

**CREDIT RISK AND ITS IMPACT ON THE  
PERFORMANCE OF SELECT PUBLIC AND  
PRIVATE BANKS IN INDIA**

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**DOCTOR OF PHILOSOPHY**

*in*

**COMMERCE**

*by*

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*Under the guidance of*

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*Dedicated to my beloved father “**BABA**”,  
my moral Support and source of  
inspiration, **Late Shri Ramkrishna Vithal  
Parab**, Left for his heavenly abode on  
Monday the 28<sup>th</sup> August 2017.*

# *Declaration*

I, Ms.Champa Ramkrishna Parab, hereby declare that this thesis for Ph.D. degree in Commerce titled “**Credit Risk and its Impact on the Performance of Select Public and Private Banks in India**” is a record of the original research work done by me under the guidance of Dr M. R. Patil, Dnyanprassarak Mandal’s College and Research Centre, Assagao, Goa, Goa University and that the same has not been previously formed the basis for the award of any degree, diploma or any certificate or similar title of Goa University or any other Universities.

Place: Taleigao

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# Certificate

This is to certify that the PhD thesis titled “*Credit Risk and its Impact on the Performance of Select Public and Private Banks in India*” is a record of the original work carried out by, *Ms. Champa Ramkrishna Parab* under my guidance and supervision and the same has not been previously formed the basis for the award of any degree, diploma or any certificate or similar title of Goa University or any other Universities.

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## ***LIST OF ABBREVIATIONS***

<b>Sr. No.</b>	<b>Abbreviations</b>	<b>Full Form</b>
1	<b>ARC</b>	Asset Reconstruction Companies
2	<b>BCBS</b>	Basel Committee on Banking Supervision
3	<b>BIS</b>	Bank for International Settlement
4	<b>BCBS</b>	Basel Committee on Banking Supervision
5	<b>CAR</b>	Capital Adequacy Ratio
6	<b>CD</b>	Credit Deposit Ratio
7	<b>CRAR</b>	Capital Adequacy Ratio
8	<b>CRM</b>	Credit Risk Management
9	<b>GDP</b>	Gross Domestic Product
10	<b>HC</b>	Health Code (HC) System
11	<b>KYE</b>	Know your Employee
12	<b>LLP</b>	Loan Loss Provision
13	<b>NPL</b>	Non Performing Loans
14	<b>NPAs</b>	Non Performing Assets
15	<b>NNPAs</b>	Net Non Performing Assets
16	<b>NIM</b>	Net Interest Margin
17	<b>OLS</b>	Ordinary Least Square
18	<b>GDP</b>	Gross Domestic Product
19	<b>GNPAs</b>	Gross Non Performing Assets
20	<b>GL</b>	Gross Loan
21	<b>HC</b>	Health Code
22	<b>RBI</b>	Reserve Bank of India
28	<b>ROA</b>	Return on Assets
23	<b>ROE</b>	Return on Equity
24	<b>RWA</b>	Risk Weighted Assets
25	<b>SARFAESI</b>	Securitisation and Reconstruction of Financial Assets and Enforcement Security Interest Act
26	<b>TL</b>	Total Loans
27	<b>TA</b>	Total Assets
28	<b>TI</b>	Total Investments
29	<b>T_ASS</b>	Total Assets

# **CHAPTER I**

## **INTRODUCTION**

### **1.1 Background of the Study**

Across the globe, the banking sector acts as an encouragement for the economy of any country of the world and thereby has become necessary fragment of the economy ensuring economic development and growth of a country through their mediation role and services of financial nature. Indian banking sector is becoming a dominant sector and playing a key role in socio-economic progress of the country and accounts for more than half the assets of the financial sector. Sound and effective banking system is required for healthy economy to meet new challenges imposed by technology and internal and external factors.

In emerging economies including India banks are more than bare agents of financial intervention and shoulder an additional responsibility of meeting government's public agenda and thus there is close relationship between banking and economic development and the overall growth of the economy correlates with the health of the banking industry. A sound banking system efficiently mobilizes the generated savings in productive sectors and in turn

meets its obligation towards the depositors and becoming the most essential component of a robust economy.

The main objective of the bank is to maximize the wealth of the shareholders and to achieve this objective banks seek to enhance their profitability by performing the lending function so called its core function along with other functions but their maximum income comes from their core activity of lending.

The credit facilities of the banks facilitate the exploration and expansion of productive investments avenues by individuals and institutional investors. Thus the profits of the banks are procured from the spread between the interest rate that they pay on the deposits and the interest rate they receive from borrowers and thereby create the flow of funds for the banks. By managing this flow of funds, banks act as intermediary and generate profits from interest paid and interest received, and has been taking the risks of offering credit over the years.

Credit creation which is the main income generating activity of banks exposes the banks to credit risk. Thus granting of loans and advances is not only the main source of income of the banks but also the source of credit risk, which may result into serious threat and cause great danger to the bank's profitability. Credit risk is an important internal determinant of bank performance. The higher the exposure of a bank to credit risk, the higher is the tendency of the banks to experience the financial crisis and vice-versa.

The literature reviewed and the arguments by scholars show that the poor performance of banks and series of financial crisis over the years is the result of high credit risk and inadequate credit risk management. Therefore Central Banks across the globe have adopted policies with regard to Basel II Prudential regulations to protect them against bank failures and financial crisis.

Due to increasing non-performing loans, the emphasis of Basel II Accord is on Credit Risk Management practice and being in compliance with this Accord means that banks follow a sound approach to credit which ultimately results in improving their performance. By effective management of credit risk exposure, banks not only support the viability and profitability of their own business but they also contribute to systemic stability and an efficient allocation of capital in the economy.

Among other risks faced by the banks, credit risk has great impact on the banks' profitability as large chunk of banks' revenue; interest income comes from the loans.

Thus, the long run success of banks depends upon their effectiveness in management of different types of risks associated with their activities; thereby risk management becoming core to any banking service and the ability to gauge risk and take appropriate action is the key to success of banking.

## **1.2 Overview to Indian Banking Sector and context to the Research Problem**

Indian banking system, one of the largest banking networks in the world, has witnessed a dynamic growth and reforms over the years and resulted in bringing sea changes of liberalization, deregulation of interest rates, dilution of government stake in public sector banks and a tremendous increase in the market share of private sector and foreign banks. There has been massive transformation in the role played by banks as a financial intermediary. Before liberalization all the activities of banks were regulated and hence operational environment was not conducive to risk taking but currently banks have grown from being a financial intermediary into a risk intermediary because of exposure to severe competition and hence are forced to encounter various types of financial and non-financial risks.

The banking sector reforms and policy changes over the years have gradually changed the banking landscape and credit market in India, the banks have now become more customer focused and offering innovative products at fast pace. Deregulation has not only given freedom to the banks to frame their own schemes and offer products as per their market segment and risk appetite but also to redesign business process and lending policies and procedures to meet changing expectations of the customers and the market. Introduction of risk management practices and implementation of Basel II recommendations have brought in more professional approach in credit

delivery process of the banks which has made them more risk focused resulting in pricing of loan-products depending upon risk perception of the borrower and likely hood of the default. Banks are now aggressively expanding credit to retail, agriculture and small and medium enterprises and others, and all these changes creating new business opportunities to the banks and also demands new challenges which banks will have to handle boldly and proactively.

Thus Indian banks have been going through transformation brought by the reforms in the financial sector, which are being carried out in Indian banks in a gradual manner and converting banking sector of India into a healthy, robust and energetic system capable of playing its role very proficiently and effectively.

Though Indian Banking sector is the largest financial sector showing tremendous growth and being the foundation for strengthening country's economic situation has been encountering challenges on account of mounting Non Performing Loans resulted from their credit activities. NPA account represents a situation where the credit risk has crystallized, where default has taken place and has been the single largest cause of irritation of the banking sector of India. As a result quality of assets in Indian Banking Sector has been worsening where NPAs have outpaced the credit growth over the last couple of years. The Indian banking system continues to battle falling asset quality issues and the need to maintain capital adequacy in the light of piling bad loans. A high and rising proportion of banks stressed loans, particularly those of Public Sector Banks (PSBs) and a consequent increase in provisioning for

Non-Performing Assets (NPAs) continued to weigh on credit growth reflecting their lower risk appetite and stressed financial position.

Bad loans of 39 listed Indian Banks grown from Rs 53,917 crores, in September 2008, just before the 2008 global financial crisis broke out following the collapse of Lehman Brothers, to Rs 3,41,641 crores in September 2015. The total GNPA's of banks, as a percentage of the total loans, has grown from 2.11 % to 5.08 %. The Net NPA to Net advances by public sector banks increased from 2.92% to 5.75% in F Y 2016.

The bad loan crisis that has gripped India's Rs 95 trillion banking sector didn't happen overnight, for years, Indian public sector banks, were engaged in volume game to balloon their balance sheets and satisfy their promoter, the government. Ever since nationalisation of these banks Governments often treated these banks as their extended arms and used them for populist measures. The competition among public sector banks to mark their total business number made them to give very little attention to the quality of assets as during the period 2011 to 2013 every bank rushed to give money to corporations.

NPAs generate no interest income for the banks as interest is not paid by the borrowers, thereby affecting the profitability and liquidity with fewer funds left with the banks to lend. High NPAs degrade a bank's credit rating, lowering its credibility as well as its ability to raise fresh capital in the form of deposits as public have lost confidence in such banks. Cost of bad loans is borne by good loans in the form of higher interest. Capacity of banks for interest payment on deposits reduces thus lowering interests to depositors

including senior citizens. Due to erosion in net worth the share prices also come down thereby impacting market capitalisation.

As per law and RBI guidelines every bank has to maintain a Capital Adequacy Ratio (CAR), which is the ratio of total capital to risk weighted assets of 9% or more and 10% for new Private Banks. As NPAs go up the aggregated risk weighted assets, forcing the banks to allocate further capital to provide for increased NPA. As higher NPAs worsen the financial health of a bank, banks as per provisioning norms are required by law to provide for future losses arising from its bad assets at coverage of 70% out of current profits, called at Provision Coverage Ratio.

In a published report, the RBI attributes the rising NPAs of both Public and Private Sector banks to many reasons such as diversion of funds away from the original purpose, for which they were granted, as well as willful defaults and misappropriation of funds by the borrowers. Amongst other reasons adverse economic and market factors, ranging from recessionary conditions, regulatory changes and resource shortage to inefficient management and strained labour relations have affected the businesses badly and driven them to default on their repayment.

Delays by banks in loan disbursement can throw a project off track and have a cascading effect on the viability and capacity to repay. Also often banks do not follow up diligently enough on loan dues. A drop in the market value of collateral has immediate impact on the quality of the related loan asset. There are legal impediments and delays in the process of speedy disposal of NPAs.

Highly connected corporate debtors as a known fact has been using political pressure to get banks to waive their dues or restructure terms in their favour. Populist promises by political parties during election time forces commercial banks to honour their promises.

The Government and the RBI are taking many steps to alleviate this situation by automating Non Performing Assets classification and reporting by banks, which enables not only to exercise manual control in this area but also accurate disclosure of the same as per requirement.

### **1.3 Statement of the Problem**

Banking is a risky business as large part of the money that Banks run on is a Public Money. Saunders & Cornett (2006) states that the very nature of banking business is sensitive because more than 85% of the liability of banks is Deposits and the basic function of the bank is credit creation which banks have been performing using the amount of deposits of their customers. Credit creation is revenue generating activity but resulting in exposing banks to dangerously high risk which is consequently leading to financial erosion and bankruptcy. The scholars world over have consensus on the relationship between the amount of Non Performing Loans and the bank's failure and financial erosion in both developing as well as in developed countries of the world.

Bank's lending activity in any country is governed by the credit policy ensuring smooth lending operations of the banks'. Lending if not properly

gauged involves the risk that the borrower either will not be able pay or willing to meet his obligations. The issue of Non Performing Loans is universal and the leading nations of the world have been dealing with this problem impacting the profitability and affecting the quality of assets of the banks widely.

Structural increase in bankruptcies, departing of margins, growth of off- balance sheet derivatives technology and the BIS based capital requirements in the banks are some of the reasons for emergence of greater stress on the credit risk in the recent past. Every country has developed various policies, schemes and law agencies to protect the economy from declining profitability. In spite of heavy regulations in the last two decades, many developed and emerging countries have witnessed severe banking crises. Inadequate Credit Risk Management Practices and high levels of credit risk was the main cause of banking crisis over last two decades including East Asia Crisis of 1997 and global financial crisis of 2007 to 2009. As a result banks are strengthening their credit risk management practices to ensure their safety and maintaining acceptable level of profitability. Central Banks of all countries also have been devising and implementing new rules to control credit risks. There is also an urgent need to follow internationally compatible prudential norms relating to capital structure and supervisory role and banks need to develop a system which will involve minimum risk exposure.

Though nationalization of Indian banks has resulted in phenomenal expansion in the geographical coverage and functional spread of banking and

financial system, several distortions over the years, have crept into the Indian banking and financial system. As a result, productivity and efficiency of the system has suffered; its portfolio quality had badly deteriorated and profitability has been eroded. Under these circumstances the government of India had set up a Committee in the country with Mr. Narasimha, a former Governor of RBI as a Chairman to examine the misconduct in all aspects of the financial system.

The primary concern of the Naarasimha Committee (1991) was in improving the financial health of public sector banks and development of financial institutions, so as to make them viable and efficient to meet fully the emerging needs of the real economy.

The Indian Banking Industry has been in focus when it comes to Non Performing Assets or 'loans gone badly' and ever since the introduction of financial sector reforms in India the non-performing assets of the banking system have been getting highly focused attention. The question of NPA in bank is a cause of worry to all concerned, may it be the management of banks, the government, industry federations or the public at large. The banking industry was saddled with a whopping NPA of over Rs. 63963 crores in 2000-01 as against 60840 crores in 1999-2000. The NPA constituted 11.4% of the total advances of Rs. 558679 crores as on 31-3-2001. To the close of study period as at end March 2016 the total Gross Non Performing Assets (GNPAs) of banks stood at Rs 5, 94,929 crores, marking a substantial jump of about Rs 200,000 crores in just one quarter at the end of December 2016

quarter, the total GNPA's stood at about Rs 4, 00,000 crores, over 90 per cent of this is on the books of public-sector banks.

According to the RBI's statistical tables relating to Banks in India 2015-2016, NPAs were 3 per cent of gross advances of all banks in India in 2013. By 2016, they grew to 9.3 per cent. The increase was much more prominent for nationalized banks and increased from 2.9 per cent in 2013 to 13.8 per cent in 2016. The privately-owned banks GNPA's rose from 2 per cent in 2013 to 3.1 per cent in 2016. For the 10 worst PSBs, GNPA's averaged at 16.4 per cent as on December 2016 there by destroying its balance sheet.

The banks are seriously concerned about the growing NPA menace, which is taking its toll on the efficiency and profitability. NPA are a serious strain on profitability as banks cannot receive income on such accounts and on the other hand, they are required to charge the funding cost and provision requirements to their profits.

The magnitude of NPA's in Indian Banking system is very high and the situation is alarming. Though NPA as a percentage of total advances may have been declining, but actual number are increasing in absolute volume. Thus absolute amount of NPA continues to be a major drag on the performance of banks. The large volume of NPAs reflects both an overhang of past dues and ongoing problem of fresh accretion.

The NPA level in the Indian banks is much higher than that in the banks of various western countries. The gross NPA level in Indian banks stands at around 11-12% as against the level of 2-3% of the total portfolio in world-class western banks. The gross NPA level of over 5% is considered as poor and with the growing competition and then spreads, it is almost impossible for banks to make money if gross NPA are more than 6 to 7%.

The problem of NPA is multi-dimensional and unless it is checked with the NPA level standard of 2 to 3% of the total loan assets, it is bound to weaken the banking system. No wonders NPA has become an important term in the banking industry because of the aforesaid factors having far reaching implications on the bottom lines of the banks, which are already undergoing the rigors of the reforms process.

It is therefore necessary for Indian banks to come up to international standards and bring down the NPA level. The credit risk management has therefore now become an important term for better banking and the RBI is making all out efforts to ensure that the financial services industry standards comparable to the internationally acceptable ones.

The level of NPAs has assumed greater significance as they are contributing to credit risk and used as proxy for credit risk and play a crucial role in determining the health of a Banking sector. Therefore bringing down of deteriorating asset quality and timely handling of potential NPAs assume greater relevance. Well planned and well thought improvements in credit

administration and efficient risk management, credit appraisal system, credit risk evaluation and credit monitoring through periodic interaction with borrowers to ensure end use of credit could be some of the measures to be initiated by the Banks to prevent NPAs besides exchange of credit information and compromise settlements.

Nevertheless, some percentage of the total advances would always be bad debts and therefore appropriate efforts need to be made to minimize the same if not to eliminate them fully. Therefore some scholars and experts, as a rough guide, divide the risk composition for a bank as 95% for Credit Risk, 4% for Market Risk and remainder 1% for Operational Risk and in banking business highest amount of threat is therefore Credit Risk and needs to be studied in depth in the context of Indian Banks. Credit Risk is a Contemporary and burning issue in the Indian banking system as well as other countries of the world and also challenging in the light of Basel II accord.

Though this has evoked interest among the bankers, researchers, academicians, policy makers etc. to the best of researchers knowledge there is a very little work on comprehensive study dealing with Credit Risk in terms of evaluation of quality of asset to measure the Credit Risk, factors influencing the credit risks so called causes and determinants of credit risk and studying its effect on the Performance of Banks abroad as well as in India. This has motivated the researcher to make this national level comprehensive study in the light of this Contemporary issue Credit Risk and its effect on the Performance of Public and Private Banks in India.

**Table 1.3.1**

**Asset Quality of Selected Banks as on 31st March 2016**

<b>Asset Quality of selected Private and Public Banks as on 31st March 2016</b>					
	<b>Name of the Banks</b>	<b>(Rs. in Crores ) Gross NPA</b>	<b>Gross NPA %</b>	<b>(Rs. in Crores ) Net NPA</b>	<b>Net NPA %</b>
1.	Axis Bank	6,087.51	1.67	2,522.14	0.7
2.	City Union Bank Ltd	511.98	2.41	323.15	1.53
3.	DCB Bank	197.38	1.51	97.46	0.75
4.	Dhanlaxmi Bank Ltd	458.92	6.36	193.19	2.78
5.	Federal Bank	1,667.77	2.84	950.01	1.64
6.	HDFC Bank	4,392.83	0.94	1,320.37	0.28
7.	ICICI Bank	26,720.93	5.21	13,296.75	2.67
8.	Indusind Bank	776.82	0.87	321.75	0.36
9.	Jammu & Kashmir Bank	4,368.62	8.32	2,163.95	4.31
10.	Karnataka Bank	1,180.40	3.44	795.47	2.35
11.	RBL Bank	208.05	0.98	124.44	0.59
12.	Karur Vysya Bank	511.18	1.3	216.17	0.55
13.	South Indian Bank Ltd	1,562.36	3.77	1,185.26	2.89
14.	Lakshmi Vilas Bank	391.25	1.97	231.64	1.18
15.	Yes Bank Ltd	748.98	0.76	284.47	0.29
16.	Kotak Mahindra Bank	2,838.11	2.36	1,261.96	1.06
17.	Oriental Bank Of Commerce	14,701.78	9.57	9,932.15	6.7
18.	Allahabad Bank	15,384.57	9.76	10,292.51	6.76
19.	Andhra Bank	11,443.63	8.39	6,035.65	4.61

<b>Asset Quality of selected Private and Public Banks as on 31st March 2016</b>					
	<b>Name of the Banks</b>	<b>(Rs. in Crores ) Gross NPA</b>	<b>Gross NPA %</b>	<b>(Rs. in Crores ) Net NPA</b>	<b>Net NPA %</b>
20.	Bank of Baroda	40,521.04	9.99	19,406.46	5.06
21.	State Bank of India	98,172.80	6.5	55,807.02	3.81
22	Punjab National Bank	55,818.33	12.9	35,422.57	8.61
23	Punjab and Sind Bank	4,229.05	6.48	2,949.47	4.62
24	State Bank of Bikaner and Jaipur	3,602.76	4.82	2,005.19	2.75
25	Vijaya Bank	6,027.07	6.64	4,276.82	4.81
26	State Bank of Mysore	3,635.56	6.56	2,257.18	4.18
27	United Bank of India	9,471.01	13.26	6,110.71	9.04
28	State Bank of Travancore	3,199.96	4.78	1,902.55	2.77
29	Syndicate Bank	13,832.16	6.7	9,014.87	4.48
30	UCO Bank	20,907.73	15.43	11,443.59	9.09
31	Bank of India	49,879.12	13.07	27,996.39	7.79
32	Bank of Maharashtra	10,385.85	9.34	6,832.03	6.35
33	Canara Bank	31,637.83	9.4	20,832.91	6.42
34	Central Bank of India	22,720.88	11.95	13,241.80	7.36
35	Corporation Bank	14,544.25	9.98	9,160.14	6.53
36	Dena Bank	8,560.49	9.98	5,230.47	6.35
37	IDBI	24,875.07	10.98	14,643.39	6.78
38	Indian Bank Ltd	8,827.04	6.66	5,419.40	4.2
39	Indian Overseas Bank	30,048.63	17.4	19,212.57	11.89
40	Union Bank of India	24,170.89	8.7	14,025.94	5.25

Source: Money Control.Com Dion Global Solutions Limited

To know the status of selected banks under study the above table 1.3.1 is presented which highlights the asset quality performance of these banks as on 31-3-1016, the last year of the study period. The above table presents the quality parameters in terms of Gross NPAs and NNPA's in amount as well as percentages. The GNPAs in percent is highest for Indian Overseas Bank @ 17.4, followed by UCO Bank @ 15.43, United Bank of India @ 13.26, Bank of India @ 13.07, Punjab National Bank @ 12.9, Central Bank 11.95, IDBI @ 10.98, Bank of Baroda @ 9.99, Allahabad Bank @ 9.76, and so on.

Of all the 40 Commercial Banks under study, only Four Private Sector Banks show lowest rate of GNPAs and include Yes Bank @0.76 followed by Indusind Bank @ 0.87, HDFC @ 0.94 and RBL @ 0.87.

The NNPA's % as disclosed by the above table is highest for Indian Overseas Bank @ 11.89 followed by UCO Bank @ 9.09, United Bank of India @9.04, Punjab National Bank @ 8.61, Bank of India @ 7.79, Central Bank of India @ 7.36, IDBI @6.78, Allahabad Bank @ 6.76, Andhra Bank @ 6.7 and Dena Bank 6.53.

NNPA's percent is low for Private Sector Banks when compared with all banks under study and such banks include HDFC @ 0.28 followed by Yes Bank @ 0.29, Indusind @ 0.36, Karur Vysya @ 0.55, RBL @ 0.59, AXIS Bank @ 0.7 and DCB @ 0.75.

**Table 1.3.2****Major countries Ratio of Banks Gross Non Performing Loans to Total Loans**

Countries	Years						
	2010	2011	2012	2013	2014	2015	2016
Brazil	3.11	3.47	3.45	2.86	2.85	3.31	3.92
China	1.13	0.96	0.95	0.99	1.24	1.67	1.75
Costa Rica	1.86	1.82	1.75	1.75	1.55	1.66	1.55
Germany	3.2	3.03	2.86	2.7	2.34	1.97	1.69
Spain	4.67	6.0	7.48	9.38	8.45	6.162	5.64
France	3.76	4.29	4.29	4.49	4.16	3.98	3.63
UK	3.95	3.96	3.59	3.11	1.654	1.01	0.94
Ghana	18.08	14.15	13.20	12.00	11.27	14.67	17.29
Greece	9.12	14.43	23.27	31.90	33.78	36.65	36.30
India	2.39	2.67	3.37	4.03	4.35	5.88	9.19
Italy	10.03	11.74	13.75	16.54	18.03	18.06	17.12
Japan	2.46	2.45	2.43	2.13	1.75	1.53	1.40
Kenya	6.29	4.43	4.59	5.05	5.46	5.99	11.66
Sri Lana		3.82	3.63	5.58	4.23	3.240	2.63
Malaysia	3.35	2.68	2.02	1.85	1.65	1.60	1.61
Nigeria	20.14	5.77	3.71	3.39	2.96	4.86	12.82
Pakistan	14.75	16.21	14.47	12.99	12.27	11.36	10.06
Portugal	5.15	7.73	10.52	10.66	11.89	11.96	11.84
Singapore	1.42	1.06	1.043	0.87	0.76	0.92	1.22
United State	4.39	3.78	3.32	2.45	1.85	1.47	1.32

**Source:** International Monetary Fund, Global Financial Stability Report.

The above table 1.3.2 presents the GNPA ratios of different countries of the world from 2010 to 2016. The year 2016 is the cutoff date which is considered as a period of implementation of Basel II in India

The GNPA ratio of India has been showing rising rate from 2.39% in 2010 to 9.19 % in 2016, which means there is an increase approximately by four times.

When the position of India is compared with the NPA position with other countries of the world in the year 2010 GNPA of Indian Banks were much lesser than developed nations of the world USA, UK and Germany

which stood at 4.39, 3.95 and 3.2 and when the same is compared with the latest year of period of study i.e. 31-3-2016, Indian Banks disclosed a height of 9.19% as against this, banks in USA showed a decline to 1.32%, UK to 0.94% and Germany to 1.69%. The banks in US, Germany and UK managed to bring down their NPA level thereby improving their quality of Assets and have been showing a decline from 2010 to 2016. On the contrary the banks in India failed to manage the quality of their assets as revealed by rise in GNPA in comparison with many countries as revealed by the table.

When compared with Nigeria, Italy, Pakistan Portugal and some more nations of the world Indian banks have fared well as these countries show a very high rate. But Indian banks have to follow the footpath of banks from Singapore, Malaysia, Japan, China, Brazil and France which have been maintaining the quality of their asset as revealed by the level of NPAs over a period from 2010 to 2016.

## **1.4 Conceptual Framework**

### **1.4.1 Asset Quality**

Asset Quality or Loan Quality plays a very significant role in determining the overall condition and the financial strength of the banking institution. The primary factor affecting overall Asset Quality is the quality of Loan Portfolio in the Bank's Balance Sheet and the entire credit administration program of the bank. Loans are the largest asset items which carry the greatest amount of risk to the capital of the bank. Out of twenty-five

core principles for effective banking supervision (Basel 1997), seven are designed to address the relevant issues of bank asset quality on Credit Risk Management suggesting significance of asset quality is a priority and the area of focus to the financial supervisory Authorities of every country of the world.

Asset quality, as it stands, is the quality and structure of a bank's assets. One important aspect while determining asset quality is its key, the loan book, which is bank's primary source of income. Therefore, while analyzing asset quality, the Non Performing Loan is of great importance.

Asset quality is an aspect related to the bank administration which involves an evaluation of an asset to facilitate the measurement of the level and size of credit risk associated with its business operation and helps in determining how many of banks assets are at financial risk and the amount of allowance that they have to provide for potential losses.

Quality of Assets also refers to an asset's ability to generate cash flows over a time and provision of earnings to the bank and the timely manner with which the borrowers are meeting their contractual obligations. It basically represents huge collection of loan which account for undue risk to the financial institution.

An Asset Quality measures the component of NPAs as a percentage of Total Assets. It indicates the type of loans advanced by the banks to generate interest income and thereby presents the type of debtors the bank has in its Balance Sheet

Thus high asset quality generally indicates stability of cash flow pattern with secured positive advancement and low risk of losing its value of future cash flows due to high credit worthiness and market stability.

The deterioration in the bank's asset quality affects its operating and financial performance and also the general soundness of the financial system in which it operates. Yin (1999) observed that the deterioration of bank asset quality arising from the ignorance of loan quality is one of the proximate causes of the Asian Financial Crisis.

Thus asset quality is an important measure of potential credit risk. The research on bank failure finds that the asset quality is a statistically significant predictor of insolvency (Barr and Siems, 1994; Dermirguc-Kunt, 2000; Hou, 2007). And the important reason for the failure of bank is the weakening asset quality explained by the magnitude of NPAs. Many times the quality of loans advanced lead to the amount of nonperforming assets, provision and profitability of the banks.

### **1.4.2 Risk and its Categories**

Risk is not new to the banking sector world over and the Indian banking scenario is not an exception. Risk has always been present in the banking services but managing the risk has become prominent in recent years. No doubt, the very essence of the banking and financial sector is based on the principle of taking risk.

Risks and uncertainties form an integral part of banking which by nature entails taking risks and business grows mainly by taking risk. Greater the risk, higher the profit and hence the business unit strikes a tradeoff between the two. Thus risk and returns are directly related.

Risk may be defined as a possibility of loss or an event having adverse impact on profitability and reputation due to several distinct sources of uncertainty. It may be a financial loss or loss to the reputation or image. Such outcome could either result in a direct loss of earnings or capital or may result in imposition of constraints on banks' ability to meet its business objectives or to take benefit of opportunities to enhance its business activities.

The type and degree of risk a bank may have depends upon its size, complexity, business activities, volume etc. Various risks, to which the banks are exposed to, are interrelated; collectively exhaustive but mutually exclusive and highly interdependent and events that affect one area of risk can have effect on a range of other risk categories and may be broadly categorized as follows:

- Credit Risk
- Operational Risks
- Interest Rate Risk
- Liquidity Risk
- Markets Risk.

## **Credit Risk:**

***“Granting credit involves - accepting risk as well as producing profits”***

*-Bank for international settlements, Basel, Switzerland.*

Credit Risk is one of the oldest, greatest and a major risk faced by banks and is inherent to any business of lending funds to individuals, corporate, trade, industry, agriculture, transport, or banks and financial institutions.

The Basel Committee on Banking Supervision (2001) defined credit risk as the possibility of losing the outstanding loan partially or totally, due to credit events (default risk).

RBI defines Credit Risks as the possibility of losses associated with a diminution in the credit quality of the borrowers or counterparties. It is the risk of loss of principal resulting from a borrower's failure to repay a loan or meet a contractual obligation. Such risks occur when customers default or fail to fulfill their obligation to service the debt, generating either partial or total loss. Credit Risk is the potential that a bank borrower or counter party fails to meet the obligations on agreed terms. There is always scope for the borrower to default from his commitments for one or the other reason resulting in crystallization of credit risk to the bank. These losses could take the form outright default or alternatively, losses from changes in portfolio value arising from actual or perceived deterioration in credit quality that is short of default.

