Business Analyst, ISSN 0973 - 211X, 41(1), 23-53, ©SRCC

A TREND ANALYSIS OF NPAS OF BANKS IN INDIA FOR 2008-2018

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ABSTRACT

Non-Performing Assets (NPAs) are one of the indicators indicating the performance of banks in India. As Indian Financial system is banking dominated, its health reflects the health of the economy. This paper discusses the Gross NPA, Gross Advances and thus the Asset Quality of Public Sector banks, Private Sector banks and Foreign banks from 2008-2018. The objectives of the paper are to analyse the trends in banking sector, highlight individual banks and understand few dynamics. The data is mainly secondary in nature collected from the RBI website. The study finds that Public Sector banks have deteriorating performance than other banks in the period. The asset quality deteriorated to 11.2% in 2018 as highest peak.It also found that there exists positive relation of Gross NPA ratioamong PSB, PV and FB. Also there was significant difference in the Gross NPA (in amount) and Gross NPA ratio of different structure of banks measured by ANOVA. PSB advances are less affected by Gross NPA as compared to others.

Keywords: Non Performing Assets, Asset Quality, Gross Advances and Gross NPA, Public Sector Banks, Private Sector Banks and Foreign Banks

INTRODUCTION

The basic function of banks to accept deposits and give out loans on the basis of trust makes it vulnerable to various risks. One such risk is credit risk which is risk of non-

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repayment of loans in the form of principal or loans.After the implementation of Liberalisation, Privatisation and Globalisation (LPG) in the Indian Economy in 1991, a committee under Maidavolu Narasimham (13^{th} Governor of the RBI) was formed to look into all aspects of the financial system in India, popularly known as Finance Sector reforms. The committee recommended various measures to improve and strengthen the banking system. The recommendations ranged from consolidation of banks to de regulation of interest rates to setting up of Asset Reconstruction Companies to deal with the problems relating to mounting NPAs.

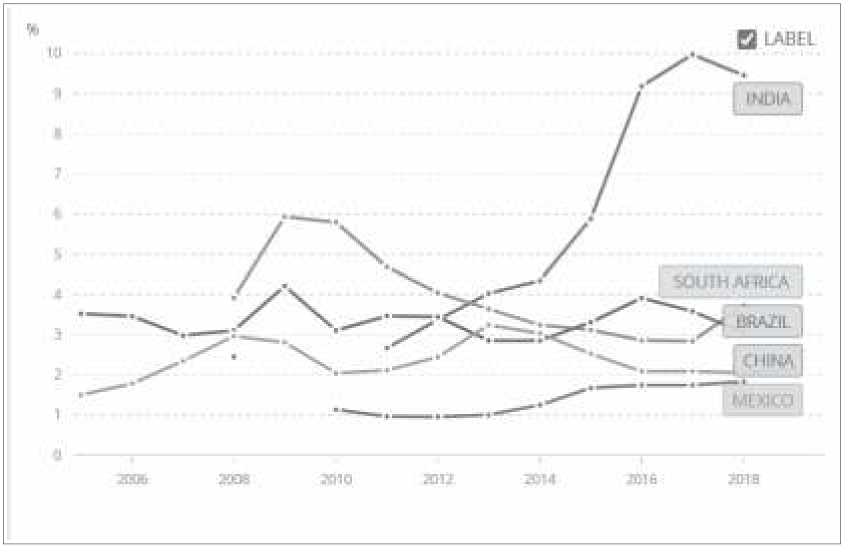
From then series of measures has been undertaken by RBI to deal with mounting problems of NPA. It varied from reducing the time period of NPA classification from 180 to 90 days to introduction of PCA to Special Mention accounts to IBC Code of 2016.

As per bis.org "There is no comparable internationally harmonised framework that governs NPA measurement".[1] Every country follows different measures of identifying NPA.

When comparing performance of India with respect to BRICS, India was worst performer as indicated by the World Bank.

1 See: https://www.bis.org/fsi/publ/insights7.pdf published by Bank for International Settlements on April 2018 retrieved on 04-04-2020

Figure 1:Nonperforming loans to total gross Advances of BRICS incl. Mexico



Source: data.worldbank.org

The real health was unveiled by the RBI in late 2015 by its Asset Quality Review. Growth in Net Profit was negative following the review for the banks.

When looked at the major contributors to Gross NPAs in amount for 2018, SBI (Rs. 223427 crore) and PNB (Rs. 86620 crore) had largest share among Public Sector Banks and Axis Bank (Rs. 30876 crore) and ICICI bank (Rs. 53240 crore) among Private Sector Banks. The total Gross NPA for Scheduled Commercial banks were on 2018 stood at Rs. 10,39,679 crore (85% were from Public Sector Bank) (PRS, 2018). Also as studied in a paper, HDFC has better financial performance than ICICI bank and can be demonstrated from the table 1 (Kashappa, CS, 2017)

Reasons to study the NPAs is that inability of the borrower to repay its principal and/or instalment creates NPAs for banks which affect its performance.

- Profitability- The profitability is affected as banks have to provide provisioning for non- performing. The funds get blocked from the current profit.

- Monetary transmission- Banks with low NPAs or low gross NPAs ratio are able to pass on the deteriorated quality of assets to the borrowers in the form of high lending rates resulting in increasing NIM.

- Management of NPAs: The management of NPAs burdens the banks. It requires administrative burden, case filings, follow-ups, delayed recoveries, etc.

- Credit crunch: When banks have large NPAs, they are reluctant to lend in the economy. This leads to credit crunch for the industries and ripple effect in the economy.

- Negative outlook: When banks reports high Gross NPAs, it signals lower asset quality of banks and thus affects share price of the banks. This leads to decrease in shareholders wealth as pointed in some of the studies.

REVIEW OF LITERATURE

The importance of NPAs levels in India could be checked by looking at various measures undertaken by the RBI and the government. Budget 2019 had Rs. 70000 crore for capitalisation of banks in India. There have been ample of studies on the presence of NPAs in banking sector. The studies range from determining the factors affecting NPA levels in India to their management. They have been undertaken in relation to various aspects of NPAs. Below are listed few areas where studies have been conducted.

Arunkumar and Koteshwar (2006) and Kadanda and Raj (2018)showed that concentration risk is an important component of credit risk and are directly related to higher NPAs in both public and private sector. Declining trend of NPAs can be associated credit portfolio diversification.A report by (PWC, 2014) showed that majority of the stressed assets in 2013 held with the banks were from Infrastructure sector. Credit rating is highly regarded for getting loans from the banks. As banks can develop their own credit rating model, ratings can be validated from that of the public credit rating agencies. RBI (2020) in its report stated that the credit rating agencies were responding in lag with the asset turning bad. This showed their inefficiency in timely reporting.

Many studies have been undertaken to study the determinants impacting the asset quality or NPA of banks.

