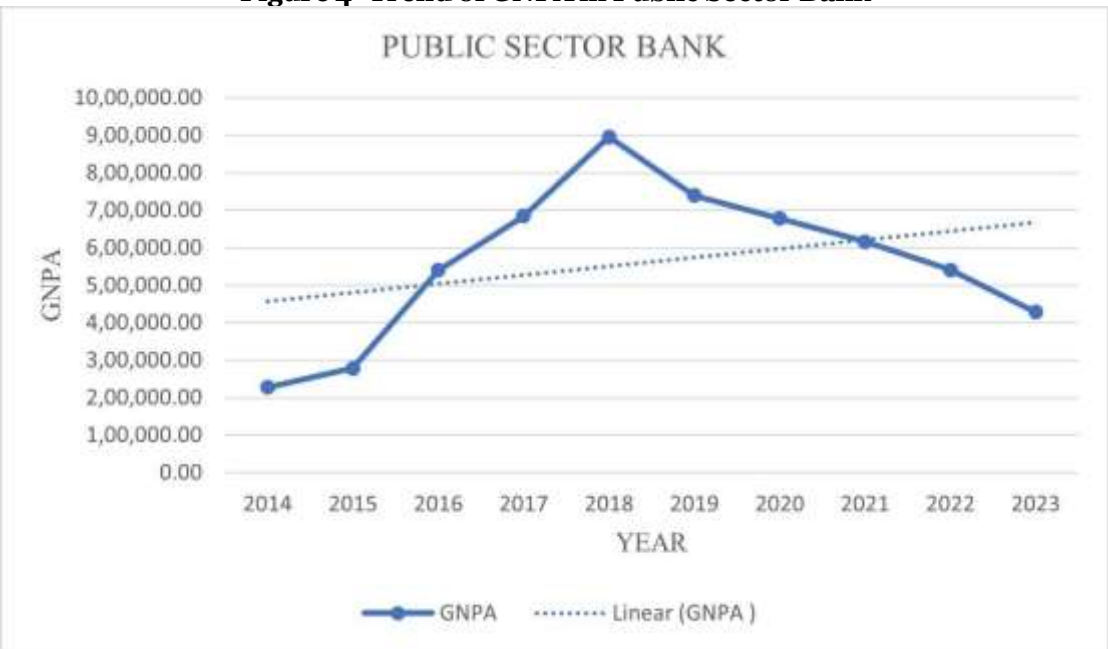
As shown in table, a high $R^2$ and adjusted $R^2$ value (90%) and significant F statistic value (p value: 0.000) indicate that the model is fit for the data-set. The value of adjusted $R^2$ shows that 90% of impact on GNPA is explained by the independent variable. It is also clear from the table that gross advance significantly impacts the GNPA as the p value is less than 0.05. It can be seen that gross advance has significant positive effect on GNPA. The relation between the dependent variable GNPA and independent variable gross advance can be modeled as LOG(GNPA) = -0.277389+0.704878*LOG(GA)

Since this is a double log model the estimated slope coefficients represent elasticities. Thus, if there is 1 percent increase in gross advance the GNPA goes up by 70%.