Thus Credit Risk is having two components; the first is related to the solvency aspect which involves default in the business operation. The second

is related to the liquidity aspect which involves when the payments due are delayed and affect cash flow of the banks.

Banking Credit Risk consists of following three risks:

(1) Transaction Risk

(2) Intrinsic Risk

(3) Concentration Risk

**(1) Transaction Risk:**

Transaction risk is the result of the volatility in credit quality and earnings resulting from how the bank underwrites individual loan transactions and the dimensions of credit risk are selection, underwriting and operations.

**(2) Intrinsic Risk:**

Intrinsic risk is that risk which is deeply rooted in certain lines of business and includes loans to specific industries like commercial real estate constructions.

**(3) Concentration Risk:**

Concentration risk is that risks which results from loans to one borrower or one industry, geographic area, or lines of business.

The primary cause of credit risk is poor credit management, inadequate appraisal, over reliance on the realizable value of collateral, faulty credit rating system etc. The effects are loan losses, rising non-performing assets declining interest income, profitability and asset quality and concentrations. The higher the perceived credit risk, the higher will be the rate of interest the investors will demand for lending their capital.

Thus the requirement of developing and establishing a system for credit risk management is extremely important for ensuring soundness and appropriateness of financial institution's business and the institution's management is therefore assigned the responsibility of developing and establishing such a system enabling banks to improve their performance.

**Operational risk:**

Banks always live with the risks arising out of human error, financial fraud and natural disasters. Exponential growth in the use of technology and increase in global financial inter-linkages are the two primary changes that contributed to such risks. Operational risk is the risk of loss which arises from failed and inadequate processes or people and systems or from any external events.

It refers to the malfunctioning of information and reporting system and of internal monitoring mechanism. The causes are error in the process of recording transaction, lacunae in monitoring reporting, absence of rules regulations, human and technical errors, IT related factors etc. It includes fraud risk, settlement risk, IT risk, legal risk, accounting risk, personnel risk and reputational risk.

**Interest rate risk:**

Interest Rate Risk is nothing but the potential negative impact on the Net Interest Income of the bank and refers to the vulnerability of an institution's financial condition to the movement in interest rates and thus occurs due to movements in interest rates. The causes are rise and fall in

interest rates, fixed interest becomes variable interest rates after maturity or after fixed period etc. The interest rate risk which forms a part of the market risk has become more prominent after the removal of regulatory interest rates restrictions on banks by the RBI.

### **Liquidity risk**

It arises when the bank is unable to meet a financial commitment arising out of variety of situations such as usage of non-funded credit line, maturing liabilities or disbursement to customers. It results in losing a good customer, loss due to distress sale of investments or high cost of raising resources, loss of reputation.

### **Markets Risk**

Market risk is caused due to changes in the market variables, having an adverse impact on the earnings of a bank or its capital. It is assessed with reference to instability or volatility of market parameters like interest rates, stock exchange indices, foreign exchange rates, equity prices and commodity prices.

Whatever be the type of risk, the impact is primarily financial, and ultimately manifests in the form of loss of income and reputation. As it is not possible to eliminate the risk it is recognized as an intrinsic part of Commercial activities. Financial risk management aims to reduce the volatility of earnings and boosts the confidence of investors or to maximize shareholders wealth by avoiding costs associated with renegotiation of debt restructuring of capital,

legal fees losses of bargaining powers with regard to suppliers due to delayed payment, loss of reputation in the financial markets due to failure to meet obligations.

## **1.5 Research Questions**

Several research questions have developed in the mind of the researcher regarding the problem statement. These research questions will be the useful guidelines to answering the problem statement clearly. Based on the research questions result, hopefully that it will be answering in evaluation of credit risk by assessing the quality of assets of the banks with the help of asset quality ratios, macroeconomic and bank specific determinants of credit risks and the effect of credit risk on the performance of Indian Public and private banks.

- 1) Whether the assets quality of Public and Private Banks was the same during the period under study?
- 2) Whether the quality of assets of all the Commercial banks under study was the same prior to and the post implementation of Basel II norms in India based on following asset quality indicators?
  - i) Whether the ratio of GNPA to GL was the same across Pre Basel II and Post Basel II.
  - ii) Whether the ratio of Total investment to Total Asset was the same across Pre Basel II and Post Basel II.

- iii) Whether the ratio of Loan Loss Provision to Total Loans was the same across Pre Basel II and Post Basel II.
  - iv) Whether the ratio of Net Non Performing Assets to Net Advances was the same across Pre Basel II and Post Basel II
  - v) Whether the ratio of Net Non Performing Assets to Total Assets was the same across Pre Basel II and Post Basel II
  - vi) Whether the ratio of Gross Non Performing Assets to Total Assets was the same across Pre Basel II and Post Basel II.
  - vii) Whether the ratio of Priority sector to Total Advances was the same across pre Basel II and Post Basel II?
- 3) Which are the main determinants of Credit Risks in Public and Private Banks in India?
- i) Whether only macro economic factors or bank specific factors or both bank specific and macro economic factors play a very significant role in influencing the credit risks?
  - ii) Do macroeconomic variables such as Gross Domestic Product (GDP), unemployment rate, inflation rate, interest rate and lending rate influence credit risks?
  - iii) Which of the bank specific factors like Credit Growth, Operating Inefficiency, Ownership Structure, Size and Loan Loss Provision to Total Advances influence the Credit Risk?
- 4) Whether Credit Risks affect the Performance of the banks?
- i) How far credit risk affects profitability performance of public and private banks in India?

- ii) Is there statistically significant relationship between Non Performing Loans Ratio and profitability of public sector banks as measured by ROA, ROE and NIM?
- iii) Is there statistically significant relationship between Loan Loss Provision Ratio and profitability of public sector banks as measured by ROA, ROE and NIM?
- iv) Is there statistically significant relationship between CAR and profitability of public sector banks as measured by ROA, ROE and NIM?
- v) Is there statistically significant relationship between Loans to Deposit Ratio and the profitability of public sector banks as measured by ROA, ROE and NIM?

## **1.6 Research Objectives**

The research title Credit Risk and its Impact on the Performance of Public and Private Banks in India has been an attempt to study the effect of credit risk, a major risk faced by the banks on the performance profitability of Indian Banks. The magnitude of Credit Risk faced by the banks depends on the magnitude of Non Performing Assets of the banks thereby impairing the quality of assets held by banks and having severe impact on the performance of banks, causes being either bank specific factors or macroeconomic determinants. Thus the study aims to attend to the following objectives leading from above-mentioned research problem:

- a. To assess the Quality of Assets of the Banks under study.
- b. To study different factors influencing Credit Risk in the banks under study.

- c. To assess the effect of credit risk on the performance of the banks under study.

## **1.7 Significance of the Study**

The chosen area is very significant in the light of rising NPAs in terms of its magnitude affecting the health of the banking sector and being representative of the quality of assets of the banks has been used as proxy for credit risks, its impact on the profitability performance and the corresponding Provisioning and capital adequacy ratio to be maintained as per the guidelines from time to time by the Indian Banks to keep themselves up to the mark to be on par with the international banks standards. In view of this the present study helps in knowing the following:

1. The research findings of this study will help in addressing the existing knowledge gap in literature of Asset Quality, effects of macroeconomic and bank specific variables on credit risk in Indian commercial banks and the effect of credit risk on the performance of banks.
2. It will also be a valuable addition to the existing knowledge and provide a platform for further research which will be useful to scholars to work in the direction of Credit Risk.
3. The study guides on the status of credit risk of 40 commercial banks together as well as 24 Public Banks and 16 Private Banks specifically.

4. An understanding of the bank specific and macroeconomic factors determining Credit Risk in the Indian banking system will prove to be of great importance to the senior managers dealing with the management of Credit Risk and also the investors of financial institutions in India to know the factors influencing credit risk in Indian Banking Sector.
5. The study throws light in knowing the determinants of credit risk, whether bank specific factors or macro factors are the major causes of credit risk or both macro and micro factors influence the credit risk in Indian public and private banks. On the policy front the study findings are also important to the government, regulatory bodies and to the commercial banks themselves to know exactly whether the credit risk is affected individually only by macroeconomic or bank specific variables or both and its resulting impact on the profitability performance of the banks thereby enabling them to strengthen their policy decisions.
6. The study dealing with the credit risk and its impact on the performance of banks being comprehensive in nature enables the readers to know three different aspects of credit risk together viz., the quality of assets of Indian Public and Private Banks, assessment and evaluation of credit risk, factors influencing credit risk and the effect of credit risk on the performance.
7. The study enables to know various asset quality ratios used by the researcher to evaluate the quality of assets of the banks.

8. The study helps in knowing whether quality of assets of public and private banks is the same or it differs as per ownership structure of the banks
9. The study sheds light on the quality of assets of all 40 banks prior to and post implementation of Basel II and also the public and private banks separately.
10. Study helps in knowing the trend of credit risks in banks based on trend of GNPA and NNPA ratios from 2001 to 2016.
11. The study helps in knowing whether credit risk has any effect on the performance when all 40 banks are studied and also only 24 public and 16 private banks when studies separately.

## **1.8 Scope of the study**

The scope of the study is restricted to the Indian public and private banks listed on Bombay Stock Exchange, which were in existence up to 31<sup>st</sup> March 2016. Out of 43 listed banks, 40 banks have been selected depending upon the availability of Annual Reports for the period from 2000-01 to 2015-16, comprising of 24 public and 16 private banks. The study is restricted to the secondary data collected from the annual reports of the selected banks under study and the macroeconomic indicators of the country India determining Credit Risks. This study covers evaluation of credit risk by assessing the quality of assets of the banks and how the non-performing loans of the Indian

banking sector proxy for credit risks is influenced by the macroeconomic and bank specific determinants and the resultant effect of Credit Risk on the Performance of the Banks.

## **1.9 Organization of the Study**

This study covers Eight Chapters as detailed below

### **Chapter 1: Introduction**

This topic mainly deals with the introductory background, contribution in general of the banking sector in economic development of the country, overview to the research problem, different types of financial risk faced by banks, in depth conceptual coverage to credit risk in banks, meaning of Quality of Assets, research questions raised in the mind of the researcher, leading to research objectives, significance and scope of study and the organization of the study dealing with chapterisation. Quality ratios of banks under study for the year ending 31-3-2016 giving details is presented along with country wise NPA details from 31-03-2010 to 31-3-2016 to know where the Indian Banks stands in comparison with other countries of the world. And finally summarizes the chapter.

## **Chapter 2: Overview of Indian Banking System**

This chapter covers history of banking in India covering meaning of bank, banking in pre independence and post independence period, nationalization, economic liberalization, different Banking groups, profile of banks with their brief history, banking sector reforms, health code system, prudential norms, asset classification and provisioning, and Basel norms, overview to risk management in general and Credit Risk Management in particular.

## **Chapter 3 Literature Review**

This chapter on literature review include introduction to literature review, systematic analysis of empirical literature on asset quality, factors influencing credit risks, and effect of credit risk on performance of banks and accordingly reviewed literature is presented under three headings viz., evaluation of asset quality and Non Performing Assets, Determinants of credit risks, Effect of Credit Risk on Performance and finally summary of reviewed literature and the research gap the researcher wants to fill up is presented.

## **Chapter 4, Research Design and Methodology**

The topic includes introduction to description of the study area and research design and discusses about source of data, selection criteria, duration of the study, brief background to Time Series, Cross sectional and Panel data

sets used in the study , tools of analysis like trend analysis, correlation , regression and descriptive.

## **Chapter 5 Analysis and Discussion of Asset Quality**

The topic covers brief introduction to Asset Quality, its importance, causes and effect, brief review of important studies on asset quality, description of quality parameters, and different ratios used to gauge and evaluate quality, Trend of quality ratios is presented along with line graph and the results of hypothetical testing of asset quality for all banks under study for period prior to and after implementation of Basel II. Chapter also includes quality of assets of public and private banks separately based on the ownership structure during the period under study and finally conclusion.

## **Chapter 6: Analysis and Discussion on Determinants of Credit Risk**

The topic covers introduction to various macroeconomic and bank specific factors influencing credit risk, review of core papers dealing with determinants of credit risk, methodology used for this objective and results of diagnostic analysis covering Autocorrelation and Heteroscedasticity. The chapter gives details of results of Hausman Test to decide between Fixed Effect and Random Effect Model. Finally the results of descriptive statistics, Correlation Matrix and regression model are analysed and presented with the conclusion. Chapter also includes results of hypothesis.

## **Chapter 7: Analysis and Discussion of Effect of Credit Risk on Performance of Banks**

The topic covers introduction to the meaning of various independent and dependent variables used to assess the effect of credit risk on the performance of banks, review of core papers on the topic, diagnostic analysis dealing with Autocorrelation and Heteroscedasticity, results of Hausman Test, descriptive statistics, correlation matrix, regression model, and findings from the results and hypothesis testing.

## **Chapter 8: Findings, Conclusions and Suggestions**

In this chapter findings of the study on all three objectives of the study have been summarized along with the researcher's contribution to the credit risk in the form conclusion and suggestions.

### **1.10 Summary**

Through this 1<sup>st</sup> chapter the researcher has focused on the introductory background to the research area of Credit Risks in Indian Banking Industry which has resulted in several research questions in the mind of the researcher and finally framed the objectives in that direction. The chapter also gives highlight of NPA position of India in comparison with other countries from the year 2010 to 2016 post implementation of Basel II norms in India. The chapter presents the background to the concept of banking Credit risk, types of financial risk faced by the banks in general and mainly focused on the quality of assets, credit risk and the significance of this study.

## **CHAPTER II**

### **INDIAN BANKING SYSTEM**

#### **2.1 History of Banking in India**

A Bank is a business undertaking where money is kept for saving or making profits or it is invested or given as loans or exchanged and banking is a business activity of accepting and safeguarding money owned by other individuals and entities and thus involves lending of this money to earn profit.

The Indian banking sector has advanced and reshaped itself from a reforming administration to a liberalized, modernized and technology oriented industry. Indian banking being preservation of the nation and its people has helped in the development of the important sectors of the economy. The Indian Banking sector has travelled miles and miles of difficult terrain, suffered the indignities of foreign rule and the agony of partition.

Indian banking and financial sector has been showing rapid progress and according to the report of KPMG-CII it is likely to become the 5<sup>th</sup> largest banking industry in the world by the end of the year 2020 and 3<sup>rd</sup> largest by the end of 2025. Rs. 81 trillion, US \$ 1.31 trillion Indian Banking industry has been making use of the latest technologies consisting of internet and mobile devices and conduct their transactions and communicate with the public at large. The ownership in the banking sector has predominantly remained in the public sector despite of a gradual decline in their share.

Banking industry is the key indicator of level of development of a country and the banking sector of India has an annual growth rate of 23 percent, contributing nearly 7.7% to GDP and employing nearly 7.4 million people and has outperformed most banking indices in the world with highest total returns to shareholders at 36.76%.

The history of banking in India may be described into following four phases:

#### **1. Evolutionary Stage of Banking in India (Prior to 1947)**

Banking existed in India even in the Vedic times where giving and taking of credit in one or the other form was prevalent. The origin of banking in India was in the form of money lending business, the transition from money lending to formal banking took place before the second century. Manu, the second century rishi and scholar put forwards in his work that a sensible man deposits his surplus money with a person of a good conduct coming from a good family background and having a good knowledge of law.

Before the 20th century, usury, or lending money at a high rate of interest, was widely prevalent in rural India as money was lent to farmers at 40 to 60 % interest per annum against the mortgage of land and standing crops. The entry of joint stock banks and development of cooperative movement in the country took over a good deal of business from the hands of the Indian moneylender, who although still exists.

The Bank of Hindostan, a bank launched by a business firm, was the earliest bank started under European direction in India. However, due to the fatal combination of banking with commercial enterprises, this bank collapsed

following the failure of its parent firm in 1832.

The East India Company established banks in three metro cities, three Presidency banks in India and the first of the three was the Bank of Bengal, which obtained its charter in 1809 and received the power to issue notes in 1823. In the year 1839, this bank was given the power to open branches and to deal in inland exchange. Two more Presidency Banks were established in 1840 and 1843 respectively were the Bank of Bombay and the Bank of Madras. In 1921 these three Presidency banks were merged under the title Imperial Bank of India by bringing into effect the Imperial Bank of India Act 1920 and after independence this bank was recognized in the country as State Bank of India.

Also, towards the end of the 19th century and the beginning of the 20th century, some joint stock banks came on the scene. The Allahabad Bank Ltd. was among the first to be established in 1885-86. The Punjab National Bank Ltd. was founded in 1895, Bank of India Ltd. in 1906, Canara Bank Ltd. in 1906, Indian Bank Ltd. in 1907, Bank of Baroda Ltd. in 1908 and the Central Bank of India in 1911. These banks along with some other major banks were nationalized in 1969 and 1980.

The Reserve Bank of India was established on April 1, 1935 in accordance with the provisions of the Reserve Bank of India Act, 1934. RBI is the central Banking Authority and has extensive powers for the supervision of banking in India.

## **2. Foundation phase (1947-1969):**

Even after the formation and nationalization of RBI the growth of economy and banks was very slow and banks still experienced periodic failure. The Government of India came up with in March 1949, a special legislation, called the Banking Companies Act, 1949. From March 1966 this Act was renamed as the Banking Regulation Act and the Act vested in the Reserve Bank of India the responsibility and authority and brightened the first part of banking transformation in India.

The second transformation took place in 1955 when the Act was passed in Parliament in May 1955 and accordingly the State Bank of India was constituted on 1 July 1955, which is supposed to be the largest bank in India with the maximum number of branches. State Bank of India (Subsidiary Banks) Act was passed in 1959 and accordingly the associates of SBI were set up in the country, out of which the Bank of Jaipur Ltd. and the Bank of Bikaner Ltd. merged together to form the State Bank of Bikaner and Jaipur and all these associates existed in the country up to 31<sup>st</sup> March 2017.

## **3. Expansion phase (1969-1990)**

The need for nationalization was felt and this formed the third turning point in the history of Indian Banking. Thus with a view to serve masses, the Government of India Nationalized 14 banks in 1969 bringing the total number of branches under government control to 84 percent .Once again in April of 1980, the Government of India undertook a second round of nationalization,

placing under government control the six private banks whose nationwide deposits were above Rs. 2 billion, leaving approximately 10 percent of bank branches in private hands.

**Figure 2.1.1 Nationalisation of Banks in 1969**

1.Allahabad Bank	2.Bank of Baroda	3.Bank of India
4.Canara Bank	5.Central Bank of India	6.Syndicate Bank
7.United Bank of India	8.Union Bank	9.Punjab National Bank
10.Indian Bank	11.Dena Bank	12.Bank of Maharashtra
13.UCO Bank	14.Indian Overseas Bank	

**Figure 2.1.2 Nationalisation of Banks in 1980**

1.Andhra Bank	2.Corporation Bank	3.Punjab & Sind Bank
4.Vijaya Bank	5.Oriental Bank of Commerce	6.UTI Bank

**4. Banking Sector Reforms, Consolidation and Liberalization phase (1990 to till Date)**

Understanding the fact that a sound banking system is a must for development of economy, the then government initiated the 'Banking Sector Reforms' in 1989 by setting up of Narasimha Committee. The year 1991, the year of 'Banking Sector Reforms' allowed access to the private sector and foreign banks and this in turn increased the level of competition. Seven new private banks entered the market between 1994 and 2000. In addition, over 20 foreign banks started operations in India since 1994. By March 2004, the new

private sector banks and the foreign banks had a combined share of almost 20% of total assets.

In addition to above recommendation the other major contributors to the revamping of the banking sector was the progressive lowering of SLR and CRR, introduction of Basel Norms, Capital Adequacy Norm – CRAR be increased to 10 percent from 8 percent in a phased manner, IARC Norms – reducing the average level of net NPAs to 3percent by 2002. For Banks with a high NPA portfolio, the Committee suggested the setting up of an Asset Restructuring Company to take over bad debts, implementation of Internal Control System moving to international practice for income recognition and recommended 90 days norm in a phased manner by the year 2002, deregulation of saving interest rate, redefining of priority sectors, financial inclusion, Golden Handshake Scheme and merger of the weak banks with the stronger banks.

## **2.2. Classification of Assets**

### **2.2.1 Health Code System**

A system of classification of assets was introduced by RBI in 1985 when prudential norms were introduced for the first time. Banks were advised to classify their loans and advances under a Health Code (HC) system. The system comprises of eight codes (1 - 8) which indicated the quality or health of an individual loan account.

HC1 was categorized as satisfactory and performing asset and loans classified under HC5 to HC8 were considered as NPAs. The aggregate domestic NPAs of PSBs formed 14.46 percent of total outstanding loans and advances as on March 31, 1992 as against 13.59 percent on March 31, 1991.

With the introduction of prudential norms, the Health Code-based system for classification of advances ceased to be a subject of supervisory interest and supervisory requirement. Banks may, however, continue the system at their discretion as a management information tool.

### **2.2.2 Prudential Norms**

The Naarasimha Committee recommended various remedial measure which include prudential norms relating to Income recognition, Asset classification, Provisioning for bad debts, Capital adequacy etc. To be in line with the international practices and as per the recommendations made by the Committee on the Financial System under the Chairmanship of Shri M. Narasimha, the Reserve Bank of India introduced and implemented in a phased manner, prudential norms for income recognition, asset classification and provisioning for the advances portfolio of the banks so as to move towards greater consistency and transparency in the published accounts..

On the recommendations of the Naarasimha Committee in the year 1992-93, the Reserve Bank of India introduced the prudential norms and accordingly the concept of NPAs emerged as a contemporary issue then. According to the prudential norms as mentioned by the Central Bank of the country an asset is classified as Non Performing if interest or installment of the principal due remains unpaid for a period more than 90 days. In simple

words as long as the expected income is realized from the assets, it is treated as performing asset but when it failed to generate income or deliver value on due date, it is treated as non performing asset.

With a view to moving towards International best practices and to ensure greater transparency, the “90 Days overdue” norm for identification NPAs had been adopted from the year ending 31st march, 2004. The introduction of prudential norms in Indian Banking system was made with an objective to strengthen the Banks balance sheet and enhance transparency. These norms, which are also known as Income Recognition and Asset Classification, are considered as milestone measures in the Banking Sector reforms. The prudential norms, in addition to income recognition and asset classification, also deal with provisioning requirements for bad and doubtful debts and capital adequacy requirements.

Prudential norms has improved the health of Banks and made their balance sheets relatively more transparent.

**Table 2.2.1 Asset Classification and Provisioning**

<b>Loans and Advances</b>		
<b>1. Standard Assets</b>	<ol style="list-style-type: none"> <li>1. Standard Assets are considered as Performing Assets.</li> <li>2. They generally do not carry more than the normal risk and are regular in payments; therefore these assets are known as performing assets.</li> </ol>	
<b>Non Performing Assets</b>		
	<ol style="list-style-type: none"> <li>1. These are those advances which do not satisfy the required role and are therefore treated as non-performing assets and cease to provide any income for the banks.</li> <li>2. A Non-Performing Asset is defined as a credit facility in respect of which the interest and/or installments of principal has remained 'over-due' for a specified period of time (90 days).</li> </ol>	
<b>1. Sub-standard Assets</b>	<ol style="list-style-type: none"> <li>1. From 31 March 2005, an asset which has remained as NPA for a period less than or equal to 12 months is considered as substandard asset and such assets have well defined credit weaknesses and where there is a every possibility that bank will suffer loss.</li> </ol>	A provision of 10% has to be made on substandard assets.
<b>2. Doubtful Assets</b>	<ol style="list-style-type: none"> <li>1. The assets which have remained in a substandard category for a period exceeding 12 months are categorized as Doubtful Assets.</li> </ol>	Provision @ 100 percent of the Unsecured portion of the outstanding advance has to be made.

	2. Period for which Secured advance has remained in 'doubtful' category	Up to one year – 25%  One to three years 40%  More than 03 year 100%
<b>3. Loss Assets</b>	<p>1. Loss assets are those where the amount has not been written off either wholly or partially but such assets have been recognized as loss assets by the bank or the auditor's internal or external or the inspectors of RBI.</p> <p>2. Any NPAs would be classified as loss assets if they were irrecoverable or marginally collectible and cannot be classified as bankable asset.</p>	<p>Loss Assets are to be written off.</p> <p>If not written off Banks have to provide 100% of these outstanding advances.</p>

Strict provisioning requirements have been specified by the RBI for various asset classifications. The primary responsibility for making adequate provisions for any diminution in the value of loan assets, investment or other assets is that of the bank managements and the statutory auditors.

### **2.3 Basel Accords**

Basel committee which is an Organisation of the central banks of Group 10 countries was founded in 1974 to work in the direction of improving the observation system of Central banks and forms banking policies for members and non members.

The Basel Committee is the primary global standard-setter for the prudential regulation of banks and acts as a forum for coordinating on banking supervisory matters. It is authorized to strengthen the regulation, administration and processes of banks all over the world with the purpose of improving the financial stability. Basel guidelines refer to broad supervisory standards formulated by the group of central banks - called the Basel Committee on Banking Supervision (BCBS) and this set of agreement by the BCBS, which mainly focuses on risks to banks and the financial system are called Basel accord. The purpose of the accord is to ensure that financial institutions have enough capital on account to meet obligations and absorb unexpected losses. India has accepted Basel accords for the banking system. In fact, on a few parameters the RBI has prescribed stringent norms as compared to the norms prescribed by BCBS.

### **2.3.1 Basel I**

The first initiative from BIS came in the form of Basel I Accord with over 100 Central Banks in different countries accepting the benchmarks stipulated under the agreement. Basel agreement refers to the group of those agreements among members of Basel Committee that suggests ways to keep away risks. In 1988, BCBS introduced capital measurement system called Basel Capital Accord, also called as Basel 1 which entirely focused on Credit Risk. The minimum capital requirement was fixed at 8% of Risk Weighted Assets (RWA). Risk Weighted Assets means the assets with different risk profiles where an asset backed by collateral would carry lesser risks as

compared to personal loans, which have no collateral. India adopted Basel I guidelines in 1999, where Reserve Bank of India stipulated a minimum Capital Adequacy of 9 percent and this regulatory capital requirement was met by the Indian Banking Sector.

**2.3.2 Basel II:**

Single Rate of Capital Adequacy for credit risk regardless of the degree of risk within that group was imposed by Basel I and accordingly no provision of capital adequacy was made for a high quality credit portfolio. Basel II overcomes the weaknesses of Basel I and provides a set of comprehensive norms, sophisticated framework which clearly reflects the complexities of modern Bank Balance Sheet giving wide variety of options to measure and manage operational, market and credit risks.

Three pillar approaches to risk management are adopted by Basel II

**1. Minimum Capital Requirements for Credit Risk, Market Risk and Operational Risk**

<p><b>Pillar 1: Minimum Capital Requirement</b></p>	<p>Pillar 1 considers that banks assess credit risk, market risk and operational risk and makes provision for adequate capital to cover all three types of risks.</p>
<p><b>1. Standardized Approach</b></p>	<p>Under standardized approach banks are allowed to use credit ratings by external institutions recognized for the purpose by the Central Bank for determining the risk weight.</p>

<p><b>2. Internal Ratings Based (IRB) Approach</b></p>	<p>Banks having Management Information System (MIS) and approval of the Central Bank can make use of the IRB approach to measure credit risk on their own.</p>
<p><b>3. Advanced IRB Approach</b></p>	<p>In the case of advanced approach banks provide more of their own estimate of PD, LGD and EAD subject to meeting minimum stipulated standards.</p>
<p><b>Market Risk</b></p>	<p>Market Risks for the Banks could be caused by Change in interest rates, foreign exchange rates and prices of equity, corporate debt instruments and commodities.</p> <p>Market Risks is also caused due to mismatches in interest rates on loans and Deposits.</p>
<p><b>Operational Risk</b></p>	<p>Risk encountered by Banks due to failed internal systems, processes, people and external events are categorized as Operational Risks.</p> <p>To cut down operational risks principle of Know your Employee (KYE) is to be followed before the employees are entrusted with susceptible assignments.</p>

**Pillar 2: Supervisory Review Process**

<p>The supervisory Review Process involves initiation of interaction and active dialogue between banks and supervisors when deficiencies are identified. Only under such circumstances prompt and decisive actions can be taken to reduce risk or restore capital.</p>	<p>.</p> <p><b>Areas to be treated under Pillar 2</b></p> <ol style="list-style-type: none"> <li>1. Credit Concentration Risk</li> <li>2. Interest Rate Risk</li> <li>3. Effects of Business cycle</li> <li>4. Evaluation of conformity of minimum standards and disclosure requirements of the advanced Methods under Pillar 1.</li> </ol> <p>There is need to meet these qualifying criteria continuously.</p>
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**Pillar 3 Market Discipline and Disclosures required there under:**

<p><b>Market Discipline</b></p>	<p>Disclosure requisites are decided for banks to encourage market discipline. This will help the market participants to assess the information on capital, risk exposures, risk assessment processes and capital adequacy of the bank.</p> <p>Market discipline supplements regulation as sharing of information facilitates assessment of the bank by others including investors, analysts, customers, other banks and rating agencies. It also leads to good corporate governance.</p>
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Basel Accords I and II are efforts at the international level to strengthen the commercial banks and to absorb the shocks likely to arise due to changes in global markets.

### **2.3.3 Basel III:**

Basel III is an internationally agreed set of measures developed by the Basel Committee on Banking Supervision in response to the financial crisis of 2007-09. The measures aim to strengthen the regulation, supervision and risk management of banks. Like all Basel Committee standards, Basel III standards are minimum requirements which apply to internationally active banks. Members are committed to implementing and applying standards in their jurisdictions within the time frame established by the Committee.

## **2.4 Risk Management**

Rising global competition, increasing deregulation, introduction of innovative products and delivery channels have pushed risk management to the forefront of today's financial landscape. Risk management is the discipline that acts as the cornerstone for prudent banking practice.

Risk management is one of the main functions of any banking services and consists of identifying the risk and controlling them and keeping the risk at acceptable level. Risk Management is the application of proactive strategy to plan, lead, organize, and control the wide variety of risks that are rushed into the fabric of an organization's daily and long-term functioning. The basic

objective of risk management is to maximise the profit and optimizing the capital funds for ensuring long term solvency of the banking institution. Thus the future of banking will undoubtedly rest on risk management dynamics.