Bardhan and Mukherjee (2016) checked the time persistence of NPAs in the banking structure for a period 17 years from 1995- 96 to 2011-12 of Indian banks with bank specific factors.NPAs not written off previously as reflected on the balance sheet gets piled up. Lagged profit or lower profit due to less repayment supports Bad Management hypothesis (Berger and DeYoung (1997). Lagged bank size effect (which showed that large banks may take risky decisions on the basis of past performance of the loan whereas small banks could be efficient) was significantly positive.Kadanda and Raj (2018) found high presence of NPAs in Public Sector banks due to decreasing trend in profitability post recession and identified factors affecting them such as past NPAs, theoperating efficiency of the bank, capital adequacy, GDP growth rate, and interest rate. The result of lagged capital adequacy ratio (Moral hazard hypothesis), lagged GDP positively related to GNPAs (bad management hypothesis) and lagged operating ratio (Skimping Hypothesis) (Hypotheses given by Berger and DeYoung); Kadanda (2019)found that Interest coverage ratio (ICR) of firms was lower than the standard showing that the firms were weak and vulnerable to distress post GFC. Plus, ICR and debt at risk is higher and increasing indicating possibility of default and poor asset quality. Profitability as measured by Return on Assets (ROA) was declining since GFC causing trouble to the asset quality of the banks.

Kaur Bawa, Goyal, Mitra & Basu (2019) conducted analysis of performance of banks in India using 31 financial ratios for 2007-2014 i.e. for 8 years. One of the findings include that bank intermediation cost was negatively related to NPAs. Financial Intermediation cost is “cost is the total operating expenses for a bank as it represents the total cost involved for lending. This ratio is calculated using the total operating expenses to total assets

NPAs studied in different aspects and its management:

Swain and Das (2019)analysed relationship between NPAs and profitability of banks using correlation and regression and found positive relation between NPAs and profitability for PSB, negative relation for PVB and Foreign banks from 2011 to 2015. Whereas Bhanumurthy and Gupta (2015)in their paper showed that Off balance sheet items have severely affected profitability of banks as compared to NPAs from 1998-2007. They also stated that foreign banks are at the high risk level due to exposure to off balance sheet items.Following this RBI (2016) researched thatNPA creates hindrances to monetary rate transmission or policy rate changes as initiated by it, period April 2010- June 2017.They found that when GNPAs are high and rising, banks did not lent aggressively and could not protect their NIM in the competitive environment (banks are not responsive to rate cuts).

Agarwala (2019)studied the period from 2010-2017 of the Indian banking system. It found that DCB had better performance than Axis bank whereas Andhra Bank, Punjab and Sindh bank and IDBI banks low performance than Vijaya bank and Bank of Maharashtra in terms of growth in NPAs.

Gupta and Dharwal (2017)conducted a study on recovery of NPAs in Public sector banks in the period 2001-02 to 2012-13. The study revealed that SARFAESI Act 2002 was more effective initiative than Debt Recovery Tribunal and Lok Adalats as the percentage of recovery was significant; Economic Survey (2020) suggested PSB to use big data, machine learning and Artificial Intelligence for loan disbursements similar to GSTN. This way every large investment can be properly screened and continuously monitored. The collateralised assets can be geo tagged (GPS enabled) to help lenders track the location of the assets. AI-machine learning can be developed for credit rating of corporate (doing way with internal rating system of banks)

Meher et.al(2020) tried capturing opinions of bankers. Most of the bankers favoured wilful defaulters, government schemes and weak project appraisal as major contributor to NPAs. Bankers used Preventive measures less frequently due to structural problems.

Objectives, Research Methodology and Hypotheses

The objectives of undertaking the current study are listed below:

- To determine the trends of Asset Quality of public sector, private sector and foreign banks in India
- To bring into light the individual banks in PSBs and PVBs sectors contributing to high NPA
- To study the dynamics of asset quality among banks

The study is undertaken to analyse the Gross NPAs and Gross Advances of banks in India to check the trend. The study covers ten years from 2008 to 2018. The period is post Financial Crisis and includes Asset quality review and Insolvency and Bankruptcy Code 2016. In totality PSB, PVB and Foreign Banks. Individually, SBI & its associates, Nationalised banks, new private sector and Old Private Sector banks are taken. The sample is taken from 44 banks. Gross NPAs and Gross Advances have been used as variables. The data is primarily secondary in nature collected from the RBI. It includes Trends & Progress Reports, Handbook on Indian Economy, Statistical tables and Financial Stability reports and other government websites. Statistical tools such as Karl Pearson's Correlation Analysis and Simple Regression and Descriptive Statistics are used.

Hypotheses: Following are the hypotheses formed to study, these are:

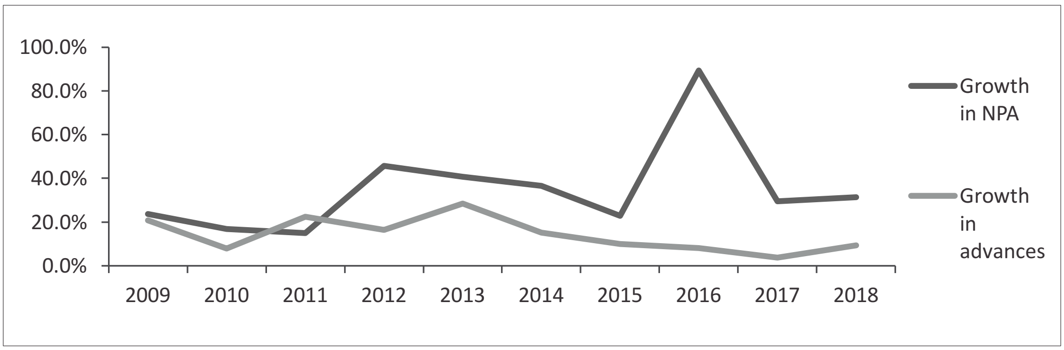
- Ho1 (Null Hypothesis): There is no significant difference in the Gross NPAs (Rs. Crore) between different structures of banks (PSB, PVB and FB) in the study period.
- Ho2: There is no significant difference in the GNPAs ratio (measure of asset

quality) of the different structures of banks (PSB, PVB and FB) in the study period

Data Analysis and Results

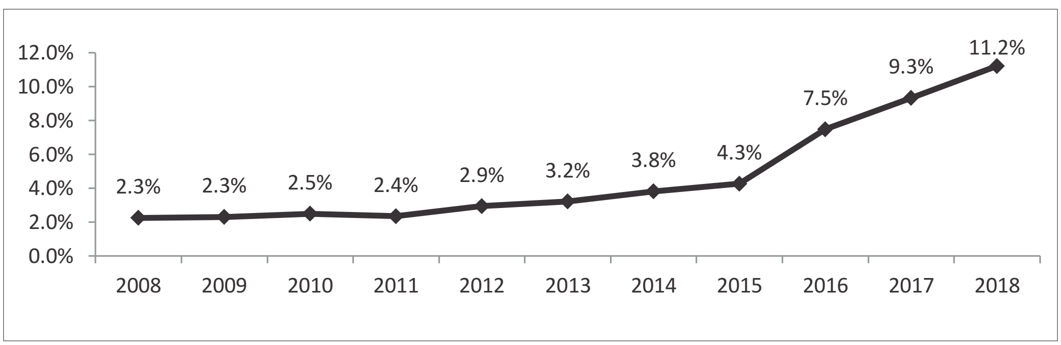
After the global financial crisis 2008-09, Indian banking system faced the brunt of it. The growth in advances of banks started crumbling down due to liquidity issues i.e. advances were increasing at a decreasing rate. After 2011, growth rate in GNPAs crossed the growth rate in advances deteriorating the asset quality of the banks.(Figure 2 and Figure 3)