### *Trend Analysis*

### *Trend of GNPA in Public Sector Bank*

**Figure 4- Trend of GNPA in Public Sector Bank**



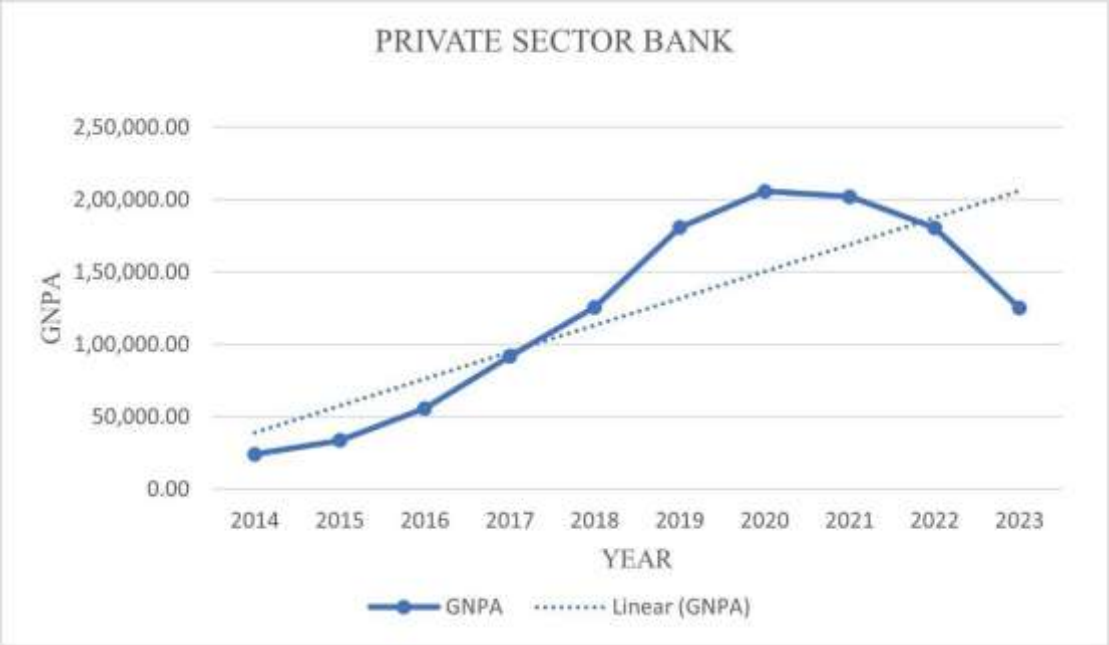

*Source: RBI, 2014-2023*

The trend of Gross Non-Performing Assets (GNPA) in the public sector over the past decade reveals

fluctuating patterns. Between 2014 and 2018 there was a consistent upward trajectory in GNPA figures, with values climbing from ₹2,27,263.91 crores in 2014 to ₹8,95,601.30 crores in 2018, indicating a significant rise in non- performing assets within the public sector during this period. However, starting from 2019, there was a notable decline with GNPA decreasing to ₹7,39,541 crores suggesting efforts to address and mitigate non-performing assets within the public sector. Despite this downward trend there was some slight fluctuations over the time.By 2023, the GNPA has further reduced as compared to its peak in 2018, but it remained above the levels observed in the earlier years of the analysed period.