#### **2.4.1 Credit Risk Management:**

Credit Risk Management is concerned more with the quality of credit portfolio before default rather than in the post default situation when the recovery proceedings begin. It gives indications of worsening, deteriorating, erosion of credit quality of the portfolio by tracking credit migration of constituent asset in the credit and investment portfolio much before the actual default occur so that management action can be initiated in order to stem the deterioration in the credit portfolio quality. Of late, several institutional mechanisms have been developed in India to deal with NPAs and including tightening of legal provisions.

Credit Risk Managements thrust is on the establishment of a system that describes the loan approval procedure, loan-review mechanism, comprehensive reporting system, credit risk rating system and risk-adjusted pricing system, The aim of Credit Risk Management is to maximise the risk adjusted rate of return by maintaining credit risk within the acceptable parameters.

Thus credit risk management strategies are measures employed by banks to avoid or minimize the adverse effect of credit risk. A sound credit

risk management framework is crucial for banks so as to enhance profitability guarantee survival.

Bank's Credit Risk Management aims at ensuring, both qualitative and quantitative credit growth that would be balanced sector wise and diversified with optimum dispersal of risk.

Key Elements of Credit Risk Management includes:

- i) Establishing of appropriate credit risk environment:
- ii) Operating under sound credit granting processes.
- iii) Maintaining an appropriate credit administration, measurement and Monitoring:
- iv) Ensuring adequate control over credit risk
- v) Communication of risk strategy throughout the organization through credit policy.

The management of credit risk includes:

- a) Measurement through credit rating/ scoring,
- b) Quantification through estimate of expected loan losses,
- c) Pricing on a scientific basis and
- d) Controlling through effective Loan Review Mechanism and Portfolio Management.

## **Dimensions to Credit Risk Management**

### **Preventive Measures**

#### **1) Risk Assessment:**

The important processes in the risk management system comprise the identification of significant risks which may potentially impact the Bank's business operations, the assessment of each type of risk, the monitoring of risks to an appropriate level under the Bank's policy, and the reporting of the status of each type of risk to relevant parties so as to enable them to manage and/or handle the risks in a timely manner.

#### **2) Risk Measurement and Risk Pricing:**

Risk Measurement is an assessment of the degree of the risk which a particular transaction is exposed. Though it is not possible to measure the risk exactly, risk level can be determined with the help of risk rating models.

Banks should evolve scientific systems to price the credit risk which should be based on the expected probability of default and link to credit quality of the borrower. For this purpose historical database on portfolio quality and provision for last 5 years, will be useful. All banks irrespective of their size should put in place Risk Adjusted Return on Capital framework for pricing of loans.

### **3) Early warning system to pick early signals of future defaults:**

An Early Warning System is a monitoring system to detect the possibility of economic crisis in advance and to alert the policy makers to take preventive action. A bank must put in place a process for the early warning of increased credit risk, which provides for the timely identification of obligors who are showing increased risk. The bank must set appropriate qualitative and quantitative early warning indicators of increased credit risk. There is a need for clearly determined procedures and written instructions and appropriate separate and independent division with the staff that conducts monitoring and manages the Early Warning System.

### **4) Diversification of Credit Portfolio:**

Diversification is the process of allocating capital in such a way that it will help to reduce the exposure to any particular type of risk. A common purpose of diversification is to reduce exposure to risk or volatility by diversifying investment in a variety of assets. Thus diversification results in the potential benefit of a reduction in total credit risk which is achieved by holding a well-diversified portfolio of loans or other assets and is one of the economic functions of banks and other financial intermediaries. Diversification can take the form of Geographic diversification, industry diversification, diversification as per Size and customer.

### **Curative Measures:**

The curative measures aims at minimizing post-sanction loan losses through steps such as:

### **1) Securitization:**

Securitization of a bank's assets and loans is a device for raising new funds and reducing bank's risk exposures. The bank pools a group of income-earning assets and sells securities against these in the open market, thereby transforming illiquid assets into tradable asset backed securities. As the returns from these securities depend on the cash flows of the underlying assets, the burden of repayment is transferred from the originator to these pooled assets.

### **2) Credit Derivatives:**

A credit derivative is a privately held negotiable contract between two parties that allows the users to manage their exposure to credit risk. Credit derivatives refers to various instruments and techniques designed to separate and then transfer the credit risk or the risk of an event of default of a corporate or sovereign borrower to an entity other than the lender or debt holder. Banks and other lenders remove the risk of default entirely from a loan portfolio and gives right to the banks to transfer the risk of default to a third party against payment of fees called as Premium. This provides banks with an approach which does not require them to adjust their loan portfolio.

### **3) Risk Sharing**

**Risk Sharing** is an entirely different concept and involves sharing or dividing common risk among two or more persons. Banks also use this practice to lend a big amount to individual or large size corporation, each bank

supplying a portion of the loaned funds and both the profits, as well as potential losses, are shared between the parties. It is a self insurance method of managing or reducing exposure to risk by spreading the burden of loss among several units of an enterprise or business syndicate.

#### **4) Legal Enforcement:**

Legal enforcement is available to the bank which helps in recovery through courts, Lok Adalat, Debt Recovery Tribunal, and SARFAESI Act and so on. The Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002 acts as an effective tool for recovery of bad loans. It is possible to implement the Act where non-performing assets are backed by securities charged to the Bank by way of mortgage or hypothecation or assignment and enables Asset Reconstruction Companies (ARCs) regulated by RBI to purchase assets from banks and financial institutions.

Many banks in India have invested significantly in improving their Credit Risk Management specifically banks have invested in methods, resources, processes, and technology to assess, monitor, manage, and model their credit risk. Most of the effort has focused on compliance with Basel II and other regulatory requirements, and some banks continue to struggle as they work through the approval process. Leading banks, however, already have risk management frameworks in place and are now seeking to make the process significantly more relevant to management decision making. These banks are evaluating how to build on lessons learned from Basel II

implementation, regulatory approval preparations, and regulators' feedback. An emerging goal is to leverage their investments in credit risk management to make better decisions and enhance profitability.

## **2.5 Summary**

The chapter presents the theoretical background to banking system as it is a must as banking system in India has gone through different phases of transition and the author through this chapter has presented the overview of history of banking in India along with the structure of Indian banking Industry. The chapter also sheds light on banking sector reforms and has detailed description on prudential norms, asset classification and required provisions as per RBI guidelines, Basel Norms and risk management in banks in general and credit risk management in particular.

## **CHAPTER III**

### **LITERATURE REVIEW**

The study by the researcher is the macro level empirical investigation dealing with the topic credit risk and its impact on the performance of select public and private banks in India. Credit risk plays a very significant role in deciding the performance of commercial banks and impacts the profitability of banks in a great way due to mounting NPAs having direct effect on the interest income earned by the banks thereby damaging the performance.

It is believed that a strong and healthy banking system is a pre requirement for sustainable economic growth of any country and Credit risk is one of the factors that affect the health of an individual bank to a great extent and therefore any financial crisis will have effect on the economy of the country.

One finds literature and research work carried out by the researchers on topic credit risk and its impact on performance in many countries of the world covering different aspects of credit risks like Non Performing Assets depicting the quality of assets of the banks, Basel accord , determinants, impact on the Performance and Credit Risk Management practices.

The literature review which is a critical discussion and summary of statistical literature having general and specific relevance to the researchers area of the research problem has helped the researcher in surveying the past

research and enabled to evaluate, summarize, compare and contrast, and correlate various scholarly books, research articles, and other relevant sources that are directly related to the researcher's current research. Thus an overview of published and unpublished material has helped to understand current theoretical and policy issues and debates related to the topic and current state of knowledge about these issues and problems. Thus the reviewed literature on the topic is the base for the researcher's research and has helped the researcher to develop a good understanding of previous research and come to the research gap and accordingly divides the Literature Review topic into three categories depending upon the objectives of the study:

The study aims at attaining following three objectives:

- a. The Quality of Assets of Banks.
- b. Factors influencing Credit Risk in banks.
- c. Effect of credit risk on the performance of the banks.

### **3.1 Review based on Quality of Assets and Non Performing Assets**

As the current topic deals with the Credit Risk and its Impact on the Performance of Public and Private Banks in India, before knowing the impact there is need to evaluate or assess the credit risks and as such the very 1<sup>st</sup> aspect deals with quality of assets (loan assets) owned by the bank which is a very important parameter to know the credit risk associated with the banks. The extent of the credit risk depends on the quality of assets held by an individual bank and the quality of assets held by a bank depends on exposure

to the credit risks, trends in non-performing loans, and the health and profitability of bank borrowers (Baral, 2005). Thus the very first segment of Literature Review deals with the review of literature on Quality of Assets and Non Performing Assets.

**Khalid Ashraf Chisti (2012)** has examined the impact of asset quality on profitability of J& K, ICICI, HDFC and Yes Bank and considered Gross NPA to Gross Advances, Net NPA to Net Advances, Total Investments to Total Assets and Net NPAs to Total Assets as asset quality parameters. Study uses ROA, Spread to Total Asset and Earning per Share as profitability indicator. Using secondary data from 2006-07 to 2010-11, the study employs Multiple Regression Techniques and draws conclusion that bad asset ratio is negatively related to the performance of banks and quality in loan processing activities prior to the granting of loans results in lower non value added services require to process problematic loan at the latter stage.

**P. Malyadri, S. Sirisha, (2012)**, studies Asset Quality and Non Performing Assets of Indian Commercial Banks and while analyzing the trends in Non-Performing Assets of Indian Scheduled Commercial banks has made comparison of Public, Private and Foreign Banks using secondary data retrieved from RBI Website for 14 years starting from 1996-97 to 2009-2010. The paper studies the GNPA's and Net NPAs, and tests the growth of NPAs along with its components with the help of compound annual growth rate. The study shows that the public sector banks have higher levels of NPAs in comparison to private and foreign banks. The study concludes that Asset

quality of banks had generally seen a steady improvement as evident from a declining level of gross NPA ratio.

**A.V. Jose, 2013**, in his study on Assets Quality of Indian Banks-an Overview, opines that most important factor which measures the health of a banking system is the size and components of NPAs. The result based on RBI Trend and Progress Report shows that the NPA figures for 2011-12 of Public Sector Banks have contributed maximum, with SBI Group taking the major share. The study has made group wise comparison of banks NPAs for the year 2011 and 2012 and draws inference that Banks were really aggressive in lending with number-games and target- games resulting in bad asset quality and increase in NPAs.

**Eva J. Gleeson (2013)**, while, assessing asset and liquidity quality as indicators of performance within the European banking sector' used financial ratios as an excellent method for analyzing financial stability (Moore & Wayne, 2011; Najjar, 2013). The researcher analyzed six hundred and twenty six banks over a period of five years from 2009 to 2013. Asset Quality which measures the impaired loans as a percentage of the total gross loan book and reserves for loans and Liquidity Quality which measures the total loan as a percentage of the customer deposits are used as independent variable. Dependent variable used in this study is Profitability/Performance quality and the ratio measures the net income returned as a percentage of shareholder equity. The results of Kruskal-Wallis H test consistently show that poor impairment is affecting the performance in the larger banks.

**Dickson Pastory & Marobhe Mutaju (2013)**, in their study evaluates the influence of Capital Adequacy on Asset Quality Position of Banks in Tanzania. Study uses Panel secondary data from 2006 to 2011 on 33 banks and expresses relationship between two variables viz. Ratio of NPL to gross loans and core capital to total assets. Results of Linear Regression model used in the study reveal that capital adequacy has a great influence on the asset quality. The increase in capital ratios has sometimes reduced the asset quality productivity and in most cases the levels of non-performing loans and non-performing asset have been increased with the increase in capital ratios.

**Pallab Sikdar and Munish Makkad (2013)** using secondary data examined the role of Non Performing Assets in the Risk Framework of select Indian Commercial Banks and interprets the credit risk from existing levels of bank NPAs. The study highlights the significant steps taken and procedures implemented by major Indian commercial banks, towards recovery of loans and advances slipping into the NPA bracket.

**Asha Singh (2013)** , analyses, performance of Non-Performing Assets (NPAs) in Indian Commercial Banks giving comparison of Gross NPAs and Net NPAs of Public and Private Sector banks with the help of Secondary data published by RBI annually. The result shows that public sector and private sector banks showed a declining trend in gross and net NPAs over the period of study from 2001-02 to 2011-12 , but public sector banks has higher NPA compare to Private sector banks as private sector banks have a secured loan policy as compared to public sector banks.

**Samir and Deepa Kamra (2013)** analyzed the trends in NPAs in terms of values, gross and net NPAs as a percentage of gross advances and net advances, gross and net NPAs as a percentage of Total Assets respectively of Selected Commercial Banks in India from 1996 to 2010. The study also deals with Sector-wise classification of NPAs and reasons for their occurrence. Research focuses on trend analysis of NPAs to evaluate the financial health of commercial banks. The gross NPAs as percentage of total assets have significantly reduced across all the banks from 1996-97 to 2009-10 and attributes the decline to the significant improvement in the asset quality with a rapid increase in quantum of credit to the commercial sector.

**Arpita Ghosh (2014)**, in her study on Asset Quality of banks: Evidence from India, has analysed Gross NPAs, Gross Advances and Slippage Ratio of Banks group wise with the help of graphs and tables showing trend in NPAs and Gross Advances during pre crisis period, crisis period, and post crisis period. It covers a period of nine years from 2004-05 to 2012-13, 4 years prior to 2008-09 and 4 years after 2008-09. Study further highlights macroeconomic and micro economic factors adding to NPAs, and the results of regression analysis shows that NPA experience of banks do vary depending upon their bank-group but PSBs not necessarily always bear a higher burden. Macroeconomic Factors like GDP slowdown, fall in stock prices, increase in interest rates and fall in debt creating inflows also contribute towards higher NPAs for the banks during the study period.

**Siraj.K.K (2014)** examined Non Performing Assets of Public Sector Banks in India with Special reference to State Bank of Travancore”, where in the researcher evaluates the trend in the movement of NPA of Public Sector Banks (PSBs) in India during pre financial crisis period from 2000-01 to 2006-07 and post financial crisis period 2007-08 to 2011-12 and used both secondary and primary source of information. The study also deals with bank performance variables and the relationship with NPA and advances, and the role of macroeconomic indicators on the relationship between advances and NPA of banks. The sample size for primary survey was 160 Officers working with State Bank of Travancore. The study analyses secondary data using averages and percentage, Charts, Correlation, Regression, ANOVA, F-test, and t-test and concludes that the trend in movement of gross NPA of PSBs is greatly influenced by the upsurge of Gross NPA of SBI & associates.

**Anto Juliet Mary M and Sivakami Rajesh (2014)**, in their study on Banking Debt Crisis: A Current Scenario of Asset Quality Management, states that high level of NPAs result in high probability of credit defaults thereby affecting the profitability and net-worth of banks resulting in erosion of the value of the asset. The rising NPAs demand the requirements of provisions and in return reduce the overall profits and shareholders’ value. The researcher using secondary data focuses on the NPA incidence, current magnitude and implications of NPA’s in the Indian scenario. The study analyses GroupWise GNPA and NNPA’s of Banks and its impact on profitability, liquidity, credit loss etc. The analysis shows that the NPA’s have negative influence on the achievement of capital adequacy level, funds mobilization and deployment policy, banking system credibility and overall economy of the country.

**Lawrence Mysyimi (2014)** establishes the effect of Tier I banks in Kenya on the Risks Adjusted Returns and applies Regression Analysis on six banks over a period of 10 years. Risks Adjusted Return is used as a measure of bank performance and asset quality is the independent variable as measured by Ratio of Gross NPAs to Gross Loans and Advances, Ratio of Loan Loss Provision to Gross Loan and Advances and Ratio of GNPA to Total Assets. The result shows that changes in the ratio of Asset Qualities brings changes and affect negatively the Risks Adjusted Return.

**Festus Kimanzi Nzoka (2014)** using secondary data and the dependent variable representing the Financial Performance of the banks denoted by Return on Assets (ROA) and Independent variable representing Assets quality such as Gross NPAs to Gross Advances, Total Investments Assets to Total Assets and Net NPAs to Total Assets determines the effect of Assets Quality on the Financial Performance of 43 commercial banks in Kenya from 2010-2014. The regression analysis showed that all the asset quality factors had a fairly statistical significant impact on financial performance. This was due to the fact that assets quality cannot solely determine the financial performance of commercial banks. The relationship between asset quality and financial performance was confirmed to be negative.

**Poonam Mahajan (2014)** analyzed trends of Non Performing Assets based on time-series data for all banks in India for a period of 15 years from March ended 1999 to March ended 2013. Study makes Comparative analysis with the help of pie diagram. The study has used four ratios such as NPAs to

Gross Advances, Gross NPAs to Total Assets, Net NPAs to Net Advances and Net NPAs to Total Assets as a tool for analyzing the trend of NPAs of banks in India. The old private sector banks, has a declining trend but in case of new private sector banks, it has a varying trend. It shows that the magnitude of this ratio has a declining trend in case of public sector banks .In case of foreign sector banks, this ratio has fluctuating trend.

**Abata, Matthew Adeolu ( 2014)** adopting ratios as a measure of bank performance and asset quality examines and evaluates banks asset quality and performance in Nigeria using secondary data obtained from the annual reports and accounts of the six largest banks listed on the Nigeria Stock Exchange for a period of fifteen-years from 1999 to 2013. The findings using (ROA) as a proxy for performance and the Loan-Loss Ratio (LLR) and the Total Investments to Total Assets Ratio (TTR), the correlation and regression revealed that asset quality had a statistically relationship and influence on bank performance.

**Abdul Latif Alhassana et al. (2014)** using Secondary data examined the factors that account for the deterioration in the asset quality of 25 Ghanaian banks from 2005 to 2010 during a period of financial crises. The study employs the ratio of Non-Performing Loans to gross loans and advances as the indicator for asset quality and considers macro and bank specific determinants of asset quality. Trend analysis has been used in the study to examine the asset quality and regression analysis is done to study factors that account for deterioration in asset quality. The result shows that the persistence of non-performing loans in addition to loan growth. Further bank market structure, bank size, inflation, real exchange rate and GDP growth are the

significant determinants of banks asset quality in Ghana. The inflation rate and exchange rate, depreciation negatively impacts bank asset quality and growth in the real economy brings improvements in the asset quality of banking industry. Market concentration, bank size and income diversification were found to have a positive impact on bank asset quality, while bank interest spread and credit growth impact negatively on performance of bank loan Portfolio.

**Nayan M Gadhia, 2015** in her study on assets quality of selected Public and Private sector banks in India opines that the basic purpose of measuring or gauging the assets quality is to ascertain the component of Non-Performing Assets (NPA) as a percentage of the total assets and thus enables banks in knowing type of debtors it has.

The study uses three ratios such as Total Investment to Total Assets, Net NPA to Net Advances and Net NPA to Total Assets as assets quality parameters. Five banks each from public sector (SBI, PNB, BOB, BOI, and UNION BANK) and private sector (ICICI, HDFC, AXIS, KOTAK and INDUSIND) using secondary data for a period of five years from 2007-08 to 2011-12 has been studied .The study uses F-Test One Way ANOVA as a statistical tool and concludes that assets quality of the selected banks was different during research period.

**Deepak Kumar Sharma 2015**, analyses Assets Quality of 10 selected Indian Nationalized Banks for a period of ten year from 2004-05 to 2013-14. The study uses Secondary data and ratios such as Total Investments to Total Assets, Net NPA's To Total Advances, Net NPA to Total Assets, as Quality

Parameters and tools like averages, ranking and coefficient of variance and correlation of coefficient. The result shows that there is a significant relationship in assets quality among nationalized banks which reflect their varied efficiency in the management of nonperforming assets.

**Shilpa Vivek Agrawal (2015)** has evaluated NPA of Selected 14 Private Sector banks in India for the period from 2000-2010 using secondary and primary data and analyzed results with the help of Percentages, Comparative statements and Regression. The results show that Gross NPA & Net NPA of all the sectors has increased in absolute terms where as it has reduced in terms of percentage to advance.

**Bogdan Florin Filip (2015)** studied the quality of bank loans within the framework of globalization for the period 2000-2012 and considered "non-performing loan as direct expression of non-quality. The study using correlation not only analyses NPLs with macro level factors that determine their formation, but also the NPLs effect on the entire economy. Study uses secondary data published by the World Bank and IMF and uses variables like annual change in bank NPLs ratio, Real GDP growth rate (%), annual change in inflation rate (%) and annual change in Unemployment Rate (%). The result for Romania and EU confirms that there exist correlations between the Changes in bank NPLs ratio, as expression of changes in bank credit quality, and levels of the macroeconomic indicators. The existence is also in EU case of a rational, but it also shows significant, reverse correlation between bank NPLs ratio variation and the real GDP growth rate. In the case of Romania, the unemployment rate variation is significant (0.7433) and in the same direction correlated with the bank NPLs ratio variation.

**Chilukuri S. S. et al. (2016)** in an Empirical Analysis for a period of 12 years from 2001-02 to 2012-13 based on secondary data on Asset Quality of Indian Banking Industry has dealt with the trend level of NPAs in Indian banking industry and made comparison between NPAs of Public, Private and Foreign Banks. The study has made use of statistical tools such as Geometric Progression Ratio, CAGR and percentages to examine the status of quality asset of Indian banking industry in relation to year-over-year growth in percentage of NPAs to advances. The study concludes that there is a major penetration of advances from Public Sector Banks showing higher share amongst all Scheduled Commercial Banks, nevertheless during that period the declining trend in NPAs shown improvement in the trend level of NPAs in Indian banking industry.

**Vivek Rajbahadur Singh (2016)** studied Commercial Banks Non-Performing Assets and it's recovery in Indian context and thereby presented the trends, status and impact for a period of 14 years from 2000 to 2014. The study uses asset quality ratios such as Gross NPA to Gross Advances and Net NPAs to Net Advances to analyse the trend in NPAs. The results also show recovery of NPAs over a period of study through recovery attempts though the NPA showed increasing trend.

**Santanu K. Ganguli (2016)** using RBI website for macro level data and prowest database for micro level data from 2007 to 2015 evaluates Asset Quality of Indian Banks and concludes that substandard asset quality is due to skewed nature of GDP distribution .The efficiency of the said sector is attributable to deployment of strategic intangible assets requiring lesser bank finance. The banks have limited option to park huge house hold saving in

quality assets. The scope of innovative advance is limited. To evaluate quality of assets study analyses gross NPA Ratio, Gross Advances, and Net NPA Ratio.

**J. Kumar and R. Thamil Selvan (2017)** assessed the impact of Asset Quality and Profitability on selected Indian Public Banks using secondary data from 1st April 2011 to 31st March 2016. Asset Quality Ratios used in the study include Non-performing Assets (GNPAs), Net Non-performing Assets (NNPAs) Total Investment to Total Assets (TITA). The study concludes that there is significant relationship between Assets Quality and the Profitability of selected Public sector banks in India.

### **3.2 Review based on Determinants of Credit Risks**

Literature reviewed uses Asset Quality as a parameter to measure the credit risk but there are many factors or determinants which causes credit risks and this section deals with the literature review on micro and macro determinants of credit risks as available from earlier research studies

**Nor Hayati Ahmad and Mohamed Ariff (2007)**, using cross-sectional data of commercial banks worked on Multi-Country Study of Bank Credit Risk Determinants covering nine countries over a crisis-prone period, 1996 to 2002. The dependent variable used in the study is changes in Non-performing Loans to Total Gross Loans as a measure for credit risk and the independent variables include bank-specific factors such as management

efficiency, loan-loss provision, loan to- deposit ratio, leverage, regulatory capital, funding costs, liquidity, spread and total assets. Study uses regression analysis and Correlation and co linearity diagnostic were also carried out to assess the extent of multi-co linearity among independent variables and shows no multi-co linearity problem between the risk predictors. The study finds that anywhere from two to four factors are alone significantly correlated with credit risk of any one banking system. Regulatory capital is significant for those banking systems that offer multi products; management quality is critical in the cases of loan-dominant banks in emerging economies. Contrary to theory or earlier studies, leverage is not correlated and is irrelevant with credit risk. An increase in loan loss provision consistently emerges, as in prior studies, to be a significant determinant of potential credit risk. The credit risk in emerging economy banks is higher than that in developed economies and that risk is the result of by a large number of bank-specific factors in emerging economies compared to their counterparts.

**Abhiman Das and Saibal Ghosh (2007)**, empirically investigated the determinants of Credit Risk in Indian State Owned Banks from 1994-2005. The Dependent Variable Non-Performing Loans represents Credit Risk and Microeconomic variables such as Growth in advances, Growth in number of bank offices, Operating Expenses/Total Asset, Loans to non-priority sector/total loans, Log (bank asset), Interest income less Interest Expense/Total Asset, Capital (tier-I plus tier- II)/Risk Weighted Assets, and Income from Loans/Total Loans less call Money Rate and one Macroeconomic determinant Growth Rate of Real GDP are used as independent variables. The regression analysis reveals that at the macro level, GDP growth and at the bank level, real

loan growth and bank size play an important role in influencing problem loans.

**Bostjan Aver (2008)** analysed 25 credit risk factors of the Slovenian banking to establish which macroeconomic factors influence the systematic credit risk of the Slovenian banking loan portfolio. The study uses loans given to the non-banking sector/ gross loans to the non-banking sector as a measure of credit risk. The study applies the method of multi linear regression and the result shows credit risk of the loan portfolio depends on the employment or unemployment rate, short and long-term interest rates and value of the Slovenian stock exchange index but doesn't depend on the inflation rate, the growth of GDP (industrial production), exchange rates or the growth of Slovenian import and export.

**Mohammed Oqlah Mahmoud Al-Smadi (2010)**, studies Credit Risk, Macroeconomic and Bank Specific Factors in 23 Jordanian Banks from 1995-2008 and uses 12 independent variables consisting of seven bank specific variables such as lag Banks NPL Provision of Loan Losses, Loan Growth, Equity Capital Ratio, loan concentration in Risky Sector, Net Interest Margin and Size and five external factors viz. Aggregate Economic activity, Inflation, Money Supply, Interest Rate and Market Risk. The dependent Variable Credit Risk is measured by Banks' NPL to Total Loans and applies OLS Regression Models. The result shows that all the macroeconomic variables together explain 51.9% of variation in Credit Risk and bank specific factors explain 73% of credit risk thus affecting credit risk more than macro economic factors and indicating close association.

**Dimitrios P. Louzis (2010)** using dynamic panel data methods examined the Bank-Specific and external factors of Nonperforming Loans in Greece for each type of consumer, business and mortgage loans from 2003-2009. The study results show that NPLs in the Greek banking system can be explained mainly by macro factors viz. GDP, unemployment, interest rates and management quality. Results show difference in the quantitative impact of macroeconomic factors among types of loans as non-performing mortgages being the least responsive towards changes in the macroeconomic conditions. Results reveal that macroeconomic variables, specifically the real GDP growth rate, the unemployment rate and the lending rates have a strong effect on the level of NPLs. Empirical results also indicate significant differences with regards to the quantitative effects of the various NPLs' determinants depending on the category of loans.

**Nabila Zribi and Younes Boujelbène (2011)** examined macroeconomic and microeconomic factors influencing bank credit risk in Tunisia for ten commercial banks over a period from 1995 to 2008. The study employs the ratio of risk-weighted assets to total assets as a measure and determinant of bank credit risk and ROA as a measure of Profitability. Study uses two dummy variables viz. ownership structure (GOV) and bank regulation (REG). Study also uses four macroeconomic indicators viz. inflation, growth rate of GDP, interest rate and exchange rate and one Bank Size as the control variable measured as the natural logarithm of total assets. The regression results show that the public ownership increases the bank credit risk and the prudential regulation of capital decreases the credit risk taken by Tunisian banks. The ratio of return on assets is positively related with

credit risk and the ratio of capital adequacy is negatively associated with credit risk. Then, the results indicate that the bank credit risk-taking decisions are also related to bank macroeconomic indicators.

**Somanadevi Thiagarajan and A. Ramachandran (2011)**, makes an empirical analysis and comparative study of credit risk ratios between 22 Public and 16 Private Sector Commercial Banks in India from 2001 –2010. The trend result shows that there is a consistent increase in the total loans to total assets ratio and total loans to total deposits ratio for both public and private sector during the period of study. Although there was a gradual decrease in the ratio of nonperforming loans to total loans for both public and private sector banks from 2001 to 2008, there has been a gradual increase from 2009 to 2010 and this increase is significantly higher for private sector banks over their public sector counterparts. Also there is a drastic and significant increase in the total loans to total equity ratio in the public sector banks during the last four years. The correlation analysis of the credit risk ratios with macroeconomic indicators reveals that there is a statistically significant high negative correlation that exists between the Export/import (%) ratio and the ratio of total loans to total assets, total loans to total deposits, total loans to total equity, total assets to GDP and provisions for loan loss and nonperforming assets. Result also shows negative correlation between real GDP and the ratio of nonperforming assets to total loans, total loans to total deposits, and total equity to total assets, nonperforming assets to nonperforming assets and total equity. Study observes significant positive correlation between inflation and total loans to total assets ratio, total loans to total equity ratio, and total assets to GDP ratio for the public sector banks.

**Nil Günsel (2012)**, using multivariate logit regression model and panel data collected for 24 commercial banks empirically investigates Micro and Macro determinants of bank fragility in North Cyprus economy from 1984 to 2008. The study considers microeconomic variables that are identified in the CAMELS context, namely, the ratio of total capital to total asset, loans to total assets, net income to total assets, total deposits to loans and natural logarithm of the total assets; and three sets of macro variables viz. real GDP growth, the inflation rate, the real interest rates and external conditions which include terms of trade, real exchange rate and market pressure index in Turkey. The study finds that, capital inadequacy, lower income, lower bank size, high inflation rate, lower growth rate, adverse terms of trade shocks and market pressure in Turkey are important determinants of banking sector distress in North Cyprus.

**Vítor Castro (2012)** made analysis of external factors determining the credit risk in the banking system in the case 5 European countries, GIPSI, Greece, Ireland, Portugal, Spain and Italy. Study measures credit risk as the ratio between the banks' nonperforming loans and the total gross loans. The growth rate of real Gross Domestic Product, share price indices, the unemployment rate, the real effective exchange rate and inflation are also as macroeconomic determinant. The interest rate is another important conditioning of the credit risk because it affects the debt burden. The study employs dynamic panel data approaches and the result of regression analysis shows that the banking credit risk is significantly affected by the macroeconomic environment and the credit risk increases when GDP growth

and the share price indices decrease and rises when the unemployment rate, interest rate, and credit growth increase. It is also positively affected by an appreciation in the real exchange rate.