Figure 2: Growth rates of GNPAs and Advances of SCB



Source: dbie.rbi.org.in

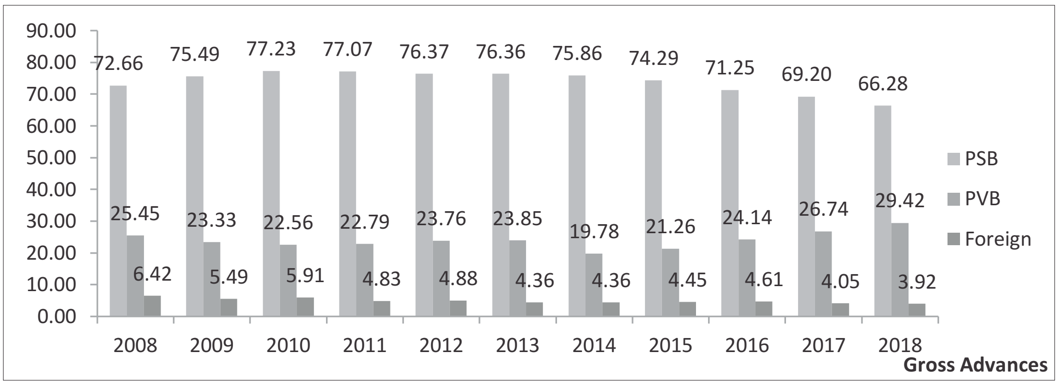
Figure 3: GNPAs ratio of all Scheduled Commercial Banks



Source: dbie.rbi.org.in

Figures 4 and 5shows the Gross advances as a percentage of Gross loans of Scheduled Commercial Banks and Gross NPAs as a percentage of Gross NPAs of Scheduled Commercial Banks

Figure 4: Gross Advances of PSBs, PVBs and Foreign Banks in India

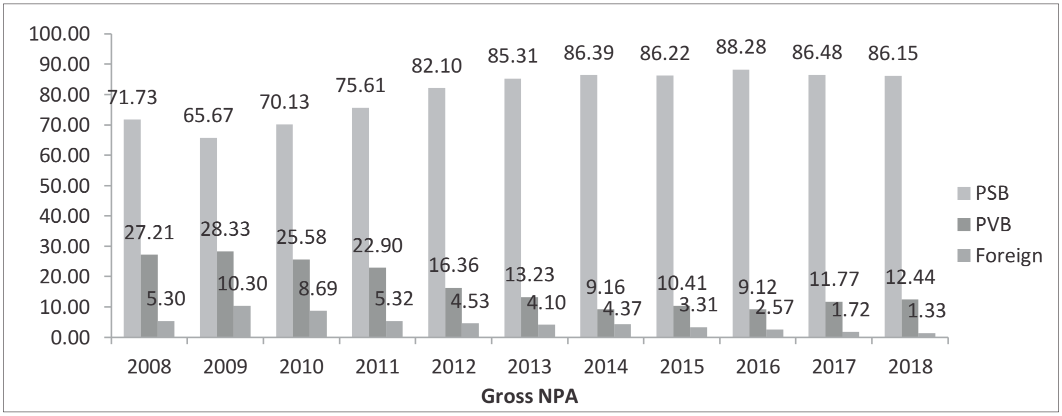


Source: dbie.rbi.org.in and Trend & Progress Reports

The major lender of credit in the economy remains Public Sector Banks followed by Private Sector and Foreign Banks. According to the IMF Staff Country Report of December 2019, PSBs account for 61% of the banking system's assets. The Banking assets for the Indian Economy stood at US$ 1,350.29 billion.

The proportion of advances of PSBs has been highest in 2010 at 77.23% and thereafter there has been continuous decline every year. The GNPAs are shooting every year with highest in 2016 at 86.48%.Contrast to this, PVB's advances after a decline in 2014, is increasing rapidly. This is accompanied by declining GNPAs in Total GNPAs reflecting healthy position of PVBs

Figure 5: Gross NPAs of Public Sector, Private Sector and Foreign Banks in India



Source: dbie.rbi.org.in and Trend & Progress Reports

When inspected further to find which banks under PSBs and PVBs contributed the most to the GNPAs and Gross Advances, we have-

Table 1: Gross NPA of Top three banks contributing highest GNPAs in amount in Rs. crores

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
SBI	12837	16346	17836	23074	37156	51189	61605	56725	98173	112343	223427
PNB	3319	2767	3214	4379	8690	13466	18880	25695	55818	55370	86620
ICICI	7580	9649	9267	9816	9293	9608	10506	15095	26221	42159	53240

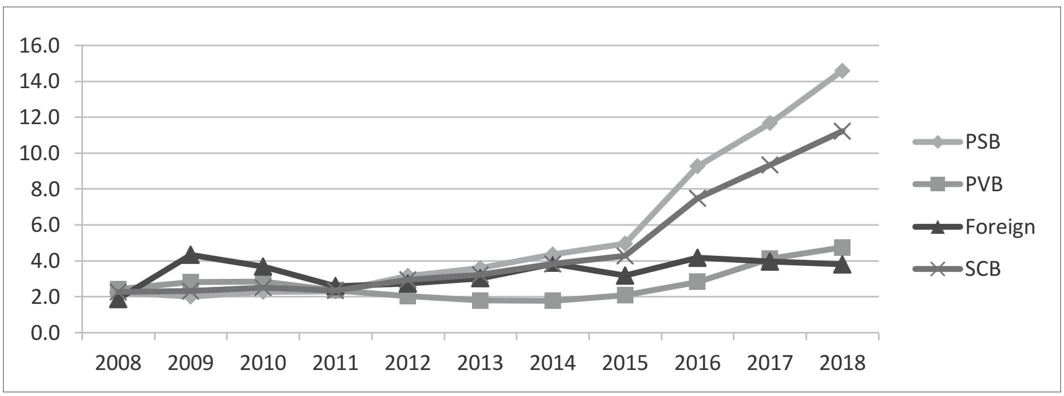
Source: dbie.rbi.org

State Bank of India has remained the highest contributor to the Gross GNPAs followed by Punjab National bank and ICICI Bank Ltd. This indicated larger share of lending to the riskier projects by the PSB.

Asset Quality

An attempt is made to study Asset quality of various banks in the bank wise segment. Asset can be defined as the quality of loan portfolios of the banks (loans and advances being the majority of the assets of the banks). It is used to assess the credit risk of the portfolio. The risk involves non repayment of interest on loans and investments and principal repayment.