### *Trend of GNPA In Private Sector Bank:*

**Figure 5- Trend of GNPA in Private Sector Bank**



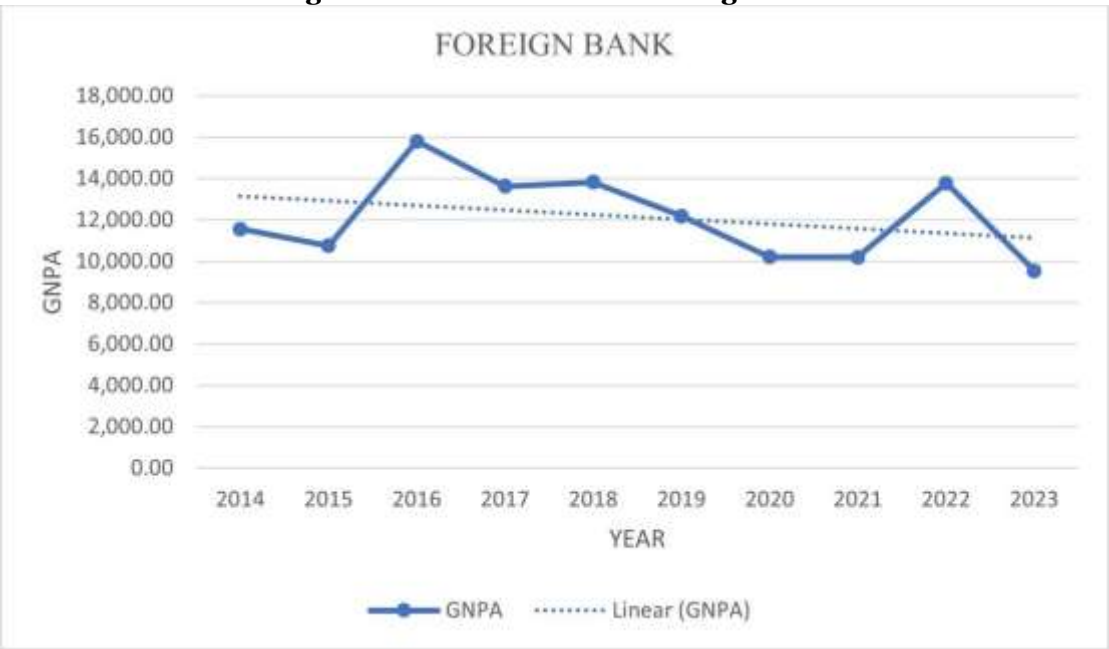

*Source: RBI, 2014-2023*

Over the period from 2014 to 2023, the Gross Non-Performing Assets (GNPA) of private sector banks in India exhibited a notable trend. Beginning at ₹24,183.50 crore in 2014, the GNPA increased consistently each year until 2020. This period witnessed a substantial surge, reflecting a concerning escalation in non-performing assets within the private banking sector. By 2020, the GNPA has reached a substantial ₹2,05,847.82 crore marking a significant challenge for the banking industry. However, following this peak, there was a visible reversal trend. From 2020 onwards, there was a gradual decline in the GNPA figures indicating potential efforts by private sector banks to address and mitigate non-performing assets. By 2023, the GNPA had reduced to ₹1,25,211.82 crores indicating effort to stabilize and improve asset quality within the private banking sector.

### *Trend of GNPA in Foreign Bank:*

The trend analysis of Gross non- performing assets for foreign banks from 2014 to 2023 illustrates fluctuations in performance over the period. Initially, there was a decrease in GNPA from 2014 to 2015, followed by a significant increase in 2015 to 2016.

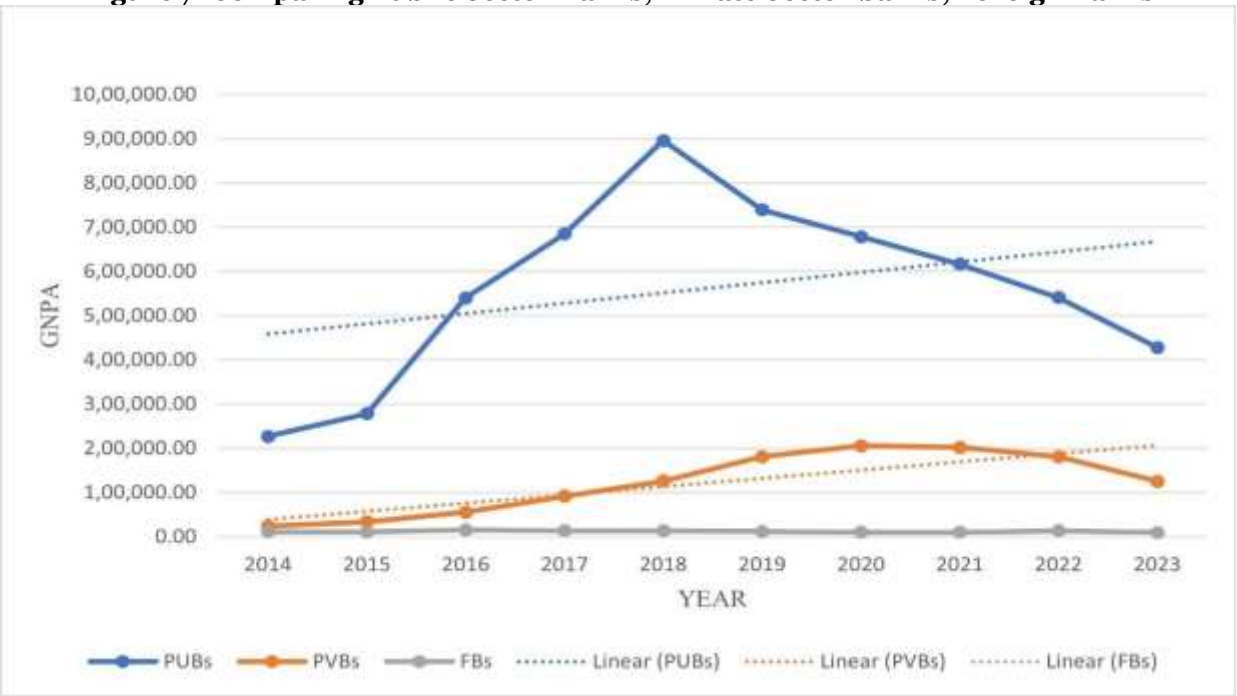
**Figure 6- Trend of GNPA in Foreign Bank**