**Vighneswara Swamy (2012)** using panel regression analysis, studied the determinants of bank asset quality and profitability for the period from 1997-2009. The study uses macro-economic variables such as Gross Domestic Product Growth Rate Exchange Rates, Market Capitalisation Growth Rate, Bank Lending Rates, Index of Industrial Production, Inflation rate, and Savings Growth Rate. The bank specific variables are represented by bank assets, Capital Adequacy Ratio, Credit to Deposit Ratio, Cost of Funds, Return on Assets, Ratio of Rural and Semi Urban Branches to total bank branches, Bank Credit growth, Ratio of Priority Sector Credit to total loans, Operating Expenses to total assets, and Return on Investments that are supposed to determine the NPAs in the Indian context. The study reveals that Priority sector credit and credit by rural branches is not significant in affecting the NPAs. Public sector banks have shown significant performance in controlling bad debts and private banks have continued to be stable in controlling the bad debts as they have better risk management procedures and technology, enabling them to maintain lower levels of NPAs. Study also reveals that capital adequacy and investment activity significantly affect the profitability of commercial banks apart from other accepted determinants of profitability; asset size has no significant impact on profitability.

**Anna Pestova and Mikhail Mamonov (2012)** evaluated Macroeconomic and bank-specific determinants of credit risk in Russia using single-equation approach on panel data covering Russian banks from 2004-2011. The result reveals that most of the negative influence on Russian banks' loan quality was caused by deterioration of macroeconomic conditions. GDP growth rates show significant and inverse influence on the percentage of overdue loans. During the periods of economic expansion credit risk tends to be lower and loan quality gets deteriorated during contraction period. Result indicates that sudden stop of income and asset price inflation reduces borrowers' debt sustainability. There is also significant influence of exchange rates devaluation on the quality of loans denominated in foreign currency.

**Ruchi Paruthi and Shalini Aggarwal (2012)** evaluated Credit Risk Ratios between 12 Public and 7 Private Sector Banks listed in the Bombay stock exchange. The study considers bank specific factors such as net non performing assets (NPA), total loans, total equity, total assets etc. for the period from 2005 to 2011 and makes evaluation of credit risk ratios such as the ratio of total loan (TL) to total assets (TA), Total Equity (TE) to Total Assets (TA), Non-Performing Assets (NPA) to Total Loans (TL) , Total Loans (TL) to Total Equity (TE), Non-performing assets (NPA) to NPA and Total Equity (TE). The results shows that Non Performing Assets of the banks have been reduced substantially by following the Basel norms and the banks are progressing in the right direction.

**David Kwashie Garr (2013)** using unbalanced panel data set from 33 commercial banks covering 21-year period from 1990 to 2010 examined bank-specific, industry-specific and macroeconomic factors that influence credit

risk (CR) in commercial banks in Ghana. Credit Risk in this study is measured by two ratios viz. the ratio of Loan Loss Provision to Total Assets of Banks and the ratio of Net Interest Income to Total Assets. Bank specific factors include real loan growth rates, size of loan portfolio, bank size, operating efficiency and branches. The two banking industry variables include financial sector development and competition. Results of panel data regression shows that credit risk in Ghana is significantly influenced by management efficiency, GDPPC, Government borrowing and the financial sector development. Government borrowing and financial sector development have a negative relationship with credit risk while management inefficiency and GDPPC have a positive relationship.

**Gustavo José de Guimarães e Souza<sup>1</sup>, Carmem Aparecida Feijó (2013)** studied, Credit Risk and Macroeconomic Interactions: Empirical Evidence from the Brazilian Banking System and explains credit as characterized by excessive cost and limited supply and the main reason is the high de-fault risk embedded in the spread. The study concludes that the level of economic activity and the basic interest rate are the factors which have great influence on the default risk. The study also makes analysis of reaction of the financial sector to structural risks, suggesting a new approach to credit risk. The assumption that credit risk is the result of an interactive process between banks and the economic environment is confirmed by this study for the period from 2000 to 2006 in Brazil. The results also show differences in the behavior of private and public banks.

**Hamid A.H. Al-Wesabi and Nor Hayati Ahmad, (2013)**, made analysis of factors affecting Credit Risk of Islamic Banks in GCC Countries. The study covers 25 Islamic banks from 2006 to 2010 and uses Non-Performing Loans as a proxy for credit risk, with three macro-economic variables (Gross Domestic Product, Inflation Rate and London Inter-Banks Offered Rate) and six firm specific independent variables such as natural log of total assets, management, regulatory capital, proportion of loan to deposit, risky asset which is a real estate asset in GCC countries according to the published reports and loan loss provision. Regression model is used to test the variables affecting credit risk and result of the study shows that income is significantly negatively related to credit risk, which is consistent with findings in other countries about credit risk. The result also shows that firm-specific variables such as leverage, liquidity are also relevant variables for credit risk and these results are also consistent with bank behavior reported in other studies. Credit risk is also broadly affected by both macro and firm-specific factors as found in other regions. Inflation and interest rates do not appear to be relevant.

**Bilal Mehmood et al. (2013)** empirically tested the macroeconomic and bank-specific covariates of non-performing loans for a panel of 13 commercial banks for a period from 2003-2012. Study uses NPL as the dependent variable and four independent variables viz. Market share of bank in the loan market, ROA, ROE and SLR and set of macroeconomic factors such as interest rate, GDP and inflation rate. The results of regression reveal that findings in this study conform to other studies in Asian countries including India and Bangladesh. Market share is found to be significant and

reduces the non-performing loans. Similarly, return of assets decrease NPL and NPL shows a negative relationship with return of equity. Statuary liquidity ratio decreases the NPL and Gross Domestic Product has a similar impact as the above-mentioned regressor and GDP reduces NPL. Both regressor inflation rate and interest rate are showing positive relationship with NPL.

**Tesfaye Boru Leissa (2014)**, using data from 1990-2012, investigated factors influencing the level of credit risk in the Ethiopian Commercial Banks and applied both descriptive statistics and econometric model. The estimated variables in the regression model consist of following three major classes of credit risk: Quantity of credit risk indicators- The loan to total asset measures the exposure level of banks to credit risk, the Single Borrower Limit measures the risk from credit concentration or and the growth rate of loans specify the rate of expansion of the credit activity of banks. Quality of credit risk management indicators – The natural logarithm of total assets which is the customary measure of bank size, the loan to deposit which is an efficiency measure that indicates bank's ability to convert their liquid assets in more productive investments like loans and advances and the net interest margin a profitability indicator for the lending business. Direction of credit risk indicators: The two- banks concentration ratios that shows the level of concentration and hence the level of competition in the loan market, the natural logarithm of the real gross domestic product (LN<sub>RGDP</sub>) which shows the growth trend of the Ethiopian economy and the inflation (INFL) variable, an external factor that can have impact on the price of lending and hence the debt repayment capacity of borrowers. The provision to Total Loans is used as a dependent variable. The separate evaluation of the three groupings shows that

variables related to quantity of credit risk and quality of credit risk management has got more influence to explain variation in credit risk. The quantity of credit risk variable, the ratio of Loans to Total Asset has significant relationship with credit risk exposure. The relationship witnessed that as the share of loan book from the total asset increases the exposure to credit risk will be large and significant. The quality of credit risk management variable, the LOGTA, which is a customary measure used to observe the effect of bank size on credit risk exposure resulted in significant relationship. In Ethiopian context, the variable has a strong link with the age of bank.

**Gitonga Kariuki Washington (2014)** investigates the effects of Macroeconomic Variables On Credit Risk in The Kenyan Banking System using nonperforming loans as dependent variable and macroeconomic variables like GDP per capita growth rate, Lending interest rates, Exchange rate between the US dollar and the Kenyan Shilling, Inflation rate and domestic credit to the private sector by the Commercial Bank as independent variables for a period from 1990 to 2013. OLS regression model reveals that only GDP per capita growth rate is significantly related to credit risk and in the long run however all variables are significant in explaining credit risk. Exchange rates between the US dollar and the Kenyan Shilling, Domestic Credit to Private Sector, Inflation were found to be negative and significantly related to credit risk. , Lending interest rates were positive and significant to credit risk.

**Glediana Zeneli Foto (2014)** analyses Non-economic factors that affect credit risk in Albania. The study makes qualitative and quantitative analysis of the main indicators of the banking sector from 2005 to 2012 and descriptive analysis of social factors. The study concludes that in Albania there is a positive correlation between the NPL and indicators that measures the management efficiency, confirming the hypothesis "skimping". There is strong negative relation that exists between the measure of capitalization and LTA which indicates the risk that a bank undertakes confirms the hypothesis.

**Tilahun Aemiro Tehulu et al., (2014)** using a balanced panel data of 10 commercial banks both state-owned and private owned for the period from 2007 to 2011 examined the bank- specific determinants of credit risk in Ethiopian commercial banks. The regression results revealed that credit growth and bank size have negative and statistically significant impact on credit risk. Whereas, operating inefficiency and ownership have positive and statistically significant impact on credit risk. Finally, the results indicate that profitability, capital adequacy and bank liquidity have negative but statistically insignificant relationship with credit risk.

**Nor Hayati Ahmad and Shahrul Nizam Ahmad (2016)** studied Key Factors Influencing Credit Risk of Islamic Bank: A Malaysian Case and makes comparison between Islamic and conventional banking operations using descriptive statistics, independent t-test of means of Islamic and conventional banking, independent variables and regression from 1996 to 2002. Study uses seven independent variables viz. management efficiency, leverage, risky sector loan exposure, regulatory capital, loan loss provision, funding cost, Risk-weighted assets, natural log of total assets and proportion

of loan to deposit. Non-Performing Loan to total loan has been used as proxy for the credit risk. The results show that management efficiency, risk-weighted assets and size of total assets have significant influence on credit risk of Islamic banking, while conventional banking credit risk are significantly affected by loan exposure to risky sectors, regulatory capital, loan loss provision and risk-weighted assets. Both banks observe similar effects of leverage, funding cost, risk-weighted on credit risk. Islamic banking experiences different impact of management efficiency, regulatory capital and loan loss provisions on their credit risk.

**Vania Andriani, et al. (2015)**, has made analysis of Bank-Specific Determinants of Credit Risk: Empirical Evidence from 69 commercial banks in Indonesia. Study uses Non-performing loan as the credit risk indicator and Ratios like ROA, ROE, CD, CAR, Credit Growth, Operating inefficiency as independent bank specific variables. The OLS regression model results show that the problem of Heteroscedasticity and autocorrelation still persist and proved that this research is deemed unfit for OLS regression because of failures in fulfilling the classical assumptions, i.e. normality, Heteroscedasticity and autocorrelation.

**Waeibrorheem Waemustafa Suriani Sukri (2015)** using Multivariate Regression analysis analyses micro and macroeconomics determinants of credit risk in Islamic and conventional banks. Study has selected a sample of 15 Malaysian conventional and 13 Islamic Banks. The study covers a period from 2000 and 2010 and uses 16 bank specific variables and 6 macroeconomic variables and credit risk is used as a dependent variables measured by nonperforming loans to total loans and nonperforming

finance to total finance. The findings of the study reveal that the banks specific factors influence the credit risk of Islamic and Conventional banks. The study also finds that financing to risky sector and regulatory capital are significant factors determining credit risk of Islamic banks. Significant factors influencing credit risk of Conventional Banks include loan loss provision, debt-to-total asset ratio, regulatory capital, size, earning management and Liquidity. Amongst macroeconomic factors only Inflation and M3 are significant determinants of Credit Risk for both Islamic and Conventional banks.

**Fion San Yi Ting et al. (2015)** examined the economic and bank specific factor on the Bank Credit Risk: evidence from Malaysia covering a period from 1988 to 2013. The study uses Ordinary Least Square Model to investigate the relationship between dependent variables (Non Performing Loans to Total Loans), bank credit risk and independent variables. Study uses 5 independent variables consisting of economic (external) and bank-specific (internal) factors affecting the bank credit risk. The economic factors include inflation, interest rate and Gross Domestic Product while the bank-specific factors include bank performance and reserve requirement. The empirical results of regression in this study show that inflation, GDP, bank performance and required reserve have significant impact on bank credit risk while interest rate has insignificant impact on bank credit risk. Inflation, interest rate, GDP and bank performance have positive relationship with bank credit risk and required reserve has negative relationship with bank credit risk.

**Tesfa Getachew (2016)** in his study has examined the determinants of Ethiopian Private Commercial Banks' Asset Quality and studies sixteen

private commercial banks from 2004/2005 to 2012/2013. The study investigates the relationship between non-performing loan and independent variables such as Gross Domestic Product, Inflation Rate, Capital Adequacy Ratio, Return on Equity and Real Lending Rate using regression model. The collected panel data was analyzed using descriptive statistics, and multiple linear regression analysis. The empirical results showed that GDP growth and annual inflation rate are positively related to non-performing loans. A negative relationship of CAR and ROE with the volume of private commercial banks non-performing loans was also found. Contrary to previous studies, the findings also showed an insignificant relationship among real lending rate and NPLs of Ethiopian private commercial banks.

**Abedalfattah Zuhair Al-abedallat (2016)** in an empirical investigation on factors affecting credit risk on Jordanian Commercial Banks used primary data to study factors of credit risk. The study uses descriptive statistics and regression analysis by considering credit risk as dependent variable and the efficiency of workers in the banking credit, Instructions of the Central Bank and Credit policy of the Bank as independent variables. The study findings shows that there is significant statistical impact of the factors of the efficiency of workers in the banking credit, the instructions of the Central Bank, and the credit policy of the bank on the credit risks in the Jordanian commercial banks.

**Maxwell Sandada and Agness Kanhukamwe (2016)** analysed the factors leading to rising credit risk in the Zimbabwean banking sector and considered macroeconomic, industry and bank specific factors on rising credit risk in Zimbabwe. Study surveys 130 lending managers, Heads of Credit Division, credit analysts, senior and junior bank managers and managing directors from 13 commercial banks, 3 building societies and 1 savings bank and analyses using descriptive, correlation and regression. The results reveal that macroeconomic and bank specific factors are the most significant factors leading to credit risk in the Zimbabwean banking sector. The industry factors do not show significant influence on the rising credit risk.

### **3.3 Review based on Effect of Credit Risk on the Performance:**

This segment of Literature Review deals with the review on effect or impact of the Credit Risks on the performance of Banks.

**Kosmas Njanike (2009)** has studied the effectiveness of Credit Risk Management and its effect on the banks survival. The study evaluates the extent to which failure to effectively manage credit risk led to Zimbabwe's banks demise in 2003-2004 bank crises. Using survey of 10 commercial banks chosen randomly the study finds that the failure to effectively manage credit risk contributed to a greater extent to the banking crisis and identifies poor corporate governance, inadequate risk management systems, ill planned expansion drives, chronic liquidity challenges, foreign currency shortages and diversion from core business to speculative non-banking activities as other factors that caused the crisis.

**Angela M. Kithinji (2010)** studied Credit Risk and its Management in relation to Profitability of Commercial Banks in Kenya and collected data with regard to the amount of credit, level of nonperforming loans and profits for the period from 2004 to 2008. The study measures amount of credit by loan and advances to customers divided by total assets, nonperforming loans was measured using nonperforming loans by total loans, and profits were measured by Return on Total assets. The study shows trend of level of credit, non performing loans and profit and results reveal that there is no relationship between the amount of credit, nonperforming loans and the amount of profits. Thus to conclude, findings of the regression model used by the authors reveal that the amount of credit and nonperforming loans do not determine the major profits of the commercial banks and thereby put forwards the influence and contribution of other variables other than credit and nonperforming loans on profits.

**Kargi Hamisu Sulieman (2011)** evaluates the impact of credit risk on the profitability of Nigerian banks. The study uses financial ratios as measures of bank performance and credit risk from the annual reports and accounts of sampled banks from 2004-2008 and analyses the same using descriptive, correlation and regression techniques. The findings reveal that credit risk management has a significant impact on the profitability of Nigerian banks. It concludes that banks' profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress. The non-performing loans negatively

affect the efficiency represented by the return on assets while the capital adequacy ratio shows positive association with the Net Interest Margin.

**Josiah Aduda, and James Gitonga (2011)** in their study using both primary and Secondary data from 2000-2009 evaluates the relationship that exists between Credit Risk Management and Profitability of commercial banks in Kenya. A random sample of 30 financial institutions was taken out of 44 and uses ROE as the indicator of the profitability in the regression analysis and NPL ratio as the independent variable an indicator of risk management which affects profitability of banks. The questionnaires were administered to 27 credit managers and finance managers working in respective commercial banks. The results obtained from the regression model show that there is an effect of credit risk management on profitability at a reasonable level and credit risk management has an effect on profitability in all the commercial banks under study.

**Ritab Al-Khouri (2011)** deals with assessment of the Risk and Performance of the six GCC (Saudi Arabia, Kuwait, UAE, Bahrain, Qatar, and Oman) Banking Sector and studies 43 commercial banks over the period from 1998 to 2008. Study uses two indicators of profitability viz. the Return on Assets (ROA) and the return on equity (ROE) and three risk factors, credit risk, liquidity risk, and capital risk, and bank's size and government ownership as internal factors. Five external determinants viz. degree of Market Concentration, Growth in real GDP, Inflation and Stock Market Capitalization to GDP also form the part to study the impact of environment on bank's performance. Regression results of the study show that capital risk, credit risk, and bank size are positively and significantly related performance when

measured by ROA, while liquidity risk and government ownership are negatively and significantly related to ROA. Results also show that liquidity risk is the only risk that affects the profitability as measured by Return on Equity. Bank size and government ownership are important in determining the profitability of banks and the negative and significant coefficient on government ownership implies inefficiency in banks with high government ownership.

**Girma Mekasha (2011)** using both primary and secondary data has dealt with credit risk management in six Ethiopian commercial Banks and its impact on the performance. A panel data for a period of 10 year was used to examine the relationship between return on asset (ROA) a performance indicators and loan losses (NPL/TL), loan provision to total loan (LP/TL), loan provision to non-performing loan (LP/NPL), and loan provision to total asset (LP/TA) as credit risk indicators. The regression model used in the study reveals that non-performing loan and loan provision is significantly negatively related to performance. Loan provision to non-performing loan and loan provision to total asset of the financial institution is significantly positively related to return on asset.

**Kolapo, et al. (2012)**, in their study investigated over a study period of 11 years from 2000-2010 into the effect of credit risk on the performance of commercial banks in Nigeria. The study employs a traditional profit theory to formulate profit, measured by Return on Asset (ROA), as a function of the ratio of Non-performing loan to loan & Advances (NPL/LA), ratio of Total loan & Advances to Total deposit (LA/TD) and the ratio of loan loss provision to classified loans (LLP/CL) as measures of credit risk. The study adopts

model used by Kargi (2011) .The regression result shows that the effect of credit risk on bank performance measured by the Return on Assets of banks is similar across banks in Nigeria, though the degree to which individual banks are affected is not captured by the method of analysis employed in the study. Results shows that increase in non-performing loan and loan loss provisioning reduces profitability (ROA), while increase in total loan and advances increase profitability. The study recommends enhancement in the credit analysis and loan administration.

**Ravi Prakash Sharma Poudel (2012)**, in his study explored the effect of credit risk management on the performance of commercial banks in Nepal. Financial report of 31 banks are used covering a period from 2001-2011 and comparing the profitability ratio to default rate, cost of per loan assets and capital adequacy ratio. The study reveals that all these parameters have an inverse impact on banks' financial performance; however, the default rate is the most predictor of bank financial performance. The study recommends and advice banks to design and formulate strategies that will not only minimize the exposure of the banks to credit risk but will enhance profitability.

**Ogilo Fredrick (2012)** inspects the financial performance of Commercial Banks in Kenya as affected by the Credit Risk Management and establishes relationship between the credit risk management determinants by using CAMEL indicators. The target population for this study consists of 42 commercial banks and uses secondary data which was collected from the CBK publications on banking sector survey and the respective banks' financial statements for the period from 2006- 2010. The study uses Pearson correlation analysis and a multiple regression model. The study finds that there is a strong

impact between the CAMEL components on the financial performance of commercial banks. The study also establishes weak relationship of capital adequacy, asset quality, management efficiency and liquidity with financial performance (ROE), whereas earnings had a strong relationship with financial performance. This study concludes that CAMEL model can be used as a proxy for credit risk management.

**R.W Gakure, et al. (2012)**, enquired into the Credit Risk Management Techniques and its effect on the Performance of Unsecured Bank Loans offered by Commercial Banks in Kenya. The target populations used in the study consist of 39 respondents, management staff working in commercial banks of the top, middle and low level management ranks. The data collection instrument was questionnaire and analyses the same using SPSS and presenting the results through percentages, means, standard deviations and frequencies. The study concludes that risk identification, inspection by branch managers, risk analysis assessment and credit approval guidelines and monitoring of borrowers affects the performance of unsecured bank loans to a great extent. The study suggests clear and established processes for new credit approval and also the existing credits as very important criteria while managing Credit Risks in banks.

**Danson Musyoki1, Adano Salad Kadubo (2012)** by comparing default rate, bad debts costs and cost per loan asset from financial reports of 10 banks in Kenya for the period 2000 – 2006, to the profitability ratios have assessed the impact of credit risk management on the financial performance of Banks. The study reveals that all these parameters have an inverse impact on banks' financial performance, however the default rate is the most predictor of

bank financial performance vis-à-vis the other indicators of credit risk management. The study recommends banks to design and formulate strategies that will not only minimize the exposure of the banks to credit risk but will enhance profitability and competitiveness of the banks.

**Samuel Hymore Boahene, et al. (2012)** uses a panel data from six selected commercial banks covering five-year period from 2005-2009 and reveals the relationship between credit risk and profitability of selected banks in Ghana. Return on Equity is the dependent variable and used as proxy for profitability while the independent variable Credit Risk is measured by three parameters viz. Net Charge Off to Total Loans and Advances, Non-Performing Loans to Total Loans and Advances and Pre-provision Profit to Total Loans and Advances. Beside this the study uses bank size, bank growth rate and the choice of capital structure as control variables. The regression result reveals that credit risk, size of a bank, bank growth rate and capital structure are the key factors influencing the profitability of the banks. All the variables in the study have a positive impact on the banks performance and thus indicate that banks in Ghana enjoy high profitability in spite of high credit risk, contradicting previous studies where credit risk indicators are negatively related to profitability. Thus the results can be attributed to the prohibitive lending/interest rates, fees and commission (non- interest income) charged. Study finds support for previous empirical works which depicted that bank size, bank growth and bank debt capital influence bank profitability positively and significantly.

**Muhammed Nawaz (2012)** evaluated the impact of credit risk on the profitability of Nigerian banks and uses financial ratios as measures of bank performance and credit risk. The study uses annual reports and accounts of sampled banks from 2004 – 2008 and analyses the same with the descriptive, correlation and regression techniques. Regressions employed in the study forecasts the relationship between variables and estimate the influence of each explanatory variable to the dependent variable Return on Asset. The findings reveal that Banks profitability is inversely influenced by the levels of loans and advances, non-performing loans and deposits thereby exposing them to great risk of illiquidity and distress and as such credit risk management has a significant impact on the profitability of Nigeria banks.

**Ogboi, Charles and Unuafe, OkaroKennethd (2013)**, using a time series and cross sectional data from 2004-2009 of selected banks scrutinizes how Credit Risk Management and Capital Adequacy impacts the Financial Performance of Commercial Banks in Nigeria. The study provides further empirical evidence on how credit risk management strategies and capital requirement variables affect banks' profitability in Nigeria. Study uses Panel data model to estimate the relationship that exists among independent variables like loan loss provisions (LLP), loans and advances (LA), non-performing loans (NPL), capital adequacy (CA) and dependent variable return on asset (ROA). The results shows that sound Credit Risk Management and capital adequacy have positive impact on bank's financial performance with the exception of loans and advances which has a negative impact on banks' profitability in the period under study. The study recommends enhancement of Tier-One capital of Nigerian banks.

**Indiael Kaaya1 and Dickson Pastory (2013)** uses Panel Data to analyse Credit Risk and Commercial Banks Performance in Tanzania and find the relationship between the credit risk and bank performance as measured by Return on Asset. The independent variables used as proxy for credit risks are Loan loss to Gross Loan, Loan Loss to Net Loan, and Impaired Loan to Gross Loan. The control variables used in the study are deposit and bank size as loans depends upon the deposit level and Bank size classifies banks into the large and small banks. The study uses regression model and the results show that credit risk indicators have produced negative correlation which indicates that higher the credit risk the lower the bank performance.

**Ahmed Raza ul Mustafaa1 et al. (2013)** have examined the impact of Loan Loss Provisions of the banks on the Performance of the banks operating in Pakistan and uses ratios such as Loan Loss Provisions to Total Assets, Current Liabilities to Total Assets, Natural log of Total Assets (SIZE), Advances to Total Assets, Deposits to Total Assets, Current Assets to Total Assets and Political Instability factor as explanatory variable. ROA represent dependent variable and is used as a profitability indicator. Regression analysis result reveals that a higher Advance to total Assets and Deposits to Total Assets ratios affect the level of banks' profit and the non financial variable, political instability plays an important role in explaining the banks' Return on Assets. The Loan Loss Provision to Total Assets, Advances to Deposits affect banks profitability significantly.

**Harrison Owusu Afriyie and Joseph Oscar Akotey (2013)** examined the impact of Credit Risk Management and Profitability of Rural Banks in the Brong Ahafo Region of Ghana. The study using secondary data for a period of five years from 2006 to 2010, on ten rural banks collected details on Return on Equity (ROE) and Return on Asset (ROA) as proxy for profitability and Non-Performing Loans (NPL) and Capital Adequacy Ratio (CAR) as Credit Risk Management indicators. The unusual findings as revealed by the panel regression model show significant positive relationship between non-performing loans and profitability of rural banks', which means though there are higher loan losses still banks earn profit. Theoretically NPL is expected to have an inverse relationship with a bank's profitability. The study results implies that, rural banks do not have effective institutional measures to deal with credit risk management, apart from this the banks shift the cost on loan default to other customers in the form of higher interest rate on loans and higher interest margin charged on loans by rural banks due to weak credit risk management practices enables to earn more profits.

**Samson A. Alalade et al. (2014)** have examined the impact of Managing Credit Risk to Optimize Banks' Profitability and conducted survey of Selected Banks in Lagos State, Nigeria. Study uses Correlation coefficient and understands the impact of credit risk management on profitability. The result of the primary survey conducted on 100 respondents of five banks reveal that credit risk management operations plays a significant role in the profitability and performance of banks in Lagos State and there is "moderate and positive" relationship between credit risk management and profitability.

**Junaidu Muhammad and Kurawa Sunusi Garba (2014)** evaluates the effect of Credit Risk Management (CRM) on the Profitability of Nigerian Banks and discovers the extent to which default rate (DR), cost per loan asset (CLA), and capital adequacy ratio (CAR) influence return on asset (ROA) as a measure of banks' profitability. The study uses the annual reports and accounts from 2002 to 2011 and makes analysis with descriptive statistics, correlation, as well as random-effect generalized least square (GLS) regression.

The study results reveal that there is a significant positive relationship between CRM and profitability of Nigerian banks. Two independent variables, Default Rate ratio and cost per loan asset (CLA) ratio show a clear and strong positive relationship with the dependent variable ROA. These two independent variables are influenced by loan losses, operating expenses, and the proportion of non-performing loans which are the key determinants of asset quality of a bank. This study establishes evidence that it is consistent with that of the group of scholars who established that a positive relationship exists between CRM components and profitability of firms.

**Fan Li Yijun Zou (2014)** investigates the relationship between credit risk management and profitability of commercial banks in Europe and uses ROE and ROA as proxies of profitability and NPLR and CAR as proxies of credit risk management. Study uses one control variable called Bank size (assets) . The study is based on 47 largest commercial banks in Europe and collect data from 2007 to 2012. Multivariate regression analysis findings reveal that credit risk management has positive influence on profitability of commercial banks and amongst two proxies of credit risk management, NPLR

has a significant effect on the both ROE and ROA while CAR has an insignificant effect on both ROE and ROA.

**Iwedi Marshal et al. (2014)** using secondary data for a period of 15 years from 1997 to 2011 probed into Credit Risk and Performance and included 5 Selected Deposit Money Banks in Nigeria. Application of Panel data regression technique results show that there is a positive relationship between Ratio of non- performing loans to loan and advances (Log NPL) and banks performance (Log ROA), as banks under study have very minimal level of non-performing loans in their loan portfolio. The results also show that there exist a positive relationship between Ratio of loan and advances to total deposit (Log LA) and banks performance (Log ROA). An increase in loan and advances increases banks performance through interest income generated from loan and advance.

**Abu Hanifa Md. Noman, SajedaPervin, et al. (2015)** enquires what effect the credit risk has on the profitability of the banking sectors of Bangladesh. The study uses an unbalanced panel data from 2003 to 2013 of 18 private commercial banks. The credit risk indicators used in the study include NPLGL, LLRGL, LLRNPL and CAR, while ROAA and ROAE and NIM are the profitability indicators. The results of OLS random effect model show a robust negative and significant effect of NPLGL, LLRGL on all the 3 profitability indicators. The analysis further suggests a negative and significant effect of CAR on ROAE. Effect of Basel II is significantly positive on NIM but significantly negative on ROAE. Thus study reveals that credit risk affects profitability of the commercial banks negatively.

**Asha Singh (2015)** has evaluated the performance of 10 Indian Private and 10 Public sector banks covering a period from 2002-03 to 2012-13 and examines the effect of credit risk management on the same. The study uses ROA as a performance indicator and CAR and NPAs have been used as credit risk management indicator and applies two way regression model. The results of the study shows that there is a significant relationship between bank performance and credit risk management and suggests better management of credit risk results in better bank performance.