Figure 6: GNPAs ratio of banks in India in comparison to SCB



Source: dbie.rbi.org & Trends and Progress Reports

The above figure 6 shows GNPA ratio bank wise over the period of 10 years. Initially, the GNPA ratio was constant for Public Sector banks whereas Private sector had high GNPA. The deterioration of asset quality worsened for foreign banks for the period 2008-2011 (it rose to 4.3% in 2009) as foreign banks saw tremendous growth in GNPAs in 2009 (figure 9). Later it converged with other banks in 2011 when growth in GNPAs was negative and growth in advances was falling (figure 9).Asset quality started deteriorating for PSBs which rose from 2.3% in 2011 when growth in GNPAs and Advances was almost constant to 4.7% in 2018 while advances were declining. The GNPAs spiked in 2016 at 93.9% when advances were continuously falling (figure 7).

The trend for private sector was different where growth in GNPAs was lower than the growth in advances till 2015. After 2015, growth in GNPAs was higher than the growth in Advances. Private Sector banks took dip in the ratio and was minimum of all from 2011 (2.4% in 2011)till 2017 (4.1% 2017) and then started increasing. In the mean time foreign banks were worse than PVBsand only after 2017 it improved (figure 8).

Figure 7: Growth in GNPAs and Advances of PSBs

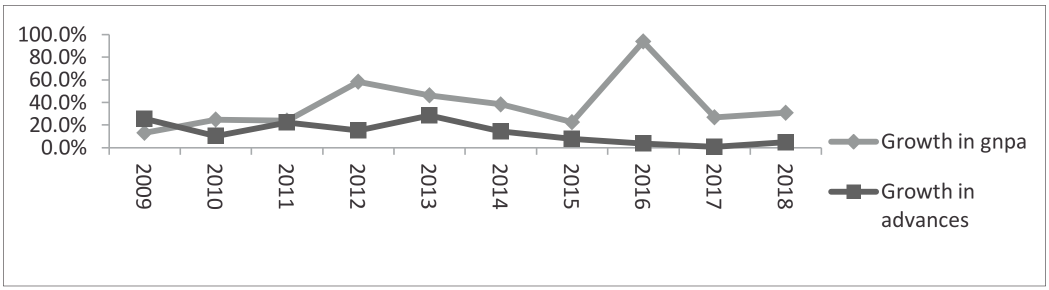


Figure 8: Growth in GNPAs and Gross Advances of PVBs

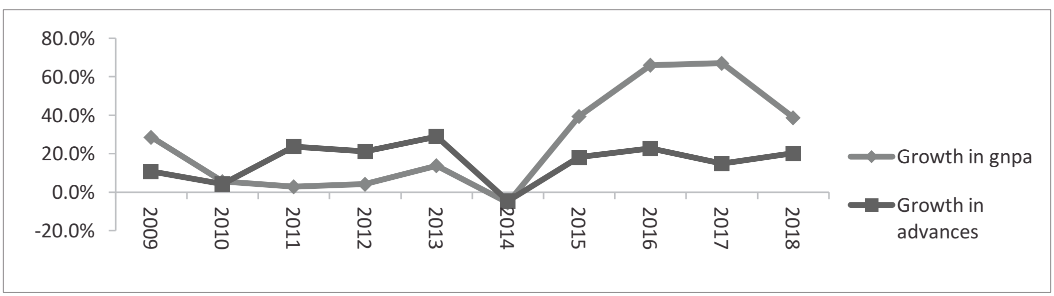
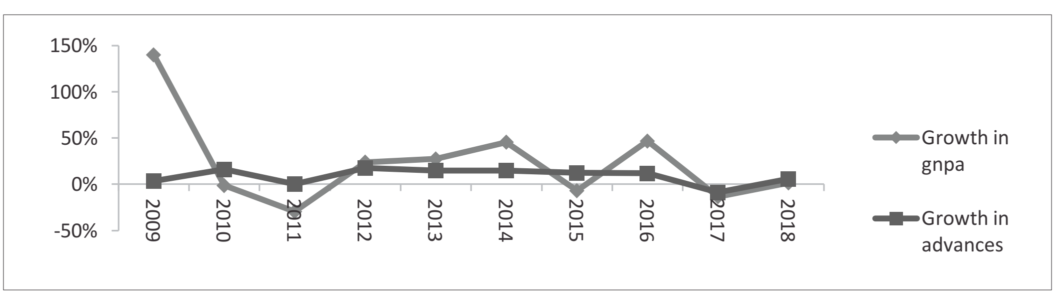


Figure 9: Growth in GNPAs and Advances of Foreign Banks



Source: Own Computation from data retrieved from dbie.rbi.org and other reports

On analysing individual banks of PSBs and PVBs we get the following table for different years for banks which have the highest GNPA ratio in the category.

Table 2: Year wise highest Gross NPAs ratio of PSB and PVB

Year	PSBs	GNPA ratio	PVBG	NPA ratio
2008	Central Bank of India	3.16%	RBL Bank	6.00%
2009	State Bank of India	2.98%	DCB Bank Ltd.	8.78%
2010	Indian Overseas Bank	4.71%	DCB Bank Ltd.	8.69%
2011	State Bank of India	3.48%	DCB Bank Ltd.	5.86%
2012	State Bank of India	4.90%	ICICI	4.83%
2013	UCO Bank	5.42%	Lakshmi Vilas	3.87%
2014	United Bank of India	10.47%	Lakshmi Vilas	4.19%
2015	United Bank of India	9.49%	J&K Bank	5.97%
2016	Indian Overseas Bank	17.40%	J&K Bank	8.32%
2017	State Bank of Mysore	25.68%	J&K Bank	11.20%
2018	IDBI Bank	27.95%	Lakshmi Vilas	9.98%

Source: dbie.rbi.org

An analysis of the above table is as follows-

Table 3: Highest Gross NPA ratio

	PSB	PVB
Highest Gross NPA ratio in the table	• IDBI in 2018: It has the highest ratio among all the years, a GNPA ratio of 28% in 2018 showing its deteriorating condition. • IDBI was already in the troubled condition due to its reckless lending. • It was put under PCA by RBI and later in 2019 taken over by the LIC India and now is treated as Private Bank.	• Lakshmi Vilas bank in 2018: had 9.98% GNPA ratio in 2018. • The bank had reduced the growth rate in its lending whereas it NPA shoot up after 2016 due to Asset quality review. • Therefore, they had to provision more for that rise
	• State Bank of Mysore: It had highest GNPA ratio in 2017 at 25.68%. • This bank was merged with State Bank of India in 2018.	• J&K bank had 11.20% of Gross NPA ratio in 2017. • The reason attributed to this high percentage is the huge corporate loans, delay in recoveries and poor management.
	• Indian Overseas Bank: The performance of Indian Overseas at 17.40% in 2016 reflects the Asset Quality Review exercise. • The loans given by this bank was mainly to small and large companies.[2] • These loans had high credit risk	• DCB Bank Ltd.: DCB Bank ltd. in 2009 had 8.9% of assets as deteriorated assets which was highest among all other Private Banks. • DCB was highly dependent on Unsecured Personal loans till 2010

2 See: https://www.firstpost.com/business/indian-overseas-bank-npa-at-20-will-govt-burn-a-hole-in-taxpayers-pockets-again-2946228.html written by Dinesh Unnikrishnan dated 10-08-2016 retrieved on 08-04-2020

Table 4: Lowest Gross NPA ratio

	PSB	PVB
Lowest Gross NPA ratio in the table	• SBI : SBI had 3.48% in 2011 and in following years it performed satisfactorily. • SBI merged with State Bank of Indore in 2010 which impacted its NPA in the next year.	• ICICI Bank has lowest GNPA ratio of 4.83% in 2012
	• Central Bank of India had 3.16% as GNPA in 2008. It was the lowest among the PSBs. • It was later put under PCA in 2017	• Lakshmi Vilas bank : In 2014, GNPA rose at 18.8% and Advances grew at 9.63%. • The Gross NPA ratio was 4.19% • The bank followed restructuring of many loans.
	• State Bank of India : It had the highest ratio at 2.98% as SBI merged with State Bank of Saurashtra, one of the associate banks in 2008. • But when comparing it to later years it is one of the lowest	• Lakshmi Vilas Bank : In 2013, Gross NPA grew at 49.48% and Gross Advances grew at 15.14% • The Gross NPA ratio was 3.87%

Source: Various news reports

Private Sector banks have performed well in comparison to Public Sector in maintaining their Asset quality.