*Source: RBI, 2014-2023*

In 2016, it reached as high as ₹15,797.99 crores, however, this growth was countered by a decline in 2017. Subsequent years saw mix of minor increase and decrease until 2019, with a notable decrease occurring from 2019 to 2020. While there was not much increase from 2020 to 2021, a substantial increase was observed in 2021 to 2022, with GNPA climbing to ₹13,786.18 crores followed by a significant decrease in 2022 – 2023 to ₹9,544.50 crores Figure 7 depicts that non-performing assets of various types of banks in the Indian financial sector have displayed distinct trends. Public sector banks experienced a surge from 2014, peaking in 2018 and then following a subsequent decline. Private sector banks exhibited a consistent increase till 2014 to 2019 and then a decline. In contrast foreign banks maintained relatively lower level of NPAs compared to public sector banks and private sector banks. Although there were fluctuations the overall trend for foreign banks remained relatively stable. In 2023, there was a notable decline in NPAs across all three sectors indicating potential recovery and better risk management implemented by banks.

**Figure 7- Comparing Public Sector Banks, Private Sector banks, Foreign Banks**



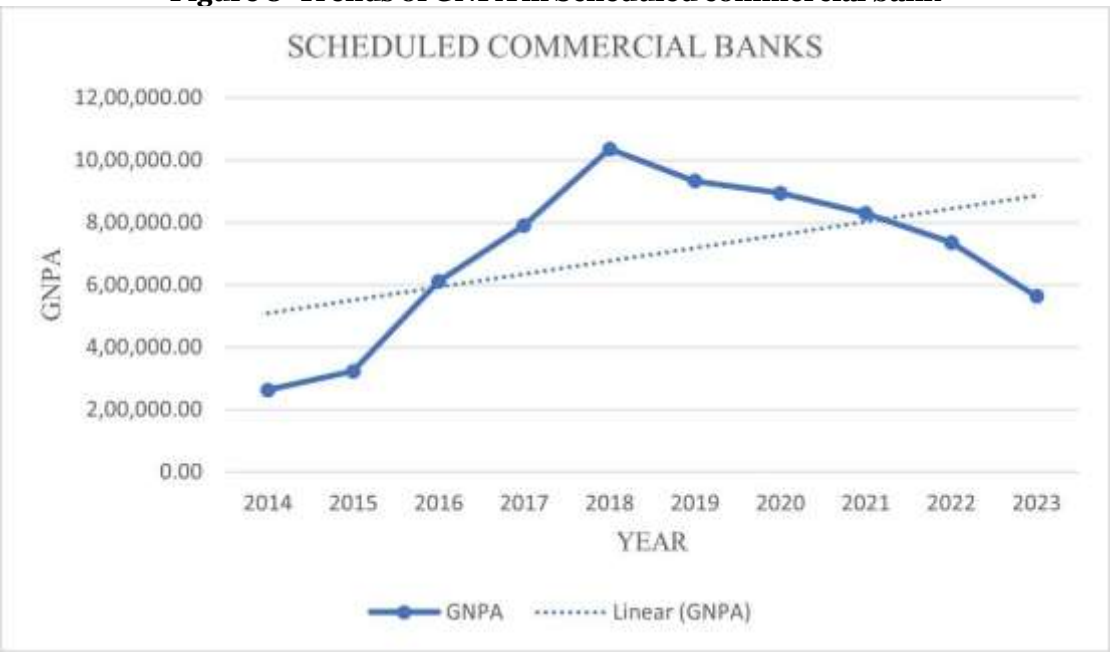

*Source: RBI, 2014-2023*

***Trend of GNPA in Scheduled Commercial Bank :***

Figure 8 depicts the trend of Gross non-performing assets in scheduled commercial banks for a period from