**Olawale Luqman Samuel (2015)** using secondary data obtained from the annual reports applies ordinary least square (OLS) method of analysis to probe into the effect of credit risk on the performance of commercial banks in Nigeria. The study adopts Kargi's (2011) model and measures profitability with ROA as a function of the ratio of non-performing loan to loan and advances (NPL/LA) and ratio of total loan and advances to total deposit (LA/TD) as indicators of credit risk. The result shows that the ratio of loan and advances to total deposit negatively relate to profitability and the ratio non-performing loan to loan and advances negatively relate to profitability. The study establishes significant association between the performance of the banks and the management of Credit Risks.

**Yuga Raj Bhattarai (2015)** using descriptive and causal comparative research design interprets the effect the credit risk of Nepalese commercial banks have on the performance of banks. The study uses pooled data of 14 commercial banks for the period from 2010 to 2015 and applies regression model, and the result reveals that negative effect of 'non-performing loan ratio' on bank performance. The result also reveals that 'cost per loan assets'

has positive effect on bank performance. Control variable Bank size has positive effect on bank performance and Capital adequacy and cash reserve ratio do not have influence on bank performance. The study concludes that there is significant relationship between credit risk indicators and bank performance.

**Tekalagn Getahun et al. (2015)** in their study checks how Credit Risk Management impacts the Performance of Commercial Banks in Ethiopia and using secondary data for six years period from 2009 to 2014 considers variables like Return on Assets (ROA) and Return on Equity as proxy for performance and Capital Adequacy Ratio (CAR), Non-Performing Loans to Total Loans (NPLR), Loan Provision to Total Loan Ratio (LPTLR), Loan Provision to Non-Performing Loans Ratio (LPNPLR), Loan Provision to Total Assets Ratio (LPTAR) and Non-Performing Loans to Total Loans (NPLTLR) as indicators of credit risk management. The tools of analysis include descriptive statistics and panel data regression model which reveals that there is strong relationship between credit risk management and commercial bank performance in Ethiopia and CAR has negative relationship with both ROA and ROE and negatively affect the banks' profitability performance and there exists positive correlation between Loan loss provision and profitability performance of bank.

**Million Gizaw, Matewos Kebede and Sujata Selvaraj (2015)**, have examined the impact of credit risk of commercial banks on the profitability of banks in Ethiopia. The study using secondary data of 8 sampled commercial banks for a period from 2003- 2012 and descriptive statistics and panel data regression model reveals that credit risk profile of Ethiopian banks shows

improving performance and the ratio of Non-Performing Loan and Loan Loss Provision ratio are declining in recent past. The descriptive analysis indicates that commercial Banks in Ethiopia have adequate capital to withstand shocks resulting from credit risk and there is significant impact of credit risk measures, non-performing loans, loan loss provision and capital adequacy on the profitability of Ethiopian banks. The study suggests great significance of credit risk management process.

**Uwalomwa Uwuigbe et al. (2015)** assessed the effect of Credit Management and Bank Performance of Listed Banks in Nigeria for the period 2007. The study adopts both descriptive statistics and econometric analysis using the panel linear regression. Bank performance is measured as profit after tax. Findings reveals that ratio of non-performing loans and bad debt do have a significant negative effect on the performance of banks in Nigeria, on the other hand, the relationship between secured and unsecured loan ratio and bank's performance was not significant.

**John Mutisya Mutua (2015)** investigated the effect of Mitigating Credit Risk on the Performance Six of Commercial Banks In Kenya: A case of Chuka Town using both primary and Secondary data and make inferences through descriptive statistics and percentages. The Multiple Regression models show that there is a positive relationship between mitigation of credit risk, risk identification and risk monitoring and credit approvals or sanctions by commercial banks in Chuka Town. Thus author concludes that there prevails a significant relationship between bank performance as measured by Return on Asset and Credit Risk Management tools Risk Identification,

Monitoring and Credit approval. Better credit risk management contributes to better bank performance.

**Ali Sulieman Alshatti (2015)** examined the 13 Jordanian commercial banks for the period from 2005 to 2013 and probed into the effect of credit risk management on the performance of these sampled banks under study and with the help of panel regression model estimated the effect of credit risk management indicators viz., Capital adequacy ratio (CAR), Credit interest/Credit facilities ratio, Facilities loss/Net facilities ratio, Facilities loss/Gross facilities ratio, Leverage ratio, Non-performing loans/Gross loans ratio) on the banks' financial performance as represented by ROA and ROE. The empirical result shows that there is a positive effect of the credit risk indicators of Non-performing loans/Gross loans ratio on financial performance, and a negative effect of Provision for Facilities loss/ Net facilities ratio on financial performance, and no effect of the Capital adequacy ratio and the credit interest/Credit facilities ratio on banks' financial performance when measured by ROA.

**Farisai Chin Anga (2015)** addresses the effects of Credit Risk Management on the Profitability of the Four Major South African Banks. Study establishes relationship between Profitability and uses ROE as proxy for profitability and uses two variables to represent Credit Risk Management viz. Capital Adequacy Ratio and Non Performing Loan Ratio. Study uses secondary data from 2002-2013 and applies panel data regression and the results shows that Credit Risk Management has impact on profitability but along with this other three variables viz. size, operating expenses and economic growth also have effect on profitability of African Banks.

**Anthony Wanbernard and Baimwera Johi (2016)** made an analysis of Credit Risk Management to study its effect on the Profitability of 43 Commercial Banks in Kenya. The study uses purposive sampling by generating a sample of 86 employees consisting of two managers one each from the Finance and the Credit Risk Department. The study uses primary and secondary data and identifies ROA as a profitability indicator representing dependent variable and practices such as credit appraisal, credit monitoring, debt collection and credit risk governance are used independent variables. The regression results show that credit appraisal, credit monitoring, Debt collection and credit risk governance practices has strong influence on the banks profitability and credit risk governance has positive effect on profitability.

**Jane GathigiaMuriithi (2016)** assessed 43 Banks in Kenya for the period from 2005 and 2014 and studied how financial performance is affected by the Credit Risk of Commercial Banks and uses capital to risk weighted assets, asset quality, loan loss provision, and loan and advance ratios as proxy for Credit risk and financial performance as measured by return on equity (ROE). The regression results show that credit risk has a negative and significant relationship with bank profitability. Poor asset quality or high non-performing loans to total asset is related to poor bank performance both in short run and long run.

**Sangare Kani (2017)** has studied Credit Risk and Banks Performance: Evidence from West African Economic and Monetary Union (WAEMU) Countries and selected 20 banks over a period of 9-years from 2007-2015 with parameters like Interest on loans, Non-Performing Loan, loss

loan provision, Interest Margin, GDP growth rate, Inflation rate and ROA. The regression result shows that all variables are significant except GDP Growth Rate and Inflation Rate. GDP growth has a non-significant positive relationship with the ROA, but inflation has a non-significant negative impact on the ROA. NPLs and LLP have negative relationships with the ROA.

### **3.4 Summary of Literature Review**

Various findings from the existing empirical studies have recorded mixed results with the help of secondary data taken from the financial reports of the banks, CMIE Database and RBI Website and very few studies conducted primary survey. Majority of the studies make use of secondary data. Studies show testing of Hypothesis to evaluate the quality of assets, to find the determinants of credit risk and the effect of credit risks on the performance of banks.

While evaluating the quality of assets of the banks almost all literature have shown Trend of the ratio of NPAs and Gross Advances, and used at least four accounting ratios such as Gross NPAs to Gross Loans, NNPA's to Net Advances, Gross NPAs to Total Assets, and Net NPAs to Total Assets, Total Investment to Total Assets and Provision / Loan Loss Reserves Total Loans to evaluate the quality.

The literature on factors influencing Credit Risk has focused on mainly two types of factors that are likely to influence bank credit risk. Firstly it suggest internal variables as potential determinants of credit risk and the other highlights changes in external variables in the prudential regulation and

economic conditions affecting the bank credit risk. The results of the literature reviewed provide evidence of a close relationship among internal variables, external variables and bank credit risk. Studies show that credit risks in emerging economies is higher than that in developed economies and credit risk is the result of by a large number of bank specific as well as external factors.

To study the effect of Credit Risks on the Performance of Banks the parameters used as proxy for performance include ROA or ROE or NIM individually or ROA and ROE together or ROA, ROE and NIM all three together and all most all studies applied multiple Regression analysis. Parameters of Credit Risk include Non Performing Assets to Gross Advances, CAR and Provision to Non Performing Loans. Studies have also used control variables like Deposits, Bank Size and CRR

Majority of researches have noted a negative quantitative relationship between credit risk or credit risk management and profitability or performance in commercial banks, while one study reveals that credit risk (non-performing loan rate, net charge-off rate, and the pre-provision profit as a percentage of net total loans and advances) has a positive and significant relationship with bank profitability (performance). Most of the studies reveal that increase in credit risk tends to lower the banks performance. Almost all the studies have used descriptive statistics, correlation and regression analysis and the results are generated with the help of software SPSS and STATA and Credit Risk indicators shows significant impact on the performance of the banks.

### **3.5 Research Gap**

There is limited research available on credit risks and its three components individually as well as in combination with one another. There are hardly few PhD thesis and research work and projects that deal together with measuring credit risks by evaluating quality of assets, factors influencing credit risk and corresponding effect on the performance of banks of credit risk. If impact or effect of credit risk on the performance of banks is to be studied it is to be studied in entirety which involves evaluation and assessment of quality of banks loan asset, determinants of quality of assets and the credit risks and finally study should deal with the impact of credit risks on performance as profitability of banks is the most important factor from the point of view of shareholders and the economy. Beside this hardly any work is carried out in India on this very crucial area. Thus in this backdrop, study identifies following points as a research gap by considering review of most recent literature available till 2017.

1. An attempt has been made to conduct comprehensive study covering all three aspects together as continuity in relationship exists between all three aspects measuring of credit risk by, evaluating the asset quality, studying the determinants of credit risk and effects of credit risk on the performance of banks together as one leads to the other in sequential order. These three aspects cannot be separated and as such study deals with all three aspects.
2. Study considers comprehensively Bank Specific and Macroeconomic determinants of Credit Risk together, Bank Specific factors and

Macroeconomic factors separately independently to assess the factors influencing Credit Risk together.

3. Study covers a long period of 16 years from 1-04-2000 to 31-03 -2016.
4. Study covers all public and private banks listed on Bombay Stock Exchange up to 31-03-2016 and include large number of 40 Indian Commercial Banks.
5. The Study incorporates implementation of Basel II Norms in Indian Banks i.e. 31<sup>st</sup> March 2009 as the cutoff date to evaluate the quality of assets, find the determinants of Credit Risks and impact of Credit Risk on the Performance of Banks in the period prior to and post implementation of Basel II Norms in India.

### **3.6 Summary**

Without systematic review of the available literature on the current topic it wouldn't have been possible for the researcher to contribute to the research topic and accordingly in this chapter the researcher has focused and categorized the reviewed literature into three themes leading in the direction of all the three objectives of study. Thus before knowing the effect or impact of credit risk on the performance, it was essential to focus on the assessment of quality of assets of the banks which would help to evaluate the credit risks

associated with the banks and the causes and determinants of such credit risk, as a result one finds earlier research gathered in this chapter under those three broad areas. Finally chapter presents the summary of literature reviewed and the research gap the researcher is trying to fill up in the current study.

## **CHAPTER 4**

### **DATA AND METHODOLOGY**

This chapter discusses the data, methodology, selection procedure, parameters and analytical tools used in the study with the brief theoretical background to different concepts of tools and data the author has come across while working on this study.

#### **4.1 Description of the Study Area**

The Banking Structure and System in India is regulated by the Reserve Bank of India and consists of scheduled Commercial Banks and scheduled Co-operative Banks, Financial Institutions, Regional Rural Banks, Public and Private Sector Banks and Foreign Banks.

Scheduled banks are those banks which are listed in the 2nd schedule of the Reserve Bank of India Act, 1934. Non-scheduled banks are those banks which are not included in the 2nd schedule of the Reserve Bank of India Act. Their number has progressively declined over the years.

Co-operative Banks are a group of financial institutions organized under the provisions of the Co-operative Societies Act of the states. These banks are essentially co-operative credit society organized by members to meet their short term and medium term financial requirements. The Co-

operative banking system in India is, however, small sized in comparison to the commercial banking system, its credit standing is just less than one fifth of their total credit outstanding of the commercial banks.

Regional Rural Banks are the scheduled banks, but unlike commercial banks, are small localized banks operating in rural areas limited to specified districts. Their ownership capital is provided jointly by Central Government (50%), the concerned State Government (15%), and the sponsor public sector banks (35%).

Public Sector Banks include SBI and its associates till 31<sup>st</sup> March 2017 and other nationalised Banks. From 1<sup>st</sup> April 2017 all associates of SBI will operate under only one banner State Bank of India. This group of banks has the largest number of branches in metros/ urban and rural areas throughout the country. The Group contributes about 75% of the total deposits and about 70% of total advances of all commercial banks in India. Most of these banks have a countrywide branch network, along with a large deposits and assets base and perform all kinds of core and modern banking functions. Some of these banks have branches offices abroad also.

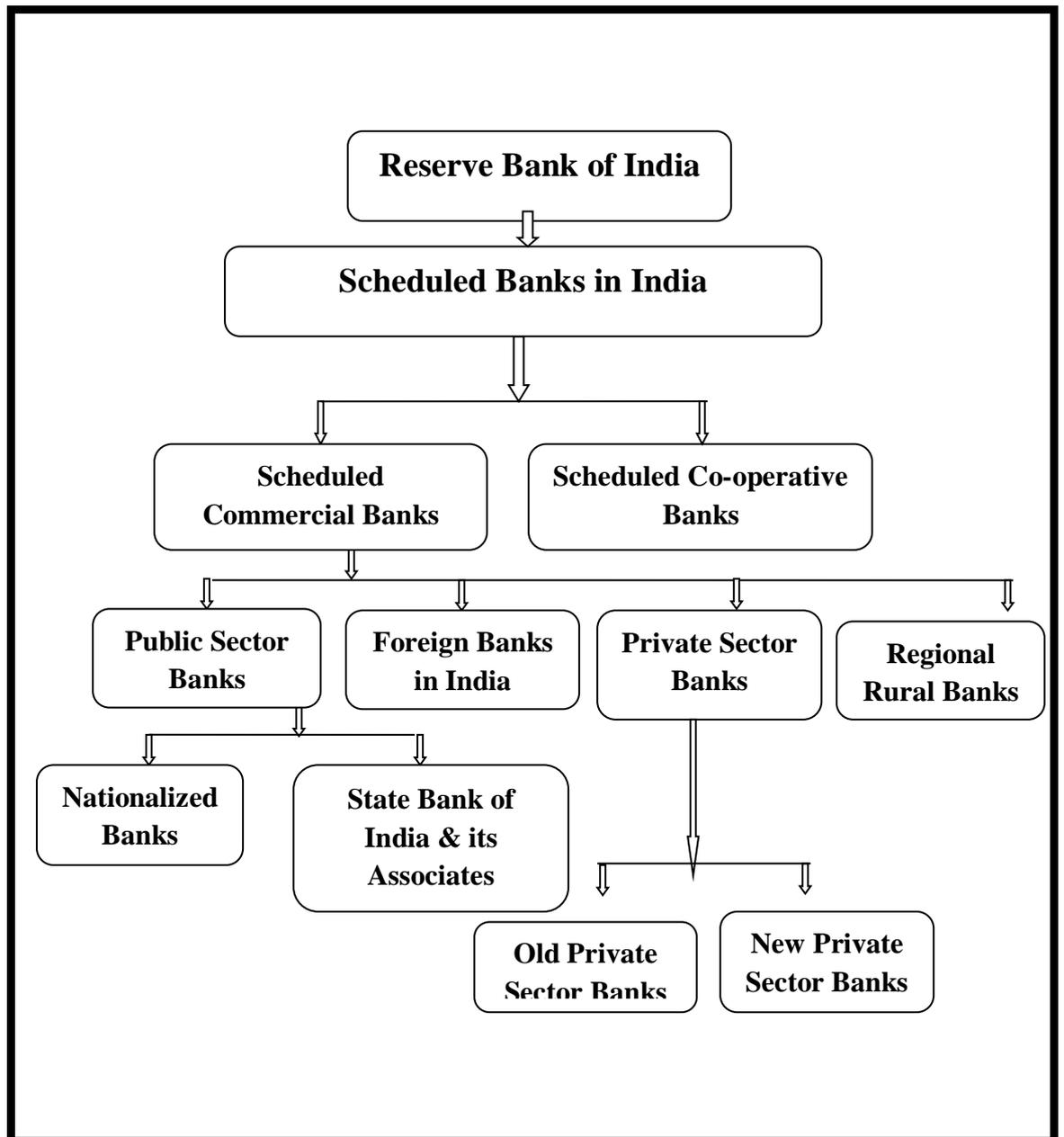
The Indian economy's expansion in the early 1990s has resulted in the creation of many private sector banks and brought boom in the country's banking sector from 1990. Indian private sector banks shares and ownership is held by business houses and individuals (public). Majority of these banks are old generation private banks which have a small balance sheet size, limited regional operations and traditional style of management and business activities.

New generation private sector banks, incorporated post-1994, are technology-driven and have a modern style of functioning, thus achieving a level of parity with that of the foreign banks operating in India. Some of these have expanded to enable country-wide operations, on account of mergers and acquisitions.

Foreign banks are the banks incorporated abroad but granted license by RBI to conduct banking business in India through their Indian branches. Their operations are technology driven and a good part of their business comprises foreign exchange, trade finance and merchant banking, which augment their income per branch and per worker.

The study considers the Commercial Banks consisting of Public and Private Banks operating in India, and forming part of banking structure in India.

**Figure 4.1.1 Banking Structure in India upto 31-3-2017**



**Source: compiled from RBI Bulletin**

## **4.2 Data and Data Source**

### **4.2.1 Data**

Basically, data can be categorized into two viz. Primary data and secondary data and these classifications are based on who collected the data and can be presented in term of words, numbers, figures or diagrams.

Primary data are information that has not been published, in other words, it is the first-hand-data. On the other hand, secondary data are information that has been published or available to the public, so no hassles of collecting it and the researcher personally is not responsible for its quality. It is the information collected from previous study by other researchers. Secondary data can be collected from books, newspapers, journals, and electronic sources such as website, e-journals and etc. Secondary data are less time consuming and costly compared to primary data.

The nature of researcher's current study demands the use of secondary data and accordingly the study is fully based on secondary data and the suitable dataset adopted for the study to deal with all three objectives is the Panel dataset. Panel data is also called as Longitudinal or Cross Sectional Time Series Data or Pooled Data is a combination of time series and cross-sectional data and refers to pooling observations on a cross-section of households, countries, firms, etc. over several time periods. Panel data contains many subjects for many time periods and deals with collection of observations for multiple subjects for multiple instances and thus consists of time component and cross sectional units. In this study of the researcher the

time component is 16 years and cross sectional units consists of 40 Indian Public and Private Banks.

Micro and Macro Panel are the two categories of Panel data which depends on the relationship between the number of the individuals and the number of the time periods.

Micro panels are usually characterized by having a large number of individuals  $N$  over relatively short periods of time  $T$ . When the number of the individuals ( $N$ ) is much greater compared to the number of time periods ( $T$ ), then the data set is called as micro-panel data. Micro-Panel Data:  $T \ll N$ .

The dataset used by the researcher in her study to deal with the research problem is the micro-panel data as the study deals with 40 Indian commercial banks comprising of 24 Public Sector Banks and 16 Private Sector Banks covering a period of 16 years beginning from 1-04-2000 and ending on 31-03-2016.

The Macro panels usually involve a few cross sectional observations  $N$  over a large number of periods  $T$ . When the number of the individuals ( $N$ ) is approximately equal to the number of the time periods the data set is called as Macro-panel data. Macro-Panel Data:  $TN$ .

Likewise Panel data can be structured in two ways viz., Balanced and an Unbalanced Panel. In a balanced panel data set, all cross sectional entities are observed in all time periods resulting in total number of observations arrived at by multiplying  $n$  entities with total Time  $t$ .

On the other hand in an Unbalanced Panel dataset each entity has different numbers of observations. If some cells in the panel data table have Zero frequency, it means that there are missing entries in the data set and the

total observation is not  $n$  multiplied by  $t$  as this represents an unbalanced panel. The researchers study is based on unbalanced panel data.

Unbalanced panel data may lead to a problem in estimation if the missing entries are not random resulting in biased estimates as a result researcher has to depend upon some model selection tests. There requires making a choice between fixed effect and random effect in panel data model and for this the test available to the researcher is the Hausman Specification test.

The Hausman test compares between random effect and fixed effect models under null hypothesis which states that the individual effects has no correlation with the regressor in the panel regression model (Hausman 1978). If the null hypothesis of no correlation between individual effect and regressor is not violated, then both fixed effect and random effect are consistent, however fixed effect is inefficient but if null hypothesis is rejected, then the fixed effect is consistent and the random effect is inconsistent and biased (Greene,2008).

If the null hypothesis of no correlation between individual effect and regressor is rejected, one may conclude that individual effects are significantly correlated with one of the regressor in the model and thus the random effect model cannot be applied, thus requiring the use of Fixed Effect Model.

Following are the three types of models that handle panel data.

Pooled Regression Models, an Ordinary Least Square ignores the basic panel data structure and estimates coefficients like a cross section model and

includes only a constant term. Therefore to remove these defects the best available models are Fixed Effects and Random Effects.

If there are no omitted variables or if omitted variables are not correlated with the independent variables those are used in the model, then under such circumstances Random Effect Model is advisable. It will produce unbiased estimates of the coefficients and use of all the available data will lead to smallest error.

While if the omitted variables are correlated with the variables in the model, then Fixed Effect Model provides a mean for controlling omitted variable bias.

Because of its flexibility, panel data analysis has applications in many different fields of social science and has several advantages compared to cross-section and time series data and accordingly adopted in the study.

Advantages of panel data are listed below

- i) Panel data enables to increase the number of total observations ( $N*T$ ) and greater the total number of observations greater will be the level of the degrees of freedom ( $N*T-N-K$ ).
- ii) The panel data helps to reduce co linearity among independent variables.
- iii) The above two factors help to improve the efficiency of the model (Hsiao et al., 1995).
- iv) The panel data model control the problem of omitted variables bias which is there in the cross-section data making the estimators biased.

- v) Panel model has a dynamic version too which can help in detecting dynamic relationships.
- vi) It helps Researchers to detect developments or changes in the characteristics of the target population at both the group and the individual level.
- vii) The longitudinal studies extend beyond a single moment in time as a result; they can establish sequences of events.
- viii) In time series analysis, it matters whether our data are stationary or not. Panel data analysis overcomes the problem of stationarity. Even if data is not stationary, i.e. the mean and the variance is not constant over the time, the panel models can produce estimators where they remain asymptotically normal.
- ix) The nature of the data in the panel models gives researchers the ability to identify a model which in the time-series or the cross-section analysis would be unidentified thus enabling to overcome problem of the measurement errors

#### **4.2.2 Data Source**

The required data has been collected from the annual reports of Public and Private Banks listed on the Bombay stock Exchange.

The data source is the official websites of 40 selected banks for the study, the Bombay Stock Exchange and the Money Control.com. Besides this the researcher has used data on macroeconomic indicators from the website of RBI and also the World Bank. For Three Macroeconomic indicators viz., GDP Growth Rate, Unemployment Rate and Inflation Rate the study uses World

Bank Data Base and remaining two macroeconomic indicators viz. Exchange Rate and Lending Rate have been collected from Reserve Bank of India (RBI) website [www.rbi.org.in](http://www.rbi.org.in).

### **4.3 Period of Study**

The study is covering a period of 16 years from 1-4-2000 to 31-3-2016 and considers the variables from the annual reports of the Public and Private Banks in India. While assessing the Quality of Assets, analyzing the factors influencing Credit Risk and effect of Credit Risks on the Performance the researcher was interested in knowing the effect of implementation of Basel II Norms in India and accordingly uses the period prior to and post implementation of Basel II norms in the Banks in India to study all three objectives. As Basel II Norms were implemented in phases in India on different dates, the researcher has considered the latest last year of implementation of Basel II in Indian Banks i.e. 31-3-2009 and this date is considered as cutoff date for pre and post implementation of Basel II. The period is significant from the point of view of implementation of Basel II Norms in Indian Banks.

#### **4.4 Sample Design and Selection Criteria**

As study is mainly concerned with the Credit Risks in Banks in India the sampling unit for the entire study is the Scheduled Commercial Banks functioning in the country India.

For studying the impact of credit risk on the performance of public and private banks in India the study has included a sample of all 43 Banks listed on Bombay Stock Exchange, India up to 31<sup>st</sup> March 2016. And the sample selected is prior to the merging of SBI associates with the giant SBI in the Country.

Out of 43 chosen banks the researcher had to drop three banks viz. State Bank of Hyderabad, State Bank of Patiala and IDFC bank due to unavailability of annual reports and finally study is based on 40 Commercial Banks comprising of 24 Public and 16 Private Banks. As a result the sample consists of maximum number of Indian Public and Private Banks out of total banks functioning in the country till 31-3-2016. Thus study is a national study based on the selection of Public and Private Banks functioning in the country India and include both old and new private sector Banks.

**Figure 4.4.1 Lists of Selected Banks**

**Private Banks**

1. Axis Bank	2. City Union Bank Ltd	3. DCB Bank	4. Dhanlaxmi Bank Ltd
5. Federal Bank	6. HDFC Bank	7. ICICI Bank	8. Indusind Bank
9. Jammu & Kashmir Bank	10. Karnataka Bank	11. RBL Bank	12. Karur Vysya Bank
13. South Indian Bank Ltd	14. Lakshmi Vilas Bank	15. Yes Bank Ltd	16. Kotak Mahindra Bank

**Public Sector Banks:**

1. Oriental Bank of Commerce	2. Allahabad Bank	3. Andhra Bank	4. Bank of Baroda
5. State Bank of India	6. Punjab National Bank	7. Punjab and Sind Bank	8. State Bank of Bikaner and Jaipur
9. Vijaya Bank	10. State Bank of Mysore	11. United Bank of India	12. State Bank of Travancore
13. Syndicate Bank	14. UCO Bank	15. Bank of India	16. Bank of Maharashtra
17. Canara Bank	18. Central Bank of India	19. Corporation Bank	20. Dena Bank
21. IDBI	22. Indian Bank Ltd	23. Indian Overseas Bank	24. Union Bank of India

**Table 4.4.1 Profile of Selected Banks**

Name of the Banks	Year of Establishment	Owner-ship	Rupees in Crores					No. of Employees	Rupees in Crores		No. of Branches	Rupees in Crores
			Total share capital	Deposits	Investments	Advances	Total Assets		Business per Employees	Profit/Earning Per Employees		Business Per Branches
Axis Bank	1993	Private	476.57	357967.6	122006.2	338773.7	525467.6	50135	138973029.5	1640303.74	2904	2399246843
City Union Bank Ltd	1930	Private	59.82	27158.13	6324.45	21056.92	31251.97	4517	106741305.1	984487.71	600	918381857.1
DCB Bank	1930	Private	284.44	14925.99	4333.33	12921.39	19068.31	4979	65554078.63	457918.31	310	1406432960
Dhanlaxmi Bank Ltd	1927	Private	177.44	11353.76	3792.24	6952.68	12462.98	2021	83782329.98	-958591.3	280	688211996.2
Federal Bank	1931	Private	343.79	79171.71	22217.49	58090.14	91430.03	11593	116719261.6	404462.67	1252	1096340668
HDFC Bank	1994	Private	505.64	546424.2	163885.8	464594	708845.6	84325	115472348.9	1404398.73	4715	2236765821
ICICI Bank	1994	Private	1163.17	421425.7	160411.8	435263.9	717877.6	84096	118696176	1347597.82	4850	1925145282
Indusind Bank	1994	Private	594.99	93000.35	31214.31	88419.34	139676.2	25314	78672891.59	991522.16	1004	1814196880
Jammu & Kashmir Bank	1938	Private	48.49	69390.25	20353.62	50193.29	80268.08	925	1215279900	4227962.4	217	1395373888
Karnataka Bank	1924	Private	188.47	50488.21	16256.65	33902.45	56500.33	7982	108304232.4	532971.51	800	1164009074
RBL Bank	1943	Private	324.73	24348.65	14436.03	21229.08	39160.09	4902	117741498.3	755579.95	244	2313590558
Karur Vysya Bank	1916	Private	121.86	50078.9	13221.67	39084.38	57663.72	7211	123648986.6	787178.75	778	1336780873
South Indian Bank Ltd	1929	Private	135.03	55720.73	14618.93	41085.75	63041.26	7677	124429920.3	428362.98	932	1160749137

Name of the Banks	Year of Establishment	Ownership	Rupees in Crores					No. of Employees	Rupees in Crores		No. of Branches	Rupees in Crores
			Total share capital	Deposits	Investments	Advances	Business Per Branches		Business per Employees	Profit/Earning Per Employees		Business Per Branches
Lakshmi Vilas Bank	1926	Private	179.46	25430.96	6545.4	19643.74	28560.43	3565	126436747.6	505570.27	523	979884793.5
Yes Bank Ltd	2004	Private	420.53	111719.5	48838.47	98209.93	165263.4	20125	139952973.4	1692964.4	1050	2441040234
Kotak Mahindra Bank	2003	Private	917.19	138643	51260.22	118665.3	192259.8	33013	81919235.15	665322.83	1369	1930294956
Oriental Bank of Commerce	1943	Public	321.4	208914.8	65657.84	148880	236034.3	21469	166656484.2	72699.33	1092	663880.05
Allahabad Bank	1865	Public	613.8	200644.4	55657.92	152372.1	233180.4	23771	146255313.1	-307953.89	2500	1099739717
Andhra Bank	1923	Public	681.16	174302.4	53864.19	130787.9	199961.8	20981	163534677.8	289363.58	2845	1088442008
Bank of Baroda	1908	Public	462.09	574037.9	120450.5	383770.2	671376.5	52420	184119500.3	-1037184.46	5481	1761972135
State Bank of India	1806	Public	776.28	1730722	477097.3	1463700	2259063	278872	153770974.8	478997.86	24000	1903254798
Punjab National Bank	1894	Public	392.72	553051.1	157845.9	412325.8	664545.7	70801	136350747.6	-561347.44	6937	1428072379
Punjab and Sind Bank	1908	Public	400.41	91249.96	27645.04	63916.07	102581.4	9403	165017587.6	357303.41	1466	1042782511

Name of the Banks	Year of Establishment	Ownership	Rupees in Crores					No. of Employees	Rupees in Crores		No. of Branches	Rupees in Crores
			Total share capital	Deposits	Investments	Advances	Business Per Branches		Business per Employees	Profit/Earning Per Employees		Business Per Branches
State Bank of Bikaner and Jaipur	1963	Public	70	94004.85	24782.37	72927.46	110336.3	12831	123388505.8	628723.26	1360	1268482595
Vijaya Bank	1931	Public	932.56	125440.7	41842.49	88986.96	144534.9	15679	147433776.2	262510.45	2031	1150980591
State Bank of Mysore	1913	Public	48.01	70568.29	20123.96	53954.18	82404.22	10226	116922504.9	336007.98	1748	1200795253
United Bank of India	1950	Public	839.52	116401.3	44723.38	68060.2	128507.1	2054	123130282.9	-188210.93	15191	917262440.6
State Bank of Travancore	1945	Public	71.1	101118.8	36061.83	65466.27	114506.8	14892	111862122.1	226787.74	1177	1415336212
Syndicate Bank	1925	Public	703.37	261735.3	68621.87	201368.5	306355.1	34989	144282591.5	-512037.11	3500	1229696851
UCO Bank	1943	Public	1075.59	207118.2	83974.2	125905.4	242516.9	24724	134696493	-1132202.48	3078	1083708458
Bank of India	1906	Public	817.29	513004.5	118848.9	359189	609913.9	45613	0	0	4963	1717930806
Bank of Maharashtra	1935	Public	1168.33	138989.8	36230.87	107562.7	159661.6	1897	179115501.9	73145.8	13765	1301068540
Canara Bank	1906	Public	542.99	479791.6	142309.3	324714.8	552960.8	59413	148960595.9	-520815.97	6639	1375459713

Name of the Banks	Year of Establishment	Ownership	Rupees in Crores					No. of Employees	Rupees in Crores		No. of Branches	Rupees in Crores
			Total share capital	Deposits	Investments	Advances	Business Per Branches		Business per Employees	Profit/Earning Per Employees		Business Per Branches
Central Bank of India	1911	Public	1689.71	266184.2	88867.54	180009.6	305466.1	37685	118400895.7	-376327.45	4715	943726259.1
Corporation Bank	1906	Public	204.5	205170.8	63280.63	140322.2	234183.9	19569	176551220.9	-258817.72	2501	1415955263
Dena Bank	1938	Public	666.93	117431	35226.22	82328.33	133441.6	13906	143649716	-672600.89	1773	1082119692
IDBI	1964	Public	2058.82	265719.8	98999.43	215893.5	368764.3	17570	274111144.1	-2085829.54	1995	2608956014
Indian Bank Ltd	1907	Public	480.29	178285.8	53089.31	129049.1	200929	20924	152599264.6	353219.17	2682	1198186818
Indian Overseas Bank	1937	Public	1807.27	224514.2	79189.55	160860.7	272025.2	31846	121012029	-909793.22	3400	1134456602
Union Bank of India	1919	Public	687.44	342720	89208.35	267354	402114.7	35514	171982637.8	381022.83	4214	1452557169

Source: Money Control .Com

The above table 4.4.1 presents the Profile of selected banks under study in terms of year of establishment and other details from the annual reports with regard to Capital, Deposit, Investments, Loans, Advances, Total Assets, business per employee, number of employees, branch networking and the business per branch, the latest details as on 31-3-2016, the concluding year under study. The Allahabad bank is the oldest bank set up in 1865 and Yes Bank is of the latest origin set up in 2004. SBI has highest branch networking of 24000 and Jammu and Kashmir bank has 217. The State Bank of India is with Total Asset of Rupees 2259063 crores, heading with large size.