On analysing the descriptive statistics for the GNPAs ratio or Asset quality measured in percentages, it can be seen that Public Sector Banks have the highest variability among banks at 79% followed by Scheduled Commercial banks. The mean statistic is higher for Public Sector banks (5.495%) and lowest for Private Sector Banks (2.708%). The descriptive have been calculated for 10 years.

After analysing the descriptive statistics, individual bank wise analysis was made.

On Individual bank level, IDBI bank had the highest Coefficient of Variation for GNPAs ratio of 118.7%. It had satisfactory growth in GNPAs whereas growth in advances has been declining since 2016. IDBI was the troubled bank where government made many efforts to revive but it fall short and finally was merged with the LIC India. IDBI now is a private sector bank. According to the Public Accounts Committee report "increasing gross NPAs and net NPA of IDBI Bank at Rs44,752 crore (21.25%) and Rs25,206 crore (13.21%), respectively as on March 2017 compared with gross NPA of Rs24875 crore (10.98%) and net NPA of Rs14,643 crore (6.78%) as on March 2016, are indeed alarming". This led IDBI fall into Prompt Corrective Action of the RBI in 2016.

SBI recorded minimum variation in the mean value of GNPAs ratio 45.93%. The GNPA ratio for SBI has been increasing consistently. It recorded highest variation in growth in advances due to mergers with its associates that are State Bank of Saurashtra (in 2009), State Bank of Indore (in 2011), State Bank of Mysore (in 2018), State Bank of Patiala (in 2018) and State Bank of Travancore (in 2018) and Bhartiya Mahila Bank (in 2018).

Following the same, Axis bank (New Private sector) and RBL bank (Old Private sector) had highest CV for GNPA ratio at 95.9% and 92.7% respectively. RBL bank hadincreasing asset quality prior to 2014 but after the asset quality started deteriorating (in 2013, 2014, 2015 Gross NPA ratio was 0.40%, 0.79% and 0.77% respectively). Keeping 2008 (6%) as base year, asset quality in 2018 was 14.32 times of 2018 (1.40%). This was due to its exposure of loans toagriculture which were

Table 5: Gross NPAs of Old and New Private Sector Banks in Rs. crore

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
NPVB	9889	13900	13772	14277	14115	15552	18276	24527	40929	74937	101150
OPVB	2246	2633	3013	3475	3946	4708	5159	7860	11389	15033	22092

Source: Compilation from RBI documents

Table 5 shows that the NPAs of Old Private sector banks have always been lesser than the New Private Sector banks in amount. We can say that though OPVB have less Gross NPA and Gross Advances, the relative measure of asset quality is poor.

To sum up, the overall Gross NPA ratio of PVB (except for RBL and DCB) was lower than PSBand this trend was followed.

<u>Descriptive Statistics</u>

This part deals with describing and understanding features of the dataset of the sample. In other words, it describes the characteristics of the data under study. The measure of central tendency is mean and variability is measured by Standard Deviation, Maximum, Minimum, Kurtosis and Skewness.

The tables below are showing descriptive Statistics for GNPA ratio for the banks

Table 6:Descriptive Statistics of banks of GNPAs ratio (in %)

	Minimum	Maximum	Mean	Std. Deviation	CV	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
GNPA_PSB	2.0	14.6	5.495	4.345	79.081	1.304	0.661	0.455	1.279
GNPA_PVB	1.8	4.7	2.708	0.944	34.846	1.299	0.661	1.097	1.279
GNPA_FB	1.9	4.3	3.381	0.765	22.621	-0.685	0.661	-0.293	1.279
GNPA_SCB	2.3	11.2	4.703	3.162	67.242	1.301	0.661	0.350	1.279

Source: Computed from RBI website

waived off. After 2014, the growth in advances started declining and growth in NPAs started increasing.

Axis bank also had highest GNPAs ratio variability after RBL bank. The GNPA ratio started increasing from 2013 and it spiked five times in 2017. The growth in advances has been declining with relatively lower variation than others.

Similarly, HDFC bank has lowest variation in Asset quality of 29.8%. The GNPAs ratio had been smooth throughout with marginal increase and decrease each year. It was the highest in growth of advances with mean of 24% among other new private sector

Correlation Analysis

The correlation analysis is conducted to check correlation of PSBs, PVBs and Foreign banks on the basis of GNPAs, Gross Advances, Growth of GNPAs and Growth of Gross Advances.

Table 7: Correlation between Gross NPA and Gross Advances (Bank wise)

	PSB Gross NPA	PVB Gross NPA	FB Gross NPA	SCB Gross NPA	PSB Gross Advances	PVB Gross Advances	FB Gross Advances	SCB Gross Advances
PSB Gross NPA	1							
PVB Gross NPA	0.97061	1						
FB Gross NPA	0.84906	0.72323	1					
SCB Gross NPA	0.99980	0.97507	0.84215	1				
PSB Gross Advances	0.82801	0.70225	0.90495	0.81979	1			
PVB Gross Advances	0.97329	0.91864	0.86919	0.97062	0.91918	1		
FB Gross Advances	0.85550	0.72024	0.93875	0.84667	0.98216	0.92146	1	
SCB Gross Advances	0.89091	0.78277	0.91720	0.88423	0.99214	0.95906	0.98418	1

Source: Computed from RBI website

The table 7 showing correlation between Advances and Gross Non-performing assets shows that there exists positive relation between these two variables among all the types of banks. Analysis of these correlations can help to find which type of bank is highly inclined to GNPAs with respect to its advances.

There exists very strong correlation between SCB NPAs and PSB NPAs of 0.99980 as the share of Gross NPA of PSB was about 86% of the total Gross NPAs of SCB. The correlation between PSB Gross NPA and PVB Gross NPA is 0.97061. This shows the NPAs of both banks moved in the period 2008-2018 with the changes introduced or prevailing financial climate in the economy. The correlation between PSB Gross NPAs with its advances was 0.82801 lesser than with PVB advances of 0.97329. This can be mainly due to the decline in the advances of the PSB and small increase in PVB advances in the economy leading to positive correlations.There exists correlation of 0.8550 between PSB Gross NPAs and Foreign bank advances and 0.89091 between PSB GNPA and SCB advances.