2014- 2023. From 2014 to 2018, there was a consistent and significant increase in Gross non-performing assets, reflecting a concerning trend of deteriorating asset qualities within the banking sector. This period saw GNPA surging from ₹2,63,015.17 crores in 2014 to ₹10,35,293.85 in 2018. This surge may be attributed to various factors such as economic slowdowns, and regulatory issues. However, from 2019 onwards, there was a reversal in this trend with GNPA showing a gradual decline. Despite minor fluctuations, the overall trajectory depicted a decreasing pattern reaching ₹5,62,953.69 crore rupees in 2023. This downward trend suggests efforts by banks and regulatory authorities to address the NPA crisis through measures like enhanced risk management practices, debt restructuring and resolution mechanisms

**Figure 8- Trends of GNPA in Scheduled commercial bank**




*Source: RBI, 2014-2023*

Non-Performing Assets (NPAs) have become a critical concern in the global banking sector in recent years, impacting financial stability and economic growth. In the Indian context, NPAs have been a persistent issue. The Indian banking system has witnessed a surge in NPAs, primarily driven by factors such as economic slowdowns, sector-specific stresses, and the aftermath of the global financial crisis. Domestic challenges, including policy uncertainties and structural weaknesses in certain industries, have further exacerbated the problem.

To address this, the Reserve Bank of India (RBI) and the government have implemented various measures, including regulatory reforms and the introduction of the Insolvency and Bankruptcy Code. Despite these efforts, NPA levels remain elevated, exerting significant pressure on the banking sector. As the Indian economy strives for sustainable growth, addressing the NPA burden is paramount. Reducing NPAs is crucial for facilitating improved credit flow, fostering investment, and supporting economic growth. Enhancing risk management practices, strengthening regulatory supervision, and accelerating NPA resolution are critical steps for the Indian banking sector to overcome this challenge.

## CONCLUSION

This study investigates the relationship between Gross Non-Performing Assets (GNAs) and Gross Advances. To determine the most suitable model, various panel data models, including fixed-effects and random-effects models, were developed. The Hausman test was employed to select the appropriate model.

The null hypothesis of the Hausman test posits that the random-effects model is appropriate. However, the test results led to the rejection of this hypothesis, indicating that the fixed-effects model is the more suitable specification for this analysis.

The estimated fixed-effects model exhibits a statistically significant relationship between Gross Advances and GNAs (p-value < 0.05). The coefficient of the independent variable (Gross Advances) suggests that a 1% increase in Gross Advances leads to a 70% increase in GNAs.

### *Trend Analysis:*

- *Public Sector Banks:* Experienced a consistent increase in GNAs up to 2018, reaching a peak of ₹8,95,601.30 crores during the study period. Subsequently, a decline was observed from 2019 onwards, albeit with minor fluctuations. While the trend is downward, GNAs for public sector banks remain significantly higher compared to the early period (2014-2015).

- *Private Sector Banks:* Showed a steady increase in GNAs from 2014 to 2020, followed by a period of slow decline.
- *Foreign Banks:* Maintained relatively stable GNA levels with minor fluctuations, exhibiting less volatility compared to public and private sector banks.
- *Scheduled Commercial Banks:* Displayed a trend similar to public sector banks, with a consistent increase from 2014 to 2018 and a subsequent decrease from 2019. This pattern reflects the efforts of banks and regulatory authorities to address the NPA issue.

Despite the declining trend, the elevated level of GNAs remains a significant concern. Strong and concerted efforts from banks and the government are crucial to effectively address NPAs. These efforts should encompass enhanced risk management practices, robust debt restructuring mechanisms, and efficient resolution frameworks to ensure the stable and sound financial health of the banking system and foster sustained economic growth.

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