**Table 4.4.2 Important Indicators of selected Banks**

Name of the Banks	CAR	Tier I	Tier II	ROA	ROE	NIM	EPS
Axis Bank	15.29	12.51	2.78	1.56	15.46	3.2	34.59
City Union Bank Ltd	15.58	15.09	0.49	1.42	14.57	3.13	7.44
DCB Bank	14.03	12.74	1.29	1.01	11.16	3.24	6.86
Dhanlaxmi Bank Ltd	7.51	6.12	1.39	-1.68	-41.23	2.44	-11.8
Federal Bank	13.93	13.36	0.57	0.52	5.87	2.73	2.77
HDFC Bank	15.5	13.2	2.3	1.73	16.91	3.89	48.84
ICICI Bank	16.64	13.09	3.55	1.34	11.19	2.94	16.75
Indusind Bank	15.5	14.92	0.58	1.63	13.2	3.22	39.68
Jammu & Kashmir Bank	11.81	10.6	1.21	0.51	6.47	3.37	8.58
Karnataka Bank	12.03	10.56	1.47	0.73	11.25	2.3	22.04
RBL Bank	12.94	11.1	1.84	0.74	9.78	2.09	9.6
Karur Vysya Bank	12.17	11.26	0.91	0.98	12.41	3.08	46.59
South Indian Bank Ltd	11.82	9.83	1.99	0.52	8.97	2.38	2.47
Lakshmi Vilas Bank	10.67	8.69	1.98	0.62	11.32	2.24	10.05
Yes Bank Ltd	16.5	10.7	5.8	1.53	18.41	2.76	60.62
Kotak Mahindra Bank	16.3	15.3	1	1.08	8.72	3.58	11.42
Oriental Bank of Commerce	11.76	9.1	2.66	0.06	1.16	2.26	5.2
Allahabad Bank	11.02	8.41	2.61	-0.31	-6.51	2.5	-12.68
Andhra Bank	11.58	8.87	2.71	0.26	4.91	2.66	8.6
Bank of Baroda	13.17	10.79	2.38	-0.8	-13.42	1.89	-23.89
State Bank of India	13.12	9.92	3.2	0.44	6.89	2.51	12.98
Punjab National Bank	13.15	10.16	2.99	-0.59	-11.2	2.29	-20.82

### Important Indicators of selected Banks

Name of the Banks	CAR	Tier I	Tier II	ROA	ROE	NIM	EPS
Punjab and Sind Bank	10.91	9.29	1.62	0.32	5.62	2.12	8.39
State Bank of Bikaner and Jaipur	11.33	9.14	2.19	0.77	12.61	2.99	121.51
Vijaya Bank	12.58	9.45	3.13	0.26	5.84	1.89	4.44
State Bank of Mysore	12.43	9.28	3.15	0.43	7.66	2.54	74.53
United Bank of India	10.08	7.93	2.15	-0.21	-5.73	1.76	-3.36
State Bank of Travancore	11.6	9.19	2.41	0.29	5.6	2.23	47.5
Syndicate Bank	11.16	7.75	3.41	-0.53	-15.32	1.94	-24.82
UCO Bank	9.63	7.63	2	-1.14	-30.35	1.97	-26.03
Bank of India	12.01	9.03	2.98	-0.99	-19.63	1.92	-83.01
Bank of Maharashtra	11.2	9.63	1.57	0.06	1.34	2.4	0.91
Canara Bank	11.08	8.8	2.28	-0.5	-10.75	1.76	-53.61
Central Bank of India	11.07	7.44	3.63	-0.46	-9.85	2.31	-8.55
Corporation Bank	10.88	7.33	3.55	-0.21	-4.73	1.8	-5.48
Dena Bank	11	8.59	2.41	-0.7	-13.09	1.85	-15.5
IDBI	11.67	8.89	2.78	-0.97	-16.57	1.62	-21.77
Indian Bank Ltd	13.67	12.29	1.38	0.34	5.27	2.18	14.81
Indian Overseas Bank	9.66	7.75	1.93	-1.05	-21.85	1.96	-19.86
Union Bank of India	11.14	8.23	2.91	0.33	6.65	2.05	20.42

Source: Money Control.com

The table 4.4.2 presents the important performance indicators like ROA, NIM, ROE, CAR and EPS. The ICICI Bank heads with the highest CAR of 16.64 during 31-3-2016. The lowest CAR was reported by Dhanalakshmi Bank which stood at 7.51. Highest ROA was reported by

HDFC Bank @ of 1.73, and many banks under study reported negative ROA during that year.

18.41 was the rate of ROE, reported by Yes BANK, while NIM of HDFC stood at 8.39.

121.51 was the rate of EPS earned by State Bank of Jaipur and Bikaner.

## **4.5. Data Collection and the Parameters**

The data collection process with regard to the current study include the financial Reports of the 40 Commercial Banks from where the data of following important variables was gathered and arranged in a Panel listing all the years from 31-3-2001 to 31-3-2016, the variables required for all three objectives as numerator and denominator components and also the ratios and the names of all 40 banks categorizing them as Public and Private.

In order to perform Comparative Test, Trend Analysis, and Regression Analysis, the required data has been collected as per the variables used for the respective objectives.

### **4.5.1 Parameters for analysing Quality of Assets**

#### **1. Gross NPAs to Gross Loans and Advances Ratio**

It is the ratio of Gross NPAs to Gross Advances and expressed accordingly and as per Basel Norms this is the most recognized and accepted ratio one can use to evaluate the quality of assets. Gross NPAs are the sum total of all loan assets which are divided as NPAs as per RBI Guidelines as on Balance Sheet date and consists of Sub- standard, Doubtful and Loss Assets. Gross advances include Bills purchased and Discounted, Cash Credits, Overdrafts and Loans Repayable on Demand, Term Loan etc. both in India and outside India.

This ratio identifies the problems in loan portfolio and depicts the proportion of GNPA's whose recovery is doubtful and resulting in generation of no return or income to total advances. Therefore the Lower ratio signifies better quality of Advances made by the banks and increasing ratio may signal deterioration in the quality of credit portfolio. The lower the ratio better it is.

## **2. Net NPAs to Net Advances Ratio**

This is the most standard measure available to analyse the assets quality as this ratio gives actual rate of NPAs after deducting the provisions at applicable rate. This ratio measures the Net Non Performing Assets as a percentage of Net Advances. Net NPAs are arrived at as follows:

= Gross NPAs - Net of Provisions on NPAs - interest in suspense account.

The lower ratio is better in the interest of the bank and the stakeholders. The net NPA above one per cent level required to be taken seriously and shall be restrained in, to support the organizational objectives ( S. K. Srinivas and L.Saroja,2013).

## **3. Loan Loss Provision to Total Loans Ratio**

As a part of prudential bank management guidelines, RBI ensures that commercial banks set aside adequate capital buffer as cover for various asset classes so that the banks are not affected due to defaults. It is

the ratio of Provisions to Total Loans. Higher loan-loss provision ratio indicates an increase in credit risk, therefore lower ratio is good.

#### **4. Ratio of GNPA's to Total Assets**

Under this ratio the NPAs are considered against Total Assets to know the proportion of NPAs to Total Assets.

#### **5. Ratio of NNPA's to Total Assets**

This ratio measures the Net NPAs as a percentage of Total Assets; the lower ratio is an indication of better quality of the advances.

#### **6. Total Investments to Total Assets Ratio**

The ratio is calculated by dividing Total investments with Total Assets of the bank and gives the idea of the extent of distribution of assets in investment instead of advances. The ratio is an important tool and enables to measure the percentage of total assets that are linked up in the category of investments. A higher ratio shows the cautious policy adopted by a bank to protect their funds by making investments rather than performing its core function of lending.

## **7. Slippage Ratio (Addition to GNPA/Opening GNPA).**

Slippage happens in banking industry when a performing advance becomes NPA and is an indication of poor sign of credit quality and increase in Credit Risk. Lower slippage Ratio indicates better quality as additions of GNPA during the year have remained low. Slippage Ratio is expressed as =  
Addition to GNPA/ Opening GNPA

### **4.5.2 Parameters for studying the Determinants of Credit Risk**

#### **A) Dependent Variable – Credit Risks**

##### **i) Ratio of GNPA to Gross or Total Loans**

#### **B) Independent Variables**

The independent variables used for 2<sup>nd</sup> objective involve macroeconomic and Bank Specific factors.

##### **1) Macroeconomic Indicators**

###### **I) Growth Rate of GDP**

The empirical review on earlier studies focuses on Gross Domestic Product as the main macroeconomic determinant of credit risk represented by the non-performing loans.

According to Jakubik (2007) Gross Domestic Product (GDP) is a measurement of the cyclical position of the economy and measure the total market value of the goods and services produced by the economy of a

respective country as well as total income earned by the people living at that country. Rise in GDP rate indicates that economy is performing well and go along with an increase in income of the people.

The association that exists between the real GDP and Non-Performing Loans is still a subject of dispute as the earlier study results show three types of relationship, a positive, negative and no relationship, though the result of most of the studies are backing inverse relationship.

An Upturn in economic growth decreases the Non Performing Loans for different types of loan. A positive economic cycle supports the repayment ability but during recession period the ability to repay the loan is impaired. Thus shows that repayment capacity depends on the phase of the economic cycle. Therefore slowdown in economic growth or lower GDP growth in the country will result into accumulation of more Non-Performing Loan as downturn impacts the flow of income level and adversely affecting the repayment capacity.

## **II) Inflation Rate**

Inflation can be defined as the rate at which the general level of prices for goods and services is rising and, consequently the purchasing power of currency is falling.

Economists define Inflation as an increase in general price level of goods and in an economy up to a certain extent when a unit of currency buys fewer goods and services. It is an increase in the amount of money in circulation which causes price inflation.

According to Tim McMahon a simple way to define is, “inflation is an increase in the price you pay for goods”, which could also be seen as “decline in the purchasing power of you money”

There is an empirical evidence for both significant positive and negative and insignificant association that exists between the inflation in the economy and non-performing loans.

Higher inflation rates results in instability of business profits and is linked to an increase in the cost of goods and services that form the price index which positively influences peoples’ willingness to take risks and there likeliness to default on loan repayment (Beck, et al., 2013).

Besides, increased inflation also weakens the loan payment capacity of the borrowers by reducing the real income. A high inflation environment in the country results in deterioration in the quality of borrowers’ repayment ability and is directly related to the banking sector distress. Inflation can also affect the purchase power of consumers and hence this macroeconomic indicator is considered.

So according to different literatures the relationship between inflation and non-performing loans can be positive or negative depending on the economy of operations.

### **III) Unemployment Rate**

Unemployment refers to a situation in which the workers who are capable of working and willing to work do not get employment and fail to secure work or activity which gives them income or means of livelihood.

Unemployment can be an aggravating cause for financial crisis. The unemployment rate which is a measure of the prevalence of unemployment and is calculated as a percentage by dividing the number of unemployed individuals by all individuals currently in the labour force has been used as an influencing factor. During periods of recession an economy usually experiences a relatively high unemployment rate.

An increase in the unemployment rate negatively influences the cash flow streams of households resulting in increased debt burden. Similarly with regard to firms, increases in unemployment results in decreased production and effective demand leading to decreased revenues and a fragile debt condition.

#### **IV) Exchange Rate**

An exchange rate is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in relation to another currency. An increase in this variable implies an appreciation in the value of the local currency thereby making the goods and services relatively more expensive. This weakens the competitiveness of export-oriented firms and affects adversely their ability to service their debt (Fofack, 2005; Nkusu, 2011). Hence, the impact of Exchange Rate on the ratio of nonperforming Asset is expected to be positive.

#### **V) Interest Rate:**

Lending Rates play a very significant role and act as an influencing factor determining Credit Risk. It is believed that cheaper the lending rates are,

the more will be the recovery rate and higher the rates, the higher will be the defaults. There is need to account for this argument, Lending Rate is considered.

If borrowers find that interest rate has gone up, loans may be taken with an intention that it would not be repayable due to the rising cost of borrowing. Inflation and interest rate often work simultaneously and Interest rate follows upward trends during the time of high inflation. High inflation and interest rate induce to increase the willful default nature of the borrowers.

## **2) Bank Specific Factors**

The bank specific factors look at the variation in Non Performing Loans, a proxy for credit risk across banks and contribute the magnitude of non-performing loans to bank related factors. The earlier studies focus on the individual bank's balance sheet data and try to identify micro variables which have been the main causes of Non Performing Loans and individual bank's failure.

### **D) Capital Adequacy Ratio**

Capital is the part of own fund and is the difference between total assets and total liabilities and available with the banker to support its business and act as a buffer in an adverse situation.

Capital adequacy is the level of capital required by the banks to withstand the credit, market and operational risks they are exposed to. Capital

adequacy is considered as a measure of the overall financial strength of a bank and is important in maintaining soundness of the banking system since it acts as a cushion against uncertainties.

CAR is recommended by Basel (1998) accord for judging asset quality and form part of prudent credit risk management practice. It is the ratio of total capital to risk adjusted assets of the bank. High ratio is the indication of adequacy of bank's capital and better assets quality, therefore, low credit risk. It is widely accepted in literature that low capital adequacy ratio is associated with higher probability of loans default. Banks with good capital adequacy ratio have good profitability and are able to absorb bad loans and thus avoids bank 'run', insolvency and failure.

The purpose of this reserve is to protect the depositors from any unexpected losses. The BASEL II accord requires banks to hold capital adequacy of at least 8% of their risky assets.

## **II) Loan Loss Provision to Total Loans**

The ratio measures the percentage of gross loan which has been set aside and historically higher ratio is an indication of weak loan portfolio management quality and high credit risk and simultaneously enables to provide for loan losses comfortably therefore the relationship could be positive or negative.

## **III) Operating Inefficiency**

Banks Inefficiency Ratio is a measure of bank's overhead as a percentage of its revenue. The most common formula is:

Bank Efficiency Ratio = Expenses\* / Revenue

\*Expenses do not include interest expense.

It basically looks at costs as a percentage of revenue and costs include payment and provision to employees' salaries, rent and other general and administrative expense, Interest expenses are usually excluded because they are not operational decisions. Revenue includes interest income and fee income loans and investment and balances with RBI.

This ratio is a quick and easy measure of a bank's ability to turn resources into revenue. The lower the ratio the better is the efficiency since a bank's operating expenses are in the numerator and its revenue is in the denominator. A lower efficiency ratio means that a bank is operating better and generally 50% is regarded as the maximum optimal efficiency ratio. An increase in the efficiency ratio means either increasing costs or decreasing revenue.

From the perspective of regulators' inefficient banks are riskier and stand a more chance of failure compared to efficient banks.

#### **IV) Credit Growth**

A rapid credit expansion is considered as one of the most important causes of problem loans (Caprio *et al.*, 1994). During economic expansion, banks are often engaged in fierce competition because of appetite market share in loans, resulting in rapid credit growth due to granting of loans to borrowers of inferior credit quality. The market share strategy will prove to be dangerous

for a newly entrant bank with a new product or regional market resulting in more problem loans also due to lack of expertise necessary for credit risk.

#### **V) Size**

Size of the bank as measured as Total Assets of the bank determine credit risk inversely as it is believed that larger the size better prospects for the banks to diversify its activities as a result low risk. Small size bank will not be able diversify its activities to many avenues resulting in more risk. Studies by Saunders et al. (1990), Chen et al. (1998), Cebenoyan et al. (1999) and Meggison (2005) show negative relationship between bank risk and bank size. Study expects negative relation.

#### **VI) Ownership (Dummy Variable)**

Ownership is used as a Dummy variable indicated by 0 for Public Banks and 1 for Private Banks. De Nicolo and Giuliano et al. (2007) reported that State-owned banks show higher risk than other type of banks. As reported in study by Nabila Zribi (2011). Zuzana and Laura (2008) the effect of state ownership on Russian Banks insolvency risk over the period from 1999 to 2007 was positive. Rainer and Paul (2007) in the context of 423 banks in countries like Russia, Hungary, Czech Republic etc, found that no excessive risk taking by specific ownership of transition banks.

## **VII) Basel II Period**

To know the influence of implementation of Basel II Norms on the determinants to determine the Credit Risks the Dummy variable was incorporated taking the value of 0 for the period prior to Basel II and 1 for the post implementation of Basel II Norms in India.

### **4.5.3 Parameters to study the Effect of Credit Risk on the Performance of the Banks.**

#### **A) Dependent Variable- Performance**

Study uses three dependent variables representing performance viz. ROA, ROE and NIM.

##### **I) ROA**

ROA is a measure of profitability for banking transactions and is the indicator that best expresses the profitability of the bank and the ability of the bank to generate resources and simultaneously expressing the management quality. In fact, this ratio is not affected by the leverage. Thus the ROA is a fundamental element in the profitability and performance of a bank and Measures Company's Profit after Tax against its Total Assets and considered as an indicator of how efficient a company is using its assets to generate earnings before the payment of contractual obligation.

## **II) ROE**

Return on Equity measures the Return on Shareholders' investment in the bank and has been used as an indicator of the profitability in the regression analysis because ROE along with ROA has been widely used in earlier research (Ara *al el*, 2009) and shows the effectiveness of management in the utilization of the funds contributed by shareholders of a bank.

## **III) NIM**

Net Interest Margin enables to examine the success of firm's investment decisions when compared with its debt decisions. NIM creates a chunk between returns to Depositors and Borrowers and reflects the cost of banks intermediation services and the efficiency of the banking sector. This ratio is calculated by considering net of Interest Income and Interest Expenses divided by the Earning Assets.

It implies that higher the net interest margin, the higher are banks' profit margins and more stable is the banking sector. However, a higher net interest margin could reflect riskier lending practices associated with substantial loan loss provisions and could be an indication of inefficiency in the banking sector (Ross et al., 2007). The interest margin beyond and its threshold moves in the same direction as the credit risk

The negative sign of NIM indicates that whatever returns generated from the investments have failed to recover the interest expenses. Rise in the magnitude of Non Performing Assets will reduce the interest earned which will result in decline in the rate of NIM. Therefore the higher the ratio, the

cheaper will be the funding and higher will be the margin enjoyed by the banks. Higher margins and profitability are desirable as long as the asset quality is maintained.

## **B) Independent Variables**

### **I) Loan Loss Provision to Gross Loans**

The allowance and the provisions for loan losses in a balance sheet is the best estimate of future losses that banks expect from their lending operations. It indicates how well a bank is protected against future losses it could have. An increase in the amount of this variable indicates caution shown by the bank as against its loans granted. It also implies that higher the level of NPLs of the banks it necessitates to make increase in the provisions for loan losses accordingly leading to decrease in the revenue and the profitability. The expected relationship with the dependent variable is negative.

### **II) Loan Loss Provision to Gross Non Performing Assets**

Here the study considers the rate of LLP expressed as a percentage of NPAs. A study by Germa Mkasha (2011) states that loan provision to non-performing loan and loan provision to total asset of the financial institution is significantly positively related to return on asset. The expected relationship is negative.

### **III) Loan Loss Provision to Total Assets**

The ratio is expressed as the rate of LLP to Total Assets and to see the rate of provisions in relation to Total Assets held by the banks. The expected relationship with the dependent variable is negative

### **IV) Gross Loans to Total Assets**

Evaluating the effect of loan activities on bank risk, Brewer (1989) uses the ratio of Bank Loans to Total Assets of the banks. The purpose behind this is that the bank loans are relatively illiquid and subject to more default risk than other assets held by the banks, there by indicating a positive relationship between Loan held and the Total Assets and the risk measures.

As against these relative improvements in the management of strategies of credit risk strategies suggests that Loans to Total Assets is negatively related to bank risk measures (Altunbas, 2005). Bourke (1989) reports the effect of credit risk on profitability appears clearly negative.

The higher the exposure of financial institutions to the risk loans, the higher will be the pilling up of unpaid loans, indicating that these loan losses have produced lower returns to many commercial banks (Miller and Noulas, 1997).

## **V) Operating Expenses to Gross Loans**

Cost per Loan Asset is the average cost per loan advanced to customer in monetary terms. It points out efficiency in distributing loans to customers (Appa, 1996; Ahmed et al., 1998; Kolapo et al., 2012). Cost per Loan Asset Ratio can be expressed as  $\text{Total Operating Cost} / \text{Total Amount of Loans}$ . Thus, cost per loan assets is considered as a determinant of the bank's performance and is viewed as an indicator of credit risk. Banks that are efficient in managing their expenses, holding other factors constant, earn high profits. Therefore, it is expected that cost per loan assets and bank performance to be negatively associated.

This may not always hold good because if there are cases of high expenditures due to business diversification, the bank will still be able to increase the returns. However, the results shown by empirical studies is mixed. In Nepalese context, Paudel (2012) has found inverse and statistically insignificant relation existing between Cost per loan assets and ROA, proxy for bank performance. Kurawa and Garba (2014) have found significant positive association between cost per loan assets ratio and banks profitability represented by ROA.

## **VI) Gross Non- Performing Assets to Gross Loans**

NPL an independent variable and it is chosen because it is an indicator of credit risk. Non Performing Loans, in particular, indicates how banks manage their credit risk because it expressed as a proportion of loan losses

amount in relation to the Gross Loan amount (Hosna et al, 2009). The expected relationship of non- performing loans with the performance is negative. High levels of Non Performing Loans lead to a reduction in the liquidity position of the bank and credit expansion thereby having direct impact on the banks performance. The expected relationship is negative.

## **VII) Capital Adequacy Ratio**

Another variable used as an independent variable is the CAR and the basic purpose of choosing this variable is that it is a core measure of a bank's financial strength from the point of view of RBI as well as Basel Norms. Banks with good Capital Adequacy Ratio have good profitability and with good Capital Adequacy Ratio banks are able to absorb loans that have gone bad. The total capital ratio of a bank must be at least 8% which indicates that 8% of the bank's risk-weighted assets must be covered by permanent or near permanent capital. The ratio below 4% is considered as undercapitalized and is mainly ratio is used mainly used by the regulators to grade bank capital adequacy.

CAR serves as a moderator and precaution against unforeseen events and accordingly holds back the financial institution from giving high rate of returns. Thus the expected relationship is positive.

## **VIII) Credit Deposit Ratio**

The main activity of banking institution is to make use of the funds, the deposits, effectively by way of financing which enhances the profitability, thereby showing positive relationship with the profitability indicator.

A high CD ratio indicates issue of more loans out of the generated deposits there by generating more income, but if repayment of loans is not made on time then the problem of liquidity will arise. The expected relationship could be negative or positive.

## **IX) Control Variables**

In order to avoid the possibility that the relationship could be due to some other factors, the study needs to incorporate Control Variable. And accordingly two control variables have been selected.

### **(A) Deposits**

Investopedia defines Bank Deposits as money placed into banking institutions for safekeeping and is made to Deposit Accounts such as Saving Accounts etc. For Banks deposits represents an item of Liability.

The study uses Deposits as a control Variable because the control variable strongly influences results, and is held constant to test the relationship between the dependent and the independent variable in a better way. The control variable Deposits itself is not of primary interest in the study. The expected

relationship is positive, because rise in deposits leads to rise in loans advanced resulting into more profits.

#### **B) Natural Logarithm to Total Assets.**

One common measure that is proven the most interchangeable to use as a measure for firm size is the natural log of total assets (Shalit & Sankar, 1977), quoted by Fan Li Yijun Zou( 2014) . In most finance literature, natural logarithm of total assets of the banks is used as a proxy for bank size. The effect of bank size on profitability is generally expected to be positive (Smirlock, 1985). Likely, a positive relationship between size and bank profitability could be found if there are significant economies of scale (Akhavain et al. 1997; Bourke 1989; Molyneux and Thornton 1992; Bikker and Hu 2002; Goddard et al. 2004).

Bank size is generally used to capture potential economies or diseconomies of scale in the banking sector. This variable controls for cost differences in product and risk diversification according to the size of the financial institution. This is included to control the possibility that large banks are likely to have greater product and loan diversification.

## X) Dummy Variable-Basel II Period

Additional dummy variable taking the value of 0 for a period prior to implementation of Basel II Norms in India and 1 for post Basel II period to see the effect of Performance

**Figure 4.5.2.1 Summary of Variables for Objective 2**

<b>Variables</b>	<b>Definition</b>	<b>Expected sign</b>
<b>Dependent Variable:</b>		
Gross Non-Performing Loans Ratio	Ratio of Non-performing loans to Total Gross Loan	
<b>Independent Variable</b>		
<b>Bank-specific variable</b>		
1. Credit Growth	Current Years Loan – Previous Years Loan/Previous Years Loan	<b>Positive</b>
2.Loan Loss Provision Ratio	Loan Loss Provision to Total Loans	<b>Negative/ Positive</b>
3.Operating Inefficiency	Operating Expenses to Total Income	<b>Positive</b>
4.Capital Adequacy Ratio	Capital to Risk Weighted Assets	<b>Negative</b>
5.Size	Total asset	<b>Negative</b>
<b>6.Ownership Structure ( Dummy Variable)</b>	Public and Private Banks, 0 for Public Banks, 1 for Private Banks	
<b>Macro Economic Variable</b>		
1.GDP Growth Rate	The growth rate of real GDP	Negative/ Positive
2.Inflation Rate	The inflation rate	Positive / Negative
3.Unemployment Rate	The Unemployment Rate	Positive / Negative
4.Exchange Rate	The Exchange Rate	Positive
5.Interest Rate	The Lending Rate	Positive
<b>Basel II (Dummy Variable)</b>	0 for Period prior to and 1 for Post Basel II	

**Figure 4.5.3.1 Summary of Variables for objective 3**

	<b>Description</b>	<b>Measurement</b>	<b>Expected sign</b>
	<b>Dependent Variable</b>		
	1.Return On Asset	Profit after Tax to Total Assets	
	2.Return On Equity	Profit after Tax to Total Equity	
	3.Net Interest Margin	Interest earned less interest paid to average earning assets	
	<b>Independent Variables</b>		
1	Non-Performing Loan Ratio	Non-performing loan / Gross loans and advances	Negative
2	Loan Loss Provision to Gross Loans Ratio	Loan Loss Provision / Gross Loans	Negative
3	Capital Adequacy Ratio	Tier 1 capital + Tier 2 capital / Risk weighted Assets	Positive
4	Credit Deposit Ratio	Total Loans/ Total Deposits	Positive/Negative
5	LLP to GNPA	Loan Loss Provision to Gross Non Performing Assets	Negative
6	LLP to Total Assets	Loan Provision/ Total Assets	Negative
7	Gross Loans to Total Assets	Gross Loans/ Total Assets	Negative
8	Cost per loan assets	Operating Expenses to Total loans assets	Negative
9	<b>Bank size ( Control Variable)</b>	Natural logarithm of Total Assets	Positive
10	<b>Total Deposits (Control)</b>	Deposits in Rupees Crores	Positive
11	<b>Basel II (Dummy Variable)</b>	0 for Period prior to and 1 for Post Basel II	

## 4.6 Hypothesis

The following hypothesis have been framed and presented objective wise depending upon the classifications of Banks made by the researcher for the purpose of study and include a group of All Banks, a group of Private Banks and a group of Public Banks.