The correlation between PVB GNPAs and SCB GNPAs was 0.97507 because of marginal increase in advances of PVBs after 2014. PVBs were 0.91864 correlate with their advances meaning as advances increased, many among them may turn NPAs. In total gross advances of SCBs, PVB GNPAs was correlated at 0.72024 showing better management of NPA than PSB.

The correlation between Gross NPAs of FB and SCB GNPA was 0.84215 because of the small size of foreign banks in the Indian economy. The advances of FB were highly correlated to its GNPAs as compared to PSB and PVB. There existed a correlation of 0.86919 between FB NPA and PVB Gross advances, 0.90495 with PSB Gross Advances and 0.91720 with SCB gross advances. FBs were also major contributor of NPAs in India. Therefore, foreign banks GNPAs had high positive correlation with SCB Gross Advances.

The correlation of Gross Advances of PSB and Gross Advances of PVB was 0.91918, with FB Advances was 0.98216 and with SCB advances was 0.99214.

Table 8: Correlation between Gross NPA ratio and growth in GNPAs (Bank wise)

	PSB GNPA	PVB GNPA ratio	FB GNPA ratio	SCB GNPA ratio	PSB GNPA growth	PVB GNPA growth	FB GNPA growth	SCB GNPA growth
PSB GNPA ratio	1							
PVB GNPA ratio	0.81815	1						
FB GNPA ratio	0.45945	0.42459	1					
SCB GNPA ratio	0.99952	0.82783	0.47784	1				
PSB GNPA growth	0.29313	-0.10070	0.32456	0.28898	1			
PVB GNPA growth	0.73826	0.60271	0.58038	0.74976	0.35963	1		
FB GNPA growth	-0.21802	-0.15056	0.52121	-0.20851	0.11729	0.04687	1	
SCB GNPA growth	0.38341	-0.00726	0.48072	0.38214	0.96915	0.50381	0.27363	1

Source: Computed from RBI website

The table 8shows correlation between Gross NPA ratio and growth rate of Gross NPA or correlation between Asset Quality and Growth rate of NPA of banks. The analysis was made to see correlation and its degree between Asset qualities of a bank with the growth in NPA of another bank. A positive and relatively lower correlation exists between Gross NPA ratios (Asset quality) of bank with itsgrowth of Gross NPA.

There were positive correlations between Asset quality of PSB, PVB and FB. Strong and positive correlation was between asset quality of PSB and SCB at 0.99952 and between asset quality of PVB and SCB at 0.82783. Weak correlation existed between asset quality of FB and SCB at 0.47784.

The correlation between Gross NPA ratio (asset quality) of PSB and growth in Gross NPA of PSB was at 0.29313. This is because of Asset quality of PSB has been declining throughout but growth in Gross NPAs has been rough with ups and downs. The Gross NPA increased at a decreasing rate from 2012- 2015, spiked in 2016 and started declining again. The correlation between PSB Gross NPA ratio and growth in

Gross NPAs of PVB was 0.73826 and PSB asset quality stood negative to the growth in Gross NPAs of FB at -0.21802. Also the Gross NPA ratio of PSB was weakly correlated with SCB growth in Gross NPAs.

The correlation betweenGross NPA ratio (asset quality) of PVB and growth in its Gross NPA was 0.60271. This shows moderate and highest correlation among other banks. This implies that pattern can be seen in the movement of these two variables. The correlation of Gross NPA ratio of PVB with growth in Gross NPA of PSB was negative with -0.10070, with growth in Gross NPA of FB was -0.15056 and with growth in Gross NPA of SCB was -0.00726. The Gross NPA ratio of PVB was weakly correlated with Gross NPA ratio of FB at 0.42459.

The correlation of Gross NPA ratio of FB was weak at 0.32456 with growth in Gross NPA of PSB. Similarly, it had weak correlation with growth in advances of PVB at 0.58038 and only 0.48072 with growth in advances of SCBs.

ANOVA Testing

In order to test Hypotheses 1 and 2 as stated earlier, One Way ANOVA testing is used. One way ANOVA testing is used to check whether there is any difference between the means of three or more independent groups.

- Ho1 (Null Hypothesis): There is no significant difference in the Gross NPA (Rs. Crore) between different structures of banks (PSB, PVB and FB) in the study period.

  Ha1 (Alternate Hypothesis): There is significant difference in the Gross NPA (Rs. Crore) between different structures of banks (PSB, PVB and FB) in the study period.

Table 9: ANOVA test for Gross NPA in amount

Source of Variation	SS	df	MS	F	P-value*	F crit
Between Groups	4.93264E+11	2	2.46632E+11	8.470345309	0.001212	3.31583
Within Groups	8.73513E+11	30	29117104485			
Total	1.36678E+12	32				

*Significance level at 5% Source: Computed from RBI website

As can be observed from the table above, $p < 0.05$ i.e., $0.001212 < 0.05$. As a result of this null hypothesis stands rejected and alternate hypothesis is accepted. Therefore, there exists significant difference between the different structures of banks with respect to their Gross NPA.

- Ho2: There is no significant difference in the asset quality of the different structures of banks (PSB, PVB and FB) in the study period

  Ha2: There is significant difference in the asset quality of the different structures of banks (PSB, PVB and FB) in the study period

Table10: ANOVA testing for Gross NPA/ Gross Advances

Source of Variation	SS	df	MS	F	P-value*	F crit
Between Groups	46.50742424	2	23.25371212	3.427106967	0.045657	3.31583
Within Groups	203.5569273	30	6.785230909			
Total	250.0643515	32				

*Significance level at 5% Source: Computed from RBI website

As can be observed from the table, $p < 0.05$ i.e. $0.045657 < 0.5$. As a result of this, null hypothesis stands rejected and alternate hypothesis is accepted. Therefore, there exists significant difference between the Gross NPA ratios between different structures of the banks.

Regression Analysis

In order to gauge the relationship between Gross Advances and Gross NPAs of PSB, PVB and FB, regression analysis is undertaken. For this, independent variable is taken as Gross NPA and dependent variable is taken as Gross Advances for the period of 2008-2018.

Table 11: Regression Statistics for PSB, PVB and FB

Regression Statistics	PSB	PVB	FB
Multiple R	0.828008342	0.918637604	0.938752222
R Square	0.685597814	0.843895047	0.881255734
Adjusted R Square	0.650664237	0.826550052	0.868061927
Standard Error	956383.0336	285948.8884	29770.39909
Observations	11	11	11

Source: Computed from RBI website

From table 11, it can be observed that there is positive correlation between Gross Advances and GrossNPA of PSB, PVB and FB. The highest correlation is for FB at 0.938 followed by PVB at 0.9186 and PSB at 0.828. The R square value of FB is 0.88 which is greater than 0.60 and can be considered as good model fit between the variables. The R square for PVB is 0.843 which also indicates good fit model between the variables. In comparison to FB and PVB, PSB has comparatively lower R Square of 0.68 signifying that some advances are not dependent on the NPA or shows good recovery mechanism in process. Therefore, PSB can be said to be better manager of NPA.