**Figure 4.6.1 Hypothesis for Objective 1 according to groups of Banks**

All Banks	Private Banks	Public Banks
<p><b>i) Ho)</b> There is no significant difference between the ratio of Gross Non Performing Assets to Gross Loans across all Banks Prior to and post implementation of Basel II norms in India.</p>	<p><b>i) Ho:</b> There is no significant difference between the ratio of Gross Non Performing Assets to Gross Loans across a group of Private Banks Prior to and post implementation of Basel II norms in India.</p>	<p><b>i) Ho:</b> There is no significant difference between the ratio of Gross Non Performing Assets to Gross Loans across a group of Public Banks Prior to and post implementation of Basel II norms in India.</p>
<p><b>ii) Ho:</b> There is no significant difference between the ratio of Net Non Performing Assets to Net Advances across all Banks Prior to and post implementation of Basel II norms in India</p>	<p><b>ii) Ho:</b> There is no significant difference between the ratio the Net Non Performing Assets to Net Advances across a group of Private Banks Prior to and post implementation of Basel II norms in India.</p>	<p><b>ii) Ho:</b> There is no significant difference between the ratio the Net Non Performing Assets to Net Advances across a group of Public Banks Prior to and post implementation of Basel II norms in India.</p>

All Banks	Private Banks	Public Banks
<p><b>iii) Ho:</b> There is no significant difference between the ratio of Loan Loss Provision to Total Loan across all Banks Prior to and post implementation of Basel II norms in India.</p>	<p><b>iii) Ho)</b> There is no significant difference between the ratio of Loan Loss Provision to Total Loans across a group of Private Banks Prior to and post implementation of Basel II norms in India.</p>	<p><b>iii) Ho)</b> There is no significant difference between the ratio of Loan Loss Provision to Total Loans across a group of Public Banks Prior to and post implementation of Basel II norms in India.</p>
<p><b>iv) Ho:</b> There is no significant difference between the ratio of Gross Non Performing Assets to Total Assets across all Banks Prior to and post implementation of Basel II norms in India</p>	<p><b>iv) Ho)</b> There is no significant difference between the ratio of Gross Non Performing Assets to Total Assets across a group of Private Banks Prior to and post implementation of Basel II norms in India.</p>	<p><b>iv) Ho)</b> There is no significant difference between the ratio of Gross Non Performing Assets to Total Assets across a group of Public Banks Prior to and post implementation of Basel II norms in India.</p>
<p><b>v) Ho:</b> There is no significant difference between the ratio of Net Non Performing Assets to Total Assets across all Banks Prior to and post implementation of</p>	<p><b>v) Ho)</b> There is no significant difference between the ratio of Net Non Performing Assets to Total Assets across a group Private Banks Prior to and post implementation of Basel II norms in</p>	<p><b>v) Ho)</b> There is no significant difference between the ratio of Net Non Performing Assets to Total Assets across a group Public Banks Prior to and post implementation of</p>

Basel II norms in India	India	Basel II norms in India
<b>vi) Ho:</b> There is no significant difference between the ratio of Total investment to Total Asset across all Banks Prior to and post implementation of Basel II norms in India.	<b>vi) Ho)</b> There is no significant difference between the ratio of Total investment to Total Assets across a group of Private Banks Prior to and post implementation of Basel II norms in India.	<b>vi) Ho)</b> There is no significant difference between the ratio of Total investment to Total Assets across a group of Public Banks Prior to and post implementation of Basel II norms in India.

**Figure 4.6.2 Hypotheses for objective 1 across Categories of Ownership of Banks**

<b>1)Ho</b> There is no significant difference in the ratio of Gross Non Performing Assets to Gross Loans across a group of Public and Private Banks	<b>4)Ho</b> There is no difference in the ratio of Gross Non Performing Assets to Total Assets across a group of Public and Private Banks
<b>2)Ho</b> There is no significant difference in the ratio of Net Non Performing Assets to Net Advances across a group of Public and Private Banks	<b>5)Ho</b> There is no difference in the ratio of Net Non Performing Assets to Total Assets across a group of Public and Private Banks
<b>3)Ho</b> There is no significant difference in the ratio of Loan Loss Provision to Total Loans across a group of Public and Private Banks	<b>6)Ho</b> There is no difference in the ratio of Total investment to Total Asset across a group of Public and Private Banks

**Figure 4.6.3 Hypothesis for objective 2 according to group of Banks with and without Dummy variable for Time Basel II period**

<b>Sr. No.</b>	<b>Main Hypothesis</b>
	<p><b>Ho:</b> There is no significant relationship between the Credit Risks in the Indian Commercial Banks and the Bank Specific and Macroeconomic factors.</p>
<b>Sub hypothesis</b>	
<b>1.</b>	<b>Ho:</b> There is positive relationship between regulatory capital and Credit Risk in Indian Commercial Banks or Public Banks or Private Banks.
<b>2.</b>	Ho: There is no positive relationship between the credit growth and the credit risks in Indian Commercial Banks or Public Banks or Private Banks.
<b>3.</b>	<b>Ho:</b> There is no inverse relationship between Size and Credit Risk in Indian Banks Commercial Banks or Public Banks or Private Banks.
<b>4.</b>	<b>Ho:</b> There is positive relationship between Loan Loss Provision and Credit Risk in Indian Commercial Banks or Public Banks or Private Banks
<b>5.</b>	<b>Ho:</b> There is no significant relationship between operating expenses and Total Income in Indian Commercial Banks or Public Banks or Private Banks.
<b>6.</b>	<b>Ho:</b> There is significant relationship between the ownership structure and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks.

<b>7.</b>	<b>Ho:</b> There is positive relationship between Inflation Rate and Credit Risk in Indian Commercial Banks or Public Banks or Private Banks.
<b>8.</b>	<b>Ho:</b> There is positive relationship between Unemployment Rate and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks.
<b>9.</b>	<b>Ho:</b> There is positive relationship between Lending Rate and the Credit Risk in Indian Banks Commercial Banks or Public Banks or Private Banks.
<b>10.</b>	<b>Ho:</b> There is no positive relationship between the Exchange Rate and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks
<b>11.</b>	<b>Ho:</b> There is no positive relationship between GDP Growth Rate and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks.
<b>12.</b>	<b>Ho:</b> There is positive relationship between regulatory capital and Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>13.</b>	<b>Ho:</b> There is no positive relationship between the credit growth and the credit risks in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>14.</b>	<b>Ho:</b> There is no inverse relationship between Size and Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>15.</b>	<b>Ho:</b> There is positive relationship between Loan Loss Provision and Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>16.</b>	<b>Ho:</b> There is no significant relationship between operating expenses and Total Income of Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>17.</b>	<b>Ho:</b> There is significant relationship between the ownership structure and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.

<b>18.</b>	<b>Ho:</b> There is positive relationship between Inflation Rate and Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>19.</b>	<b>Ho:</b> There is positive relationship between Unemployment Rate and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>20.</b>	<b>Ho:</b> There is positive relationship between Lending Rate and the Credit Risk in Indian Banks Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>21.</b>	<b>Ho:</b> There is no positive relationship between the Exchange Rate and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>22.</b>	<b>Ho:</b> There is no positive relationship between GDP Growth Rate and the Credit Risk in Indian Commercial Banks or Public Banks or Private Banks during pre and post Basel II Period.
<b>23.</b>	<b>Ho:</b> There is no significant association between the Credit Risk and the dummy for Basel II time period.

**Figure 4.6.4 Hypothesis for objectives 3 according to group of Banks with and without Dummy variable for Time Basel II period**

<b>Sr. No.</b>	<b>Main Hypothesis</b> <i>Ho:</i> There is no significant effect of Credit Risk on the Performance of Banks as represented by ROA, ROE and NIM.
<b>Sub- Hypothesis</b>	
<b>1.</b>	<i>Ho:</i> There is no significant relationship between the Ratio of Gross Non- Performing Assets and bank's Performance indicators ROA, ROE and NIM.

2.	<b><i>Ho:</i></b> The ratio of Loan Loss Provisioning to Gross Loans has no significant relationship with bank's performance as represented by ROA, ROE and NIM
3.	<b><i>Ho</i></b> The Capital Adequacy Ratio does not influence bank's performance as represented by ROA, NIM and ROE
4.	<b><i>Ho:</i></b> There is no significant relationship between Credit Deposit Ratio and Performance indicators ROA, NIM, and ROE.
5.	<b><i>Ho:</i></b> There is no significant and negative relationship between the ratio of LLP to GNPA's and the Performance indicators ROA, NIM, and ROE.
6.	<b><i>Ho</i></b> There is no significant and negative relationship between the ratio LLP to TASS and the Performance indicators ROA, NIM, and ROE.
7.	<b><i>Ho</i></b> : There is no significant and negative relationship between the ratio of Gross Loans to TASS and the Performance indicators ROA, NIM, and ROE.
8.	<b><i>Ho:</i></b> The Cost per Loan Assets has no significant and negative effect on bank's Performance indicators ROA, ROE and NIM.
9.	<b><i>Ho</i></b> Banks Size doesn't have significant and positive effect bank's Performance indicators ROA, ROE and NIM.
10.	<b><i>Ho</i></b> There is no relationship between Deposits and bank's Performance indicators ROA, ROE and NIM.
11.	<b><i>Ho:</i></b> There is no significant relationship between the Ratio of Gross Non- Performing Assets and Commercial bank's Performance indicators ROA, ROE and NIM during pre and post Basel II Period.
12.	<b><i>Ho:</i></b> The ratio of Loan Loss Provisioning to Gross Loans of Commercial Banks has no significant relationship with bank's performance as represented by ROA, ROE and NIM during pre and post Basel II period.
13.	<b><i>Ho</i></b> The Capital Adequacy Ratio does not influence Commercial bank's performance as represented by ROA, NIM and ROE during pre and post Basel II period.

14.	<b><i>Ho</i></b> : There is no significant relationship between Credit Deposit Ratio and Commercial Banks Performance indicators ROA, NIM, and ROE during pre and post Basel II period.
15.	<b><i>Ho</i></b> : There is no significant and negative relationship between the ratio of LLP to GNPA's and the Commercial Banks Performance indicators ROA, NIM, and ROE during pre and post Basel II period.
16.	<b><i>Ho</i></b> There is no significant and negative relationship between the ratio LLP to TASS and the Commercial Banks Performance indicators ROA, NIM, and ROE during pre and post Basel II period.
17.	<b><i>Ho</i></b> : There is no significant and negative relationship between the ratio of Gross Loans to TASS and the Commercial Banks Performance indicators ROA, NIM, and ROE during pre and post Basel II period.
18.	<b><i>Ho</i></b> : The Cost per Loan Assets has no significant and negative effect on Commercial bank's Performance indicators ROA, ROE and NIM during pre and post Basel II period.
19.	<b><i>Ho</i></b> Banks Size doesn't have significant and positive effect on Commercial bank's Performance indicators ROA, ROE and NIM during pre and post Basel II period.
20.	<b><i>Ho</i></b> There is no relationship between Deposits and Commercial bank's Performance indicators ROA, ROE and NIM during pre and post Basel II period.
21.	<b><i>Ho</i></b> The dummy variable Basel II period doesn't influence the Performance indicators ROA, ROE and NIM

## **4.7 Tools and Techniques employed**

Following tools and techniques have been adopted after going through a through literature review.

### **4.7.1 Comparative Test and Test of Normality**

Comparative Test was performed to analyse the quality of assets of the banks.

The study is based on the null hypothesis ( $H_0$ ) which states that the population means from which the samples are selected are equal or the mean of each group is equal.

Thus the Test of Normality Histogram was performed to check the normality of data, and the data was found to be not normal and accordingly non parametric, Independent Mann Whitney U Test has been applied to test the six Null Hypothesis to make comparison across the ownership between Private and Public banks and to see if there is any difference between the asset quality ratios of a group of Public Banks, a group of Private Banks and a group of all 40 banks prior to and the post implementation of Basel II norms in India the Wilcoxon Sign Rank Test has been applied.

### **4.7.2 Descriptive statistics**

Statistics is an important field of math which has been used to analyze, interpret, and predict outcomes from data as describing data is an essential part

of statistical analysis which is aiming to provide a complete picture of the data before moving to advanced methods and the descriptive statistics a type of statistical methods is used for describing the main features of the samples. The study uses mean to summarise variables and extract any information regarding dispersion for all three objectives under study. The study uses Standard Deviation which helps to measure how far all measurements are from mean. The standard deviation is the "average" degree to which scores deviate from the mean.

#### **4.7.3 Trend Analysis**

Trend analysis is a technical analysis of the movement of a particular entity based on past performance and could be used to estimate uncertain events in the past. Trend study is the most appropriate method of investigation to map change over a period and enables to find out what has happened in the past, what is happening now and what is likely to happen in future in a population group.

This study uses trend analysis to present the trend of Seven asset qualities ratios related to 1<sup>st</sup> objective prior to and post implementation of Basel II norms in India for a group of All, Private and Public Banks and include Gross NPAs to Gross Loans and Advances Ratio, Net NPAs to Net Advances Ratio, Provision to Total Loans Ratio, Ratio of GNPA's to Total Assets Ratio of NNPA's to Total Assets, Total Investments to Total Assets Ratio and Slippage Ratio.

The study also presents the trend analysis of Bank Specific Factors determining the credit risks such as CAR, Credit Growth and Operating Efficiency prior to and post implementation of Basel II norms in India as a part of 2<sup>nd</sup> objective.

The trend of ROA, ROE, NIM, LLP to GNPA, LLP to TASS, GL to TASS, Cost per Loan Assets, Bank Size log to Total Assets, and Total Deposits have been presented to study the 3<sup>rd</sup> objective and different bank groups.

#### **4.7.4 Correlation Analysis**

Correlation is a statistical technique that can show whether and how strongly pairs of variables are related and enable to study the strength of relationship that exists between two variables to establish if there are possible connections between variables leading to change in one resulting in change in the result of other.

Correlation is a bivariate analysis that measures the strength of association between two variables and the direction of the relationship. The main result of a correlation is called the correlation coefficient or "r". In terms of the strength of relationship, the value of the correlation coefficient varies between +1 and -1. A value of  $\pm 1$  indicates a perfect degree of association between the two variables. Positive correlation is where when one variable increases simultaneously with the other and negative correlation is when one variable decreases the other variable increases. +1 indicates strongest

correlation possible and -1 indicates strongest negative correlation possible. As the correlation coefficient value goes towards 0, the relationship between the two variables will be weaker or poorer or there is no relationship. The direction of the relationship is indicated by the sign of the coefficient and a + sign indicates a positive relationship and a – sign indicates a negative relationship. The study uses Pearson r correlation for objective 2 and objective 3 to find the degree of correlation between the dependent and independent variables mentioned and explained above under the heading parameters for objective 2 and objective 3.

#### **4.7.5 Regression Analysis**

Regression analysis is a set of statistical processes available for estimating the relationships among variables and studies of how a response variable depends on one or more predictors. It is the study of dependence which tells how does a response variable change as the values of one or more predictor variables are changed. Regression analysis estimates the relationship between two or more variables using appropriate software resulting in the best selection of the best regressor variables, testing the significance of their coefficients, and setting confidence limits to the predictions.

Regression analysis is an extension of correlation and enables to predict the outcome of a relationship with an interval-level dependent variable and one or more independent variables. Dependent variables referred to as *Y* and are caused by other variables, the independent variables referred to as *X*

which causes the changes in the dependent variables. Study applies multiple regressions for objective 2 and Multivariate Regression for objective 3 as follows.

#### **4.7.5.1 Multiple Regression for Determinants of Credit Risks**

The study has applied Multiple Linear Regressions for objective 2 which involves the use of one dependent variable the ratio of GNPA's to GL representing the Credit Risk and more than 2 categories of independent variables Bank Specific and Macroeconomic factors.

Macroeconomic Variables GDP Growth Rate, Exchange Rate, Interest Rate, Inflation Rate and Unemployment Rate as the independent variables along with Bank Specific factors like Credit Growth, Operating Efficiency, CAR, Loan Loss Provision and Size represented by Total Assets. Ownership Structure as Dummy variable taking the value of 0 for Public Banks and 1 for Private Banks and Basel II period as the dummy variable taking value as 1 for post Basel period and 0 for pre Basel II period.

Based on the categories of independent variables there are three main models which have been put up for a group of All, Public and Private Banks. Besides this, Model 4 is presented only for a group of All Banks.

##### **1) Model One - Macroeconomic and Bank Specific Variables**

This part deals with enquiring into the influence of both macroeconomic and bank specific factors on credit risk of all 40 Indian Banks,

a group of Public and a group of Private Banks covering entire period of 16 years from 2001 to 2016

### **Group of All / Private/ Public Banks**

$$GNPA\_Ratio_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 llp\_ln_{it} + \beta_3 oper\_ineffec_{it} + \beta_4 credit\_Gr_{it} + \beta_5 T\_ASSETS_{it} + \beta_6 OWN_{it} + \beta_7 GDP\_Growth_{it} + \beta_8 Inflation_{it} + \beta_9 Unemp\_rate_{it} + \beta_{10} Exchange_{it} + \beta_{11} Lending_{it} + \mu$$

### **2) Model Two Bank Specific Factors**

#### **Group of All / Private/ Public Banks**

$$GNPA\_Ratio_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 llp\_ln_{it} + \beta_3 oper\_ineffec_{it} + \beta_4 credit\_Gr_{it} + \beta_5 T\_ASSETS_{it} + \beta_6 OWN_{it} + \mu$$

### **3) Model Three Macro Economic Factors**

#### **Group of All / Private/ Public Banks**

$$GNPA\_Ratio_{it} = \alpha + \beta_1 GDP\_Growth_{it} + \beta_2 Inflation_{it} + \beta_3 Unemp\_rate_{it} + \beta_4 Exchange_{it} + \beta_5 Lending_{it} + \mu$$

**4) Model Four Macroeconomic and Bank Specific Determinants with Time Dummy for Basel Period for a group of All Banks**

$$GNPA\_Ratio_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 llp\_ln_{it} + \beta_3 oper\_ineffec_{it} + \beta_4 credit\_Gr_{it} + \beta_5 T\_ASSETS_{it} + \beta_6 OWN_{it} + \beta_7 GDP\_Growth_{it} + \beta_8 Inflation_{it} + \beta_9 Unemp\_rate_{it} + \beta_{10} Exchange_{it} + \beta_{11} Lending_{it} + \beta_{12} basel + \mu$$

**5) Model Five Bank Specific Determinants with Time Dummy for Basel Period for a group of All Banks**

$$GNPA\_Ratio_{it} = \alpha + \beta_1 CAR_{it} + \beta_2 llp\_ln_{it} + \beta_3 oper\_ineffec_{it} + \beta_4 credit\_Gr_{it} + \beta_5 T\_ASSETS_{it} + \beta_6 OWN_{it} + \beta_7 basel + \mu$$

**6) Model Six Macroeconomic Determinants with Time Dummy for Basel Period for a group of All Banks**

$$GNPA\_Ratio_{it} = \alpha + \beta_1 GDP\_Growth_{it} + \beta_2 Inflation_{it} + \beta_3 Unemp\_rate_{it} + \beta_4 Exchange_{it} + \beta_5 Lending_{it} + \beta_6 basel + \mu$$

Where:

$GNP\_Ratio_{it}$  = Gross Non Performing Assets to Gross Loans of  $i$ th Bank in year  $t$ , a dependent variable

$Credit\_Growth$  = growth in credit advanced  $i$ th Bank in year  $t$

*LLP<sub>LN it</sub>* = Loan Loss Provision to Loans of *ith* Bank in year *t*

*Operating Inefficiency* = *Operating Expenses to Total Income of ith Bank in year t*

*CAR it* = Capital Adequacy Ratio of *ith* Bank in year *t*

*Size it* = Total Assets representing Bank Size of *ith* Bank in year *t*

*Ownership Structure* = Dummy Variable taking the value of 0 for Public Banks and 1 for Private Banks

*GDP\_Growth* = GDP Growth Rate in year *t*

*Inflation* = Inflation Rate in *t* period

*Unemployment Rate* = Unemployment Rate in *t* period

*Exchange Rate* = Exchange Rate in *t* period

*Lending Rate* = Lending Rate in *t* period

*Basel it* = Time Dummy for Basel II

$\alpha$  = Intercept, constant

$\mu it$  = Error Component

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11}$  and  $\beta_{12}$  the slope representing the degree with which banks' credit risk changes as there is change in the independent variable.

#### **4.7.5.2 Multivariate Regression Models dealing with Impact of Credit**

##### **Risks**

For 3<sup>rd</sup> objective the study has made use of Multivariate Regression Analysis where three dependent variables and three models viz. ROA, ROE and NIM as proxy for Performance are presented. And GNPA to GL, LLP to

GL, CAR, CD, LLP to GNPA, LLP to TASS, GL to TASS and Cost per Loan Assets as the independent variables and Bank Size, logarithm of Total Assets, and Total Deposits as Control Variables and Basel II period as the dummy variable taking value as 1 for post Basel period and 0 for pre Basel II period. Based on the four main headings of hypothesis there are four main models, which again has subdivided component.

The econometric models one to three are employed to study a group of All, Private and Public Banks.

### 1) Model One- ROA

$$\begin{aligned}
 \mathbf{ROA} = & \alpha + \beta_1 \mathbf{GNPA\_RATIO}_{it} + \beta_2 \mathbf{LLP\_LN}_{it} + \beta_3 \mathbf{CAR}_{it} + \beta_4 \mathbf{CD\_Ratio}_{it} + \\
 & \beta_5 \mathbf{LLP\_GNPA}_{it} + \beta_6 \mathbf{LLP\_TASS}_{it} + \beta_7 \mathbf{GL\_TASS}_{it} + \beta_8 \mathbf{CLA}_{it} + \beta_9 \mathbf{Log\_TASS}_{it} \\
 & + \beta_{10} \mathbf{T\_DEP}_{it} + \mu_{it}
 \end{aligned}$$

### 2) Model Two- ROE

$$\begin{aligned}
 \mathbf{ROE} = & \alpha + \beta_1 \mathbf{GNPA\_RATIO}_{it} + \beta_2 \mathbf{LLP\_LN}_{it} + \beta_3 \mathbf{CAR}_{it} + \beta_4 \mathbf{CD\_Ratio}_{it} + \beta_5 \\
 & \mathbf{LLP\_GNPA}_{it} + \beta_6 \mathbf{LLP\_TASS}_{it} + \beta_7 \mathbf{GL\_TASS}_{it} + \beta_8 \mathbf{CLA}_{it} + \beta_9 \mathbf{Log\_TASS}_{it} \\
 & + \beta_{10} \mathbf{T\_DEP}_{it} + \mu_{it}
 \end{aligned}$$

### 3) Model Three - NIM

$$\begin{aligned} NIM = & \alpha + \beta_1 GNPA\_RATIO_{it} + \beta_2 LLP\_LN_{it} + \beta_3 CAR_{it} + \beta_4 CD\ Ratio_{it} + \beta_5 \\ & LLP\_GNPA_{it} + \beta_6 LLP\_TASS_{it} + \beta_7 GL\_TASS_{it} + \beta_8 CLA_{it} + \beta_9 Log\_TASS_{it} \\ & + \beta_{10} T\_DEP_{it} + \mu_{it} \end{aligned}$$

Following three Models have been used by including an additional Dummy variable for Basel II Period covering a group of All 40 Banks under study.

### 4) Model Four – ROA with Dummy variable for Basel II

The model has been used to see Basel II Effect only for All Banks under study

$$\begin{aligned} ROA = & \alpha + \beta_1 GNPA\_RATIO_{it} + \beta_2 LLP\_LN_{it} + \beta_3 CAR_{it} + \beta_4 CD\ Ratio_{it} + \beta_5 \\ & LLP\_GNPA_{it} + \beta_6 LLP\_TASS_{it} + \beta_7 GL\_TASS_{it} + \beta_8 CLA_{it} + \beta_9 Log\_TASS_{it} \\ & + \beta_{10} T\_DEP_{it} + \beta_{11} Basel_{it} + \mu_{it} \end{aligned}$$

### 5) Model Five – ROE with Time Dummy variable for Basel II

$$\begin{aligned} ROE = & \alpha + \beta_1 GNPA\_RATIO_{it} + \beta_2 LLP\_LN_{it} + \beta_3 CAR_{it} + \beta_4 CD\ Ratio_{it} + \beta_5 \\ & LLP\_GNPA_{it} + \beta_6 LLP\_TASS_{it} + \beta_7 GL\_TASS_{it} + \beta_8 CLA_{it} + \beta_9 Log\_TASS_{it} \\ & + \beta_{10} T\_DEP_{it} + \beta_{11} Basel_{it} + \mu_{it} \end{aligned}$$

**6) Model Six – NIM with Time Dummy variable for Basel II**

$$\begin{aligned} NIM = & \alpha + \beta_1 GNPA\_RATIO_{it} + \beta_2 LLP\_LN_{it} + \beta_3 CAR_{it} + \beta_4 CD\ Ratio_{it} + \beta_5 \\ & LLP\_GNPA_{it} + \beta_6 LLP\_TASS_{it} + \beta_7 GL\_TASS_{it} + \beta_8 CLA_{it} + \beta_9 Log\_TASS_{it} \\ & + \beta_{10} T\_DEP_{it} + \beta_{11} Basel_{it} + \mu_{it} \end{aligned}$$

Where:

$ROA_{it}$  = Return on Assets of *ith* Bank in year *t*, a dependent Variable

$ROE_{it}$  = Return on Equity of *ith* Bank in year *t*. a dependent Variable

$NIM_{it}$  = Net Interest Margin of *ith* Bank in year *t*, a dependent Variable

$GNPA\_Ratio_{it}$  = Gross Non Performing Assets to Gross Loans of *ith* Bank in year *t*

$LLP\_LN_{it}$  = Loan Loss Provision to Loans of *ith* Bank in year *t*

$CAR_{it}$  = Capital Adequacy Ratio of *ith* Bank in year *t*

$CD\ Ratio_{it}$  = Credit to Deposit Ratio of *ith* Bank in year *t*

$LLP\_GNPA_{it}$  = Loan Loss Provision to Gross Non Performing Assets of *ith* Bank in year *t*

$LLP\_TASS_{it}$  = Loan Loss Provision to Total Assets of *ith* Bank in year *t*

$GL\_TASS_{it}$  = Gross Loan to Total Assets of *ith* Bank in year *t*

$CLA_{it}$  = Cost per Loan Assets of *ith* Bank in year *t*

$Log\_TASS_{it}$  = Natural Logarithm of Total Assets representing Bank Size in year *t*

$T\_DEP_{it}$  = Total Deposits of *ith* Bank in year *t*

$Basel_{it}$  = Time Dummy for Basel II

$\alpha$  = Intercept, constant

$\mu_{it}$  = Error Component

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}$  , the slope representing the degree with which banks' performance changes as there is change in the independent variable.

#### **4.7.6 Diagnostic Analysis for Autocorrelation and Heteroscedasticity**

##### **1) Objective 2**

##### **Hausman Test**

This post-estimation test allows making a choice between Fixed and Random Effects model. The study has estimated the results of both approaches and then further subjected to this test. The criteria for selecting is the comparison of  $p$  value i.e. if  $p$ -value is less than 0.01%, 0.05% and 0.1% then Fixed Effects Model is better specification for panel data estimation.

The Hausman Specification Test is a statistical hypothesis Test and enables to evaluate the consistency of an estimator when compared to an alternative which is a less efficient estimator but already known to be consistent and states if a statistical model corresponds to the data.

In Panel Data the Hausman test differentiates between the Fixed and Random Effect Model and under null hypothesis due to higher efficiency considers Random Effect as a preferred model. And under alternative hypothesis the Fixed Effect Model is at least as consistent as Random Effect and thus is preferred to Random Effect.

<b>Hausman Test: Choice between Fixed Effect and Random Effect</b>	
<i>H<sub>0</sub></i> : Difference in coefficients not systematic	
<i>H<sub>1</sub></i> : Difference in coefficients systematic	
<b>Value</b>	<b>Decision</b>
Prob.>chi2 = 0.0423	Since p-value is < $\chi^2$ and < 0.05 <b>Fixed Effects</b> Model is preferred.
STATA 12.0 xtreg and Hausman commands	

The result shows that

*P* value less than the 5% level of significance implies that test is significant and the null hypothesis has been rejected and accordingly based on Hausman Test results; the Fixed Effect Model is more suitable and preferred.

Further to this, both autocorrelation and Heteroscedasticity was tested. Modified Wald Test for Group Wise Heteroscedasticity in Fixed Effect Regression Model was carried out, where

$$H_0: \sigma^2(i) = \sigma^2 \text{ for all } i$$

$$\chi^2(35) = 1629.08$$

$$\text{Prob } > \chi^2 = 0.0000$$

As p value is less than 0.05, the null hypothesis has been rejected. Heteroscedasticity is present and to remove the same option robust is used to obtain Heteroscedasticity – robust standard errors. The study presents the

results of Random Effect, Fixed Effect and Robust Standard Error (Fixed) in the analysis and discussion chapter.

Wooldridge Test for autocorrelation in Panel data has been applied to check first- order autocorrelation.

***H<sub>0</sub>***: No first- order autocorrelation

Prob> f = 0.1419

P value is not significant, so we have failed to reject Null hypothesis and conclude that data doesn't have first-order autocorrelation.

## **2) Objective 3**

For third objective also Hausman Test was run to make a choice between Random Effect Model and Fixed Effect Model, where the Test and Null Hypothesis is preferred Model is a Random Effect Model.

Test: *H<sub>0</sub>*: Difference in Coefficients not systematic

$$\text{Chi2 (8)} = (\mathbf{b}-\mathbf{B})'[(\mathbf{V}_b-\mathbf{V}_B)^{-1}](\mathbf{b}-\mathbf{B})$$

$$= 8.75$$

$$\text{Prob}>\text{chi2} = 0.3639$$

As the p value is > 0.1 the null hypothesis has been retained and accordingly as per test result Random Effect Model has been selected.

Further to this, both Autocorrelation and Heteroscedasticity were tested.