CONCLUSION AND LIMITATION

The asset turning low in its quality is a result of many factors affecting the borrower as well as the lender (banks). Majority of banks in India are Public Sector banks (having 3/4th of the deposits) intended to do all the activities for the benefit of the people. Sometimes this is politicised to gain from elections.When these high amount loans turn bad wither intentionally or willfully, depositors start losing confidence in the bank and this affects the reputation of the banks leading to decline in the deposits. This leads to build up for crisis.

India does not have full developed bond market. As a result banks are left with high risk projects particularly power, infrastructure, etc. During 2008-09 and before, banks were involved in indiscriminate lending with less attention paid for the credit appraisal of the loans going with global sentiments.Initially, there was sharp increase in Gross NPA of banks with less growth in its advances. Later after 2009, there was contrast in the movement of growth in Gross NPAs and Gross Advances. Gross NPAs spurt up and credit growth started falling. For PSB in 2016, Gross NPA grew at 93% whereas credit grew at 4%.The asset quality among banks is varied and differs from each other. Foreign banks have decreasing trend in their growth in Gross NPA ratio. After 2015, PVB have increasing trend in Gross NPAs ratio and PSB had increasing trend in Gross NPA ratio throughout.

There is significant difference between the Gross NPAs and the Asset quality of banks in India. When looking at Gross Advances and Gross NPAs relationship, PSB have less effect on Gross Advances due to NPAs. This shows better management on the part of PSBs. Whereas Gross advances of foreign banks are affected by its Gross NPA. IBC has also made recoveries of NPA possible in timely manner.The increasing trend in the Gross NPA is likely to continue i.e. asset quality would degrade all over the banks. Every individual bank has growing Gross NPA ratio. Early warning system, proper monitoring, effective screening of advances, training employees with required skill sets in analysing as well as employing technology in the whole process can act as preventive and corrective measures to control NPAs growth (Dhakappa, 2017). Insolvency and Bankruptcy Code 2016 is playing a major role in recovery of assets within stipulated time. As of March 2018, Out of 701 cases registered 176 cases have been resolved from IBC (PRS, 2018). As the RBI cannot print notes recklessly to recapitalise these institutions, the burden is on the government's expenditure or taxpayer's pocket. Governance and transparency should be increased to increase efficiency in banks. The recapitalisation of PSBs will provide them with some relief. Otherwise these banks are merged and acquired by large bank.Development Finance Institutions (DFIs) could be set up with private equity to lessen the burden on banks and bringing into full force of Bad banks (Mukhopadhyay, 2018).

As every study has few limitations, so does this study has.The study undertaken focuses on different aspects of Gross NPAs. Keeping all other factors affecting NPA as constant, banks are studied in one dimension. The time period is 10 years only for PSB and PVB banks.

While this study has attempted to study all aspects of GNPA, the horizon of the study can be increased by including Net NPAs, Provisioning, Slippage Ratio, etc as well as macroeconomic factors such as GDP, stock market, etc. The time period of the study can be widened to study longer period to study new development in Covid times.

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Appendix

Asset quality of Public Sector Banks

PUBLIC SECTOR BANKS																										
	SBI&Associates						Nationalised banks																			
Year	SBBJ	SBH	SBI	SBM	SBP	SBT	Allahabad Bank	Andhra Bank	Bank of Baroda	Bank of India	Bank of Maharashtra	Canara Bank	CENTRAL BANK OF INDIA	CORPORATION BANK	DENA BANK	IDBI BANK LIMITED*	INDIAN BANK	INDIAN OVERSEAS BANK	ORIENTAL BANK OF COMMERCE	PUNJAB AND SIND BANK	PUNJAB NATIONAL BANK	SYNDICATE BANK	UCO BANK	UNION BANK OF INDIA	UNITED BANK OF INDIA	VIJAYA BANK
2008	1.7%	0.9%	3.04%	1.7%	1.4%	2.0%	2.0%	1.1%	1.8%	1.7%	2.6%	1.3%	3.2%	1.5%	2.5%	1.9%	1.2%	1.6%	2.3%	0.7%	2.7%	2.7%	3.0%	2.2%	2.7%	1.6%
2009	1.6%	1.1%	2.98%	1.4%	1.3%	1.7%	1.8%	0.8%	1.3%	1.7%	2.3%	1.6%	2.7%	1.1%	2.1%	1.4%	0.9%	2.5%	1.5%	0.7%	1.8%	1.9%	2.2%	2.0%	2.9%	1.9%
2010	1.7%	1.2%	3.28%	2.0%	2.1%	1.7%	1.7%	0.9%	1.6%	3.3%	3.0%	1.5%	2.3%	1.0%	1.8%	1.5%	0.8%	4.7%	1.7%	0.6%	1.7%	2.4%	2.1%	2.3%	3.2%	2.4%
2011	2.0%	1.8%	3.48%	2.5%	2.6%	1.8%	1.8%	1.4%	1.6%	2.6%	2.5%	1.5%	1.8%	0.9%	1.9%	1.8%	1.0%	2.7%	2.0%	1.0%	1.8%	2.7%	3.3%	2.4%	2.5%	2.6%
2012	3.3%	2.6%	4.90%	3.7%	2.9%	2.7%	1.9%	2.1%	1.9%	2.9%	2.3%	1.7%	4.8%	1.3%	1.7%	2.6%	1.9%	2.8%	3.2%	1.6%	3.1%	2.7%	3.7%	3.2%	3.4%	2.9%
2013	3.6%	3.5%	4.75%	4.5%	3.3%	2.6%	3.9%	3.7%	2.4%	3.0%	1.5%	2.6%	4.8%	1.7%	2.2%	3.2%	3.3%	4.0%	3.2%	3.0%	4.3%	2.0%	5.4%	3.0%	4.3%	2.2%
2014	4.2%	5.9%	4.95%	5.5%	4.8%	4.3%	5.7%	5.3%	2.9%	3.2%	3.2%	2.5%	6.3%	3.4%	3.3%	4.9%	3.7%	5.0%	4.0%	4.4%	5.2%	2.6%	4.3%	4.1%	10.5%	2.4%
2015	4.1%	4.6%	4.25%	4.0%	5.4%	3.4%	5.5%	5.3%	3.7%	5.4%	6.3%	3.9%	6.1%	4.8%	5.4%	5.9%	4.4%	8.3%	5.2%	4.8%	6.5%	3.1%	6.8%	5.0%	9.5%	2.8%
2016	4.6%	5.8%	6.50%	6.6%	7.9%	4.8%	9.8%	8.4%	10.0%	13.1%	9.3%	9.4%	11.9%	10.0%	10.0%	11.0%	6.7%	17.4%	9.6%	6.5%	12.9%	6.7%	16.1%	8.7%	13.3%	6.64%
2017	15.5%	20.8%	6.90%	25.7%	23.1%	16.8%	13.1%	12.3%	10.5%	13.2%	16.9%	9.6%	17.8%	11.7%	16.3%	21.2%	7.5%	22.4%	13.7%	10.5%	12.5%	8.5%	17.1%	11.2%	15.5%	6.59%
2018	5.0%	5.6%	10.91%	6.1%	6.3%	4.4%	16.0%	17.1%	12.3%	16.6%	19.5%	11.8%	21.5%	17.4%	22.0%	28.0%	7.4%	25.3%	17.6%	11.2%	18.4%	11.5%	24.6%	15.7%	24.1%	6.34%

Source: Computed from the data retrieved from dbie.rbi.org.in

*IDBI Bank Limited has been re-categorised as Private sector bank with effect from January 21, 2019

Asset quality of Private Sector Banks

Year	Private Sector Banks																	
	New Private Sector Banks							Old Private Sector Banks										
	Axis Bank Ltd.	DCB Bank Ltd.	HDFC Bank Ltd.	ICICI Bank Ltd.	IndusInd Bank Ltd.	Kotak Mahindra Bank Ltd.	Yes Bank Ltd.	Catholic Syrian Bank Ltd.	City Bank Union Ltd.	Federal Bank Ltd.	Jammu & Kashmir Bank Ltd.	Karnataka Bank Ltd.	Karuru Vysya Bank Ltd.	Lakshmi Vilas Bank Ltd.	Nainital Bank Ltd.	RBL Bank Ltd.	South Indian Bank Ltd.	Tamilnad Mercantile Bank Ltd.
2008	0.81%	1.53%	1.41%	3.30%	3.04%	2.88%	0.12%	3.87%	1.81%	2.43%	2.53%	3.42%	2.03%	3.51%	1.90%	6.00%	1.77%	2.25%
2009	1.08%	8.78%	1.98%	4.32%	1.61%	4.31%	0.68%	4.56%	1.80%	2.57%	2.64%	3.66%	1.95%	2.71%	1.67%	2.13%	2.18%	-
2010	1.39%	8.69%	1.44%	6.52%	1.23%	3.62%	0.27%	3.29%	1.36%	2.97%	1.97%	3.73%	1.72%	5.12%	1.81%	2.33%	1.32%	1.37%
2011	1.28%	5.86%	1.06%	5.80%	1.01%	2.03%	0.23%	3.05%	1.21%	3.49%	1.95%	3.97%	1.26%	1.93%	1.27%	1.12%	1.11%	1.30%
2012	1.18%	4.40%	0.95%	4.83%	0.98%	1.56%	0.22%	2.35%	1.01%	3.35%	1.54%	3.27%	1.33%	2.98%	1.61%	0.80%	0.97%	1.28%
2013	1.19%	3.18%	0.85%	3.22%	1.03%	1.55%	0.20%	2.35%	1.13%	3.44%	1.62%	2.51%	0.96%	3.87%	3.09%	0.40%	1.36%	1.31%
2014	1.29%	1.69%	0.91%	3.03%	1.12%	1.98%	0.31%	3.77%	1.81%	2.46%	1.66%	2.92%	0.82%	4.19%	2.47%	0.79%	1.19%	2.46%
2015	1.36%	1.76%	0.89%	3.78%	0.81%	1.85%	0.41%	4.96%	1.86%	2.04%	5.97%	2.95%	1.85%	2.75%	2.98%	0.77%	1.71%	1.63%
2016	1.71%	1.51%	0.92%	5.82%	0.87%	2.36%	0.76%	5.62%	2.41%	2.84%	8.32%	3.44%	1.29%	1.97%	4.42%	0.98%	3.77%	1.84%
2017	5.21%	1.59%	1.04%	8.74%	0.93%	2.59%	1.52%	7.25%	2.83%	2.33%	11.20%	4.21%	3.58%	2.67%	5.01%	1.20%	2.45%	2.91%
2018	6.79%	1.79%	1.28%	9.90%	1.17%	2.22%	1.28%	7.89%	3.03%	3.00%	9.96%	4.92%	6.56%	9.98%	4.87%	1.40%	3.59%	3.60%

Source: Computed from the data retrieved from dbie.rbi.org.in

Descriptive Statistics of Public Sector and Private Sector Banks

Statistics	SBI& its associates					
	SBBJ	State Bank of Hyderabad	State Bank of India	State bank of Mysore	State Bank of Patiala	State Bank of Travancore
Mean	4.3%	4.9%	5.08%	5.8%	5.6%	4.2%
Standard Deviation	3.9%	5.6%	2.34%	6.8%	6.2%	4.3%
CV	90.9%	115.4%	45.93%	117.9%	111.2%	103.7%

Statistics	Nationalised banks																			
	Allahabad Bank	Andhra Bank	Bank of Baroda	Bank of India	Bank of Maharashtra	Canara Bank	CENTRAL BANK OF INDIA	CORPORATION BANK	DENA BANK	IDBI BANK LIMITED*	INDIAN BANK	INDIAN OVERSEAS BANK	ORIENTAL BANK OF COMMERCE	PUNJAB AND SIND BANK	PUNJAB NATIONAL BANK	SYNDICATE BANK	UCO BANK	UNION BANK OF INDIA	UNITED BANK OF INDIA	VIJAYA BANK
Mean	5.7%	5.3%	4.5%	6.1%	6.3%	4.3%	7.6%	5.0%	6.3%	7.6%	3.5%	8.8%	5.8%	4.1%	6.5%	4.3%	8.1%	5.4%	8.3%	3.5%
Standard Deviation	5.0%	5.3%	4.2%	5.4%	6.3%	4.0%	6.6%	5.6%	6.9%	9.0%	2.6%	8.7%	5.4%	3.9%	5.6%	3.2%	7.6%	4.5%	7.0%	2.0%
CV	87.7%	100.2%	91.7%	89.9%	100.5%	91.6%	87.8%	111.7%	110.3%	118.7%	75.1%	98.3%	93.4%	94.5%	87.3%	74.8%	94.5%	83.6%	84.2%	57.0%

Source: Own computation from dbie.rbi.org.in

Statistics	New Private Sector Banks							Old Private Sector Banks										
	Axis Bank Ltd.	DCB Bank Ltd.	HDFC Bank Ltd.	ICICI Bank Ltd.	IndusInd Bank Ltd.	Kotak Mahindra Bank Ltd.	Yes Bank Ltd.	Catholic Syrian Bank Ltd.	City Bank Union Ltd.	Federal Bank Ltd.	Jammu & Kashmir Bank Ltd.	Karnataka Bank Ltd.	Karuru Vysya Bank Ltd.	Lakshmi Vilas Bank Ltd.	Nainital Bank Ltd.	RBL Bank Ltd.	South Indian Bank Ltd.	Tamilnad Mercantile Bank Ltd.
Mean	2.1%	3.7%	1.2%	5.4%	1.3%	2.5%	0.5%	4.5%	1.8%	2.8%	4.5%	3.5%	2.1%	3.8%	2.8%	1.6%	1.9%	2.0%
Standard Deviation	2.0%	2.9%	0.3%	2.3%	0.6%	0.9%	0.5%	1.9%	0.7%	0.5%	3.7%	0.7%	1.6%	2.3%	1.4%	1.6%	1.0%	0.8%
CV	92.7%	77.0%	29.8%	42.3%	50.2%	35.2%	85.9%	41.6%	36.7%	17.3%	82.5%	18.9%	77.7%	59.7%	48.5%	95.9%	49.7%	39.9%

Source: Own computation from dbie.rbi.org.in