Autocorrelation is present when error terms from different time periods or cross-section observations are correlated and occurs when the errors associated with a given time period are carried over into future time periods. Thus autocorrelation occurs when the error term observations in a regression are correlated and the presence of Serial correlation breaks the major assumptions of linear regression, that the residuals are independent and if they are serially correlated, they are not independent where statistical significance of regression coefficients in the model will not be entirely reliable.

Wooldridge Test for autocorrelation in panel data was run where,

*H<sub>0</sub>*: No first-order autocorrelation or Errors are serially uncorrelated

$$F(1, 13) = 1.304$$

$$\text{Prob} > F = 0.2740$$

As p value is  $> 0.1$ , the *H<sub>0</sub>* was retained, where first order autocorrelation was not found to be present in the data.

Heteroscedasticity is present when the standard deviations of a variable are non constant when monitored over a specific amount of time. Modified Wald test for group wise Heteroscedasticity in Fixed Effect Regression Model was run, where,

*H<sub>0</sub>*:  $\sigma^2(i) = \sigma^2$  for all *i*

$$\chi^2(16) = 83802.37$$

$$\text{Prob} > \chi^2 = 0.0000$$

As p value is less than 0.1 the null hypothesis was rejected and it was observed that Heteroscedasticity was present and to remove the same robust standard error has been used and the results of Robust Standard Error are presented along with Fixed Effect and Random Effect Model.

#### **4.8 Software used to analyse Data:**

The study results of Hypothesis Testing for analysing the asset quality have been generated from SPSS 22 and the STATA 12 has been used to procure the results of Regression analysis for studying the determinants of Credit Risk and effect of Credit Risk on performance.

#### **4.9 Summary:**

The 4th Chapter presented the type of data and research methodology that has been used to achieve the three objectives of the study. The chapter presents the description of study area with the help of Banking Structure in India and focusing on developments and transformation in Banking sector in India and presents details on the selection of the sample, criteria adopted to select the sample, Panel data used in the study, structure and type of panel data and the models available to deal with the panel data. Chapter also provides details on different parameters and ratios used to evaluate the quality of assets, determinants of the Credit Risk and the effect of Credit Risk on the Performance. The chapter gives details of different tools and the software used to make analysis of all the three objectives of the study along with detailed explanations on theoretical background on various tools used for data analysis. The comparative test, the Hausman test, the test for autocorrelation and the

test of Heteroscedasticity have been used while analyzing the data and are presented in this chapter.

## CHAPTER 5

### ANALYSIS AND DISCUSSION OF ASSET QUALITY

#### 5.1 Background

As asset quality is an important measure of potential credit risk, it plays a significant role in determining the overall condition and the financial strength of the banking institution. The primary factor affecting overall Asset Quality is the quality of Loan Portfolio appearing in the Bank's Balance Sheet and carries the greatest amount of risk to the capital of the bank. Asset Quality measures the component of NPAs as a percentage of Total Assets. It is an indication of the type of loans advanced by the banks to generate interest income and thereby presents the type of debtors the bank has in its Balance Sheet.

To analyse and evaluate asset quality 1<sup>st</sup> and foremost Descriptive statistics of variable is presented to give an idea of the parameters of the asset quality. The asset quality is analysed by presenting the trend of important asset quality parameters such as GNPA in Rupees Crores, and asset quality ratios such as GNPA to TL, NNPA to NA, LLP to TL, GNPA to TA, NNPA to TA, TI to TA, and Addition of GNPA to Opening GNPA considering the Post Basel II period.

The objective deals with hypothesis testing for asset quality ratios across group of all, Public and Private Banks in Pre and Post Basel II period. Same Asset quality ratios across the ownership have also been tested. The Test

of Normality Histogram was performed to check the normality of data, and the data was found to be not normal and accordingly non parametric, Independent Mann Whitney U Test and Wilcoxon sign Rank Test have been applied to test the six Null Hypothesis.

The analysis and discussion have been presented based on results of the hypothesis and the trend analysis.

## 5.2 Analysis

The analysis of Quality of Assets was carried out as follows

### 5.2.1 Descriptive Statistics

**Table 5.2.1.1 Descriptive Statistics of Asset Quality Ratios of all Banks**

Variables	Observations	Mean	Std. Dev.	Min	Max
Gross Non Performing Assets Ratio ( GNPA to TL)	498	4.45	3.65	0	24.11
Net Non Performing Asset Ratio(NNPA to NA)	572	3.2400	54.40	0.0007	9.09
Loan Loss Provision to Total loans(LLP to TL)	558	0.0442	0.22	-0.0071	3.0469
Gross Non Performing Assets to Total Assets(GNPA to TA)	596	0.0576	0.19	1.65E-06	2.5093
Net Non Performing Asset to Total Assets Ratio(NNPA to TA)	558	0.0215	0.0591	2.78E-06	0.9244
Total Investment to Total Assets (TI to TS)	604	0.3752	0.49	3.01E-07	4.4951
Slippage Ratio (Addition of GNPA to Opening GNPA)	517	0.9207	0.84	0.0047	8.3232

**Source: Annual Reports of Banks under study and the Authors Calculations**

In order to give a brief overview of the data used for 1<sup>st</sup> objective the researcher has presented the above table 5.2.1.1 which contains the descriptive

statistics of variables used to analyse the quality of assets and include GNPA to TL, NNPA to NA, LLP to TL, GNPA to TA, NNPA to Total Assets, TI to TA and AGNPA to OGNPA for 40 Indian Commercial Banks, covering a period of 16 years from 2001 to 2016.

As per the above table number 5.2.1.1 the average GNPA's Ratio, a proxy for credit risk for all the banks on an average stood at 4.45% which means the banks under study couldn't recover 4.45 % on an average from loans advanced to the borrowers. The minimum lowest GNPA % was 0.00 and maximum highest was 24.11. The average of 4.45 is a manageable ratio for the study period because this rate is lower than Basel standard limit of 5%. Besides this the Economic Survey 2017 reveals 10% as acceptable GNPA level.

The mean of Net Non Performing Asset Ratio is 3.24; minimum is 0.0007 and max is 9.09.

The mean of Loan Loss Provision Ratio is 0.044 which is less than the required 2% and 2.5%. The minimum provision is -0.007 and maximum is 3.047.

The average of Gross NPA as an expression of Total Asset is 0.057 and the minimum is 1.65 E and maximum is 2.51.

The mean of Net Non Performing Asset to Total Asset is 0.022, with a minimum of 2.78 E and maximum of 0.92.

The mean of Total Investment to Total Assets is 0.38, minimum is 3.01 and maximum is 4.5%.

The average of Slippage Ratio an expression of Addition to Gross NPAs by Opening GNPA's is 0.92, which means when compared with opening

GNPAs on an average slippage from performing to none performing is by .92, while minimum slippage was 0.005 and maximum was 8.32

**Table 5.2.1.2 Descriptive Statistics of Asset Quality of Public Banks under study**

<b>Variable</b>	<b>Observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Gross Non Performing Assets Ratio	320	4.83	3.68	0.17	24.11
Net Non Performing Asset Ratio	334	0.02	0.09	-0.007	1.37
Loan Loss Provision to Total loans	336	0.42	1.18	0.001	9.09
Gross Non Performing Assets to Total Assets	353	0.04	0.18	1.08E-05	2.50
Net Non Performing Asset to Total Assets Ratio	352	0.02	0.06	2.78E-06	0.92
Total Investment to Total Assets	358	0.44	0.62	0.026	4.49
Slippage Ratio	291	0.83	0.55	0.015	2.86

**Source: Annual Reports of Banks under study and Authors Calculations**

The average of GNPA ratio of a group of Public Banks stood at 4.83, maximum was 24.11, with a minimum of 0.17 and the deviation was @ 3.68. The NNPA averaged at 0.020 and the maximum ratio was 1.37, with a minimum of 0.007 and deviation of 0.09.

The mean of LLP to Total Loans was 0.43, with a maximum 9.09 and minimum of 0.0015.

The ratio of GNPA's to Total assets showed a mean of 0.049, and the maximum stood at 2.5, with a minimum of 0.18 and deviation was @ 0.18. and the ratio of NNPA's to Total Asset is showing a mean of 3.52, deviation of 0.069 with a maximum ratio of 0.92.

The ratio of Total Investments to Total Asset averaged at 0.44, with a maximum of 4.49 and a deviation of 0.62.

Slippage Ratio showed an average mean of 0.8, with a minimum rate of 0.015, maximum of 2.86 and showing a deviation of 0.55.

**Table 5.2.1.3 Descriptive Statistics of Asset Quality Ratios of Private Banks**

<b>Variable</b>	<b>Observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Gross Non Performing Assets Ratio	178	3.76	3.50	0	19
Net Non Performing Asset Ratio	224	0.07	0.32	0.000287	3.0469
Loan Loss Provision to Total loans	236	0.27	1.01	0.0007	7.13
Gross Non Performing Assets to Total Assets	243	0.06	0.21	1.65E-06	2.0735
Net Non Performing Asset to Total Assets Ratio	236	0.01	0.03	8.98E-06	0.3424
Total Investment to Total Assets	246	0.27	0.17	3.01E-07	2.2781
Slippage Ratio	226	1.03	1.10	0.004796	8.3232

**Source: Annual Reports of Banks under study and the Authors Calculations**

Table 5.2.1.3 given above presents Summary Statistic of a group of Private Banks under study with regard to the parameters of asset quality.

The mean of GNPA rate is 3.76, showing a deviation of 3.5 and having minimum rate as 0.00 and highest rate observed was 19.

With regard to NNPA the mean revealed by the table was stood at 0.08, with a deviation of 0.33, and minimum of 0.0002 and maximum of 3.04.

LLP on an average stood at 0.273 with a maximum of 7.13 and deviation of 1.01.

GNPAs to Total Assets averaged at 0.07, showing a deviation of 0.21 and the maximum was 2.07.

The mean of NNPA's to Total Asset was 0.02 and the maximum stood at 0.34.

Total Investment to Total Assets averaged at 0.28 and shows a deviation of 0.18.

Slippage Ratio shows a deviation of 0.11 and an average mean of 1.03.

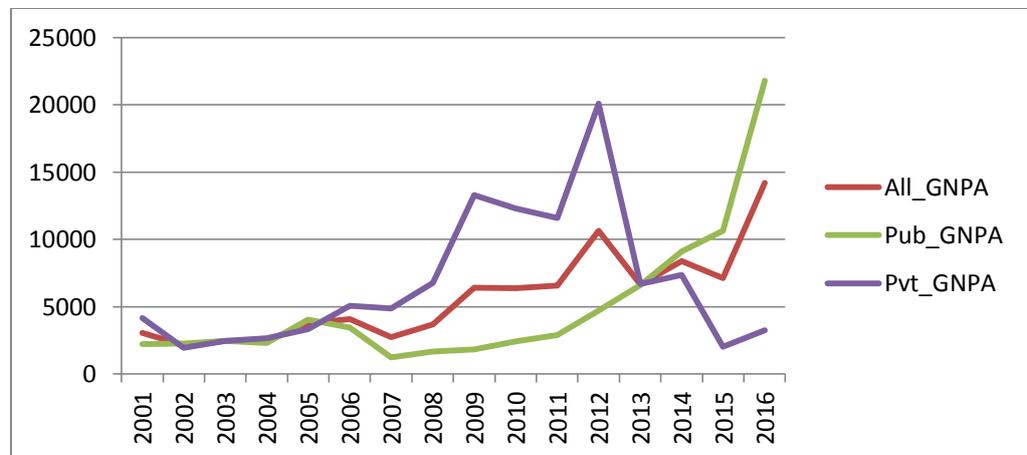
## 5.2.2 Trend Analysis

**Table 5.2.2.1 Trend of Gross NPAs (Rupees in Crores)**

Year	GNPAs of All Banks	GNPAs of Public Banks	GNPAs of Private Banks
2001	3076.984	2232.301	4163.005
2002	2159.057	2284.735	1965.707
2003	2461.98	2458.143	2467.461
2004	2452.286	2299.795	2665.772
2005	3752.937	4055.035	3350.139
2006	4096.389	3446.125	5093.461
2007	2761.715	1243.722	4886.904
2008	3691.179	1676.583	6780.227
2009	6404.558	1813.959	13290.46
2010	6364.65	2407.472	12300.42
2011	6570.847	2914.922	11597.74
2012	10637.51	4723.59	20099.78
2013	6643.411	6617.106	6682.868
2014	8401.409	9092.102	7365.37
2015	7124.923	10668.79	2030.619
2016	14201.21	21814.05	3257.743

Source: Source: Annual Reports of the Banks

**Figure 5.2.2.1 Trend of Gross NPA in Rupees Crores**



The most important indicator of asset quality is the Non Performing Assets. The magnitude of NPAs is one of the drivers of financial risks because their accumulation in the balance sheet of a commercial bank always affects the profitability and solvency of a bank. Therefore the trend of Gross Non Performing Assets in Rupees Crores is presented to show the movement of NPAs in the banks under study according to categories made by the researcher depending upon the purpose of the study, and trend is presented for a group of all, Public and Private Banks.

The trend of GNPA which has been shown in above figure includes the figures of Sub-standard, Doubtful and Loss Assets.

The Figure 5.2.2.1 above shows decreasing trend of GNPA when all 40 banks on an average under study are concerned for the period from 2001 to 2002, again showing increasing trend in 2003 to 06 and there is downward trend for the year 2007, 2008n onwards there is an increase till 2012, and fluctuating trend from 2013 to 2016. So on average it has been showing increasing and decreasing trend.

Same is the case with Public Banks under study, from 2001 to 2004 showing fluctuating trend but with a very marginal amount but in 2005 there is an increase approximately by 82%., after that showing the increasing trend from 2013 and increased approximately 4 times in 2016 when compared with 2013. The increase from 2013 till 2016 is the result of implementation of Basel II norms by the Indian Banks.

The above figure for the period from 2001 to 2004 the private banks are also showing decreasing trend but this is true when compared with the

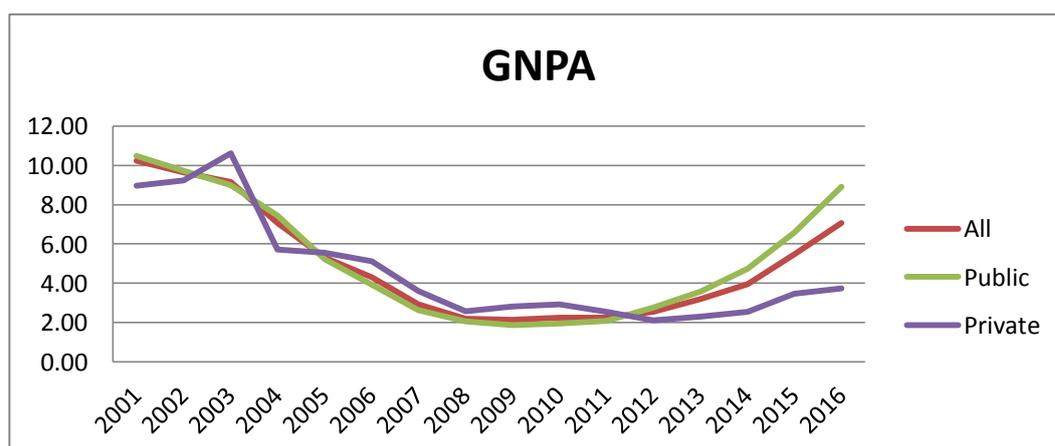
basic year 2001 and 2002 but from 2003 to 2006 it has been showing increasing trend, again in the year 2007 there is decrease and from 2008 to 2012 there is stiff increase and from 2013 to 2016 it shows declining trend, Which means the private sector banks under study have been showing improvement in terms of its quality from 2013. The probable reasons for rise in GNPA's from the year 2009 to 2012 could be because of stringent norms with regard to classification and disclosure, which may not be the new addition but accretion over the years.

**Table: 5.2.2.2 Trend of Ratios of GNPA's to Total Advances**

Year	All	Public	Private
2001	10.24	10.49	8.97
2002	9.63	9.73	9.25
2003	9.16	9.00	10.61
2004	7.08	7.44	5.70
2005	5.32	5.21	5.55
2006	4.31	3.92	5.12
2007	2.93	2.62	3.59
2008	2.20	2.04	2.58
2009	2.15	1.87	2.82
2010	2.26	1.94	2.91
2011	2.24	2.08	2.55
2012	2.55	2.76	2.12
2013	3.19	3.57	2.31
2014	3.95	4.73	2.55
2015	5.48	6.57	3.46
2016	7.07	8.90	3.75

**Source: Annual Reports of the Banks**

**Figure 5.2.2.2 Trends of GNPA's to Total Advances**



The GNPA in terms of percentage is showing decreasing trend in the case of Private Sector Banks when compared with the year 2001 till 2016 which means the Private Sector Banks have performed well in terms of asset quality when compared with the Public Banks. But the year 2003 shows there is an increase by double in comparison to 2001. The latter period depicts decreasing trend even after implementation of Basel II which means prior to and after implementation Basel II Private Banks had proper disclosure norms as a result latter years of requirement of implementation of Basel II norms have not affected the quality of assets of Private Banks. There is increase by 1% in the last 2 years when compared with 2014.

The GNPA in terms of % in the year 2001 of Public Sector Bank was 10.49, though showed decreasing trend, the decrease is ranging between 0.76 and 1 in successive two years. When compared with the base year 2001 it has been showing decreasing trend till the year 2016 but in the last year it is increased to 8.9 when compared with earlier years showing decreasing trend.

There is decreasing trend of GNPA's on an average of all 40 banks taken together. The base year show GNPA's at 10.24 and showing improvement in asset quality till 2009, next three years showing fluctuation marginally and thereafter though not increased so much shows rising trend.

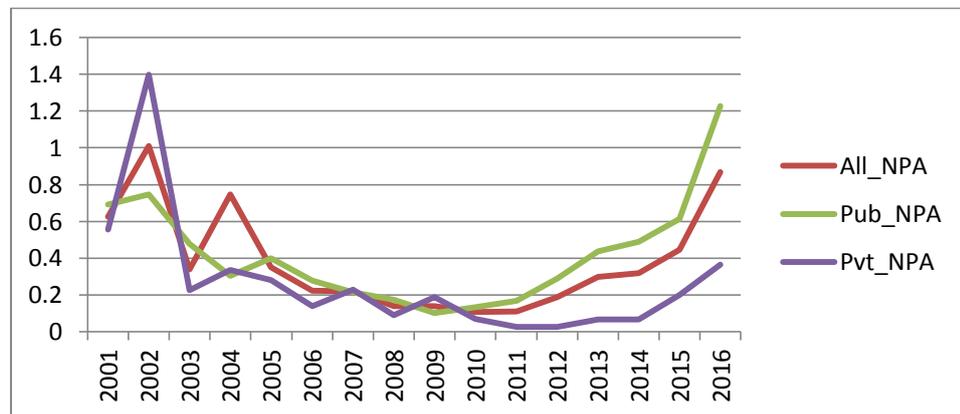
The overall trend of Public and Private Banks show movement in the same direction. If in particular year the figure shows increase for Public Bank and declining rate for Private Banks but after two years one finds reverse situation, giving rise to overall same appearance on an average.

**Table 5.2.2.3 Trend of Ratio of NNPA to Net Advances**

Year	NPA % (All)	NPA % (Public)	NPA % ( Private)
2001	0.6241	0.692357	0.555843
2002	1.010594	0.745658	1.397808
2003	0.338238	0.478479	0.227266
2004	0.747055	0.305054	0.336393
2005	0.350025	0.4004	0.2795
2006	0.223726	0.279422	0.138327
2007	0.220135	0.21441	0.22765
2008	0.139829	0.17273	0.08938
2009	0.139318	0.102959	0.189313
2010	0.107782	0.133317	0.068627
2011	0.109022	0.168852	0.02526
2012	0.189441	0.288535	0.026643
2013	0.299206	0.435805	0.068038
2014	0.317814	0.489755	0.065633
2015	0.446062	0.614782	0.198607
2016	0.866922	1.225862	0.364407

Source: Annual Reports of the Bank

**Figure 5.2.2.3 Trend of NNPA to Net Advances**



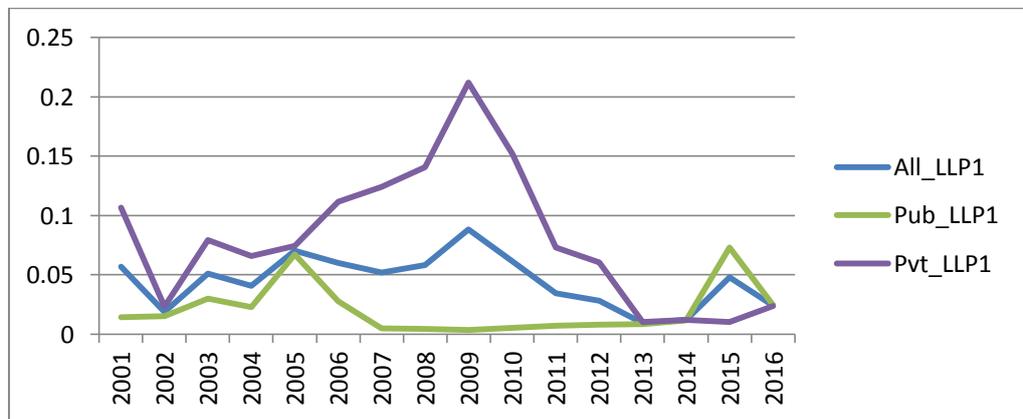
The rate of NNPA indicates that asset quality from which the required loan loss provisions have been deducted which enables to know exact position of quality performance of banks. Banks make provision from time to time for likely losses.

The rate of NNPA of Private sector bank has been showing declining trend and the thing to be noted is that the rate is less than 1% in all the years except in the initial phase in the year 2002 when it was 1.4.

The rate of NNPA of Public Banks under study when compared with the performance of Private Banks it is more which means quality performance of NNPA ratio of Private is better than Public. Overall there is fluctuation over the years but in the year 2016 there is gone up to 1.23%.

The trend of NNPA ratio of 40 banks taken together show a fluctuating trend over the years but the above figure does not show very high rise in the rate. Only the year 2002 reveals 1% rate.

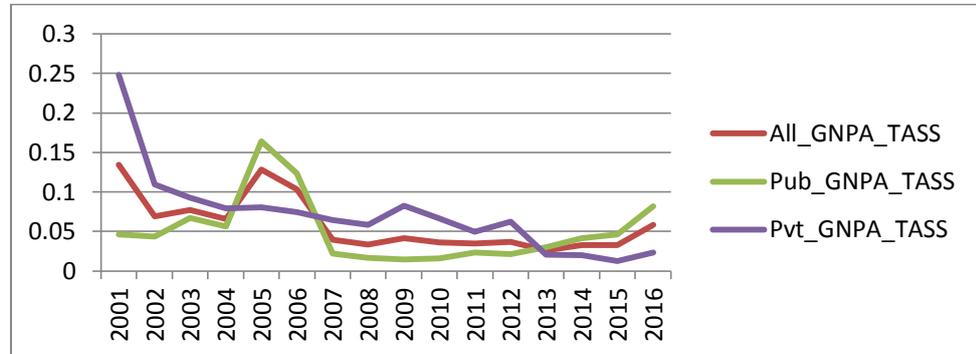
**Figure No.: 5.2.2.4 Trend of Loan Loss Provision to Total Loans**



Overall trend of Loan Loss Provision to Total Loans ratio shows that provision has been made very marginally whether it is group of Public Banks or Private Banks under study. In almost all cases the ratio is less than 1%.

When this is compared with the GNPA's ratio, this ratio of GNPA's is quite significant for Public, Private and all 40 banks when taken together.

**Figure 5.2.2.5 Trend of Ratio of GNPA's to Total Assets**

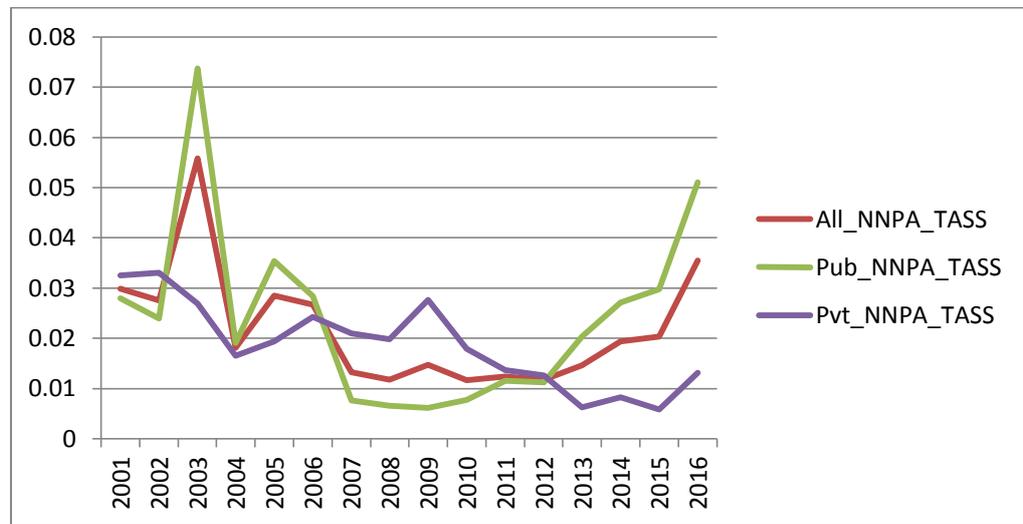


The table 5.2.2.5 shows overall a declining trend of GNPA's to Total Asset for all 40 banks together from the year 2001 to 2016 and in the last year of period under study the rate is 0.057985.

The public banks under study also show declining trend but in third and 4<sup>th</sup> year there is rise in this ratio and again a declining trend but in last year there is a rise.

The trend of this ratio for Private bank is continuously showing a declining trend which means GNPA as an expression to Total Assets is showing improvement and even after the implementation of Basel II it shows a declining trend.

**Figure 5.2.2.6 Trend of Ratio of NNPA's to Total Assts**

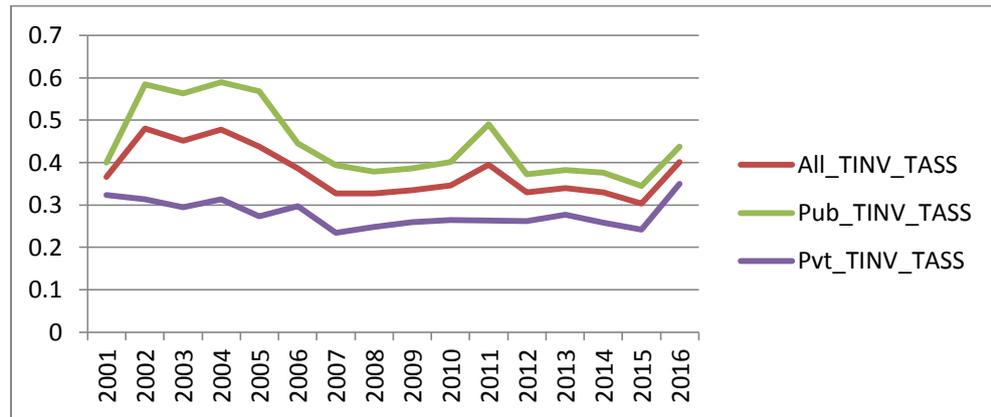


The ratio of Net NPA to Total Assets as revealed by table 5.2.2.6 for a group of Private Banks under study shows a declining trend and there is fluctuation in the ratio as well. Overall fall in the ratio show improvement in the quality.

While the trend of a group of Public banks also more or less show the same picture of decline over the years and also there is fluctuation as a result more or less show same picture.

The 40 commercial banks on an average also has resulted in similar trend, there is decline and minimal fluctuation.

**Figure 5.2.2.7 Trend of Ratio of Total Investment to Total Assets**



The ratio of Total Investment to Total Assets as revealed by the above table 5.2.2.7 is high for Public banks in all the years from 2001 to 2016 compared to Private Bank, which means that the Public Banks on an average have made distribution of their generated funds more in investment other than granting of loans and advances showing more preference towards investments than the NPAs rising from granting loans and likely default, thereby safeguarding their interest. At the same time it is also showing fluctuations in the ratio and in the latter period though this ratio is declining for Public Banks still it is more than Private Banks.

The Private Banks under study have kept this ratio at low compared to Public, though there is fluctuation in between the period under study but overall it has been maintained low which implies that along with distribution of funds in investments which is not a core function of banks Private Banks have been performing their major role in performing the core function of lending. Only the latest year shows marginal rise in this ratio.

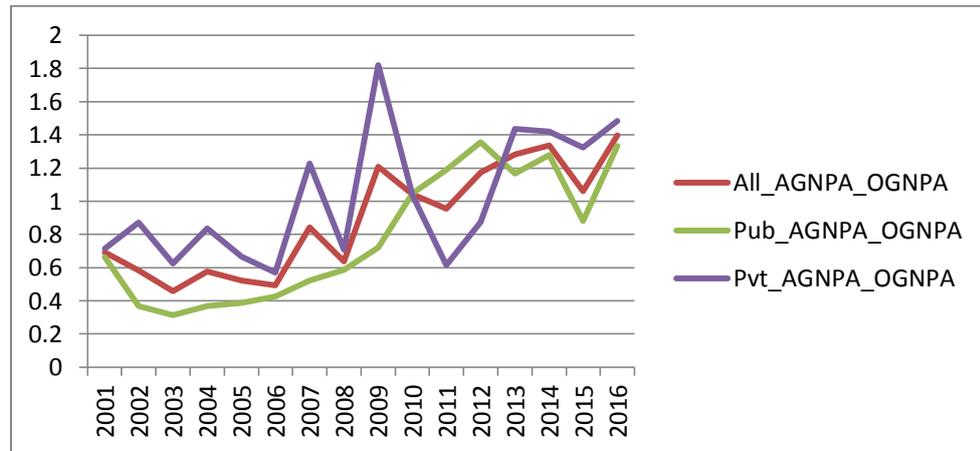
The rate of the ratio as disclosed by the table overall from 2001 to 2006 has been showing a rise from 0.36 to 0.38 but in 2007 there is marginal reduction when compared with the base year 2001 till 2010, then the ratio show fluctuation for further four years and again rise in the latest year 2016 @ 4.0

**Table 5.2.2.4 Slippage Ratio**

<b>Year</b>	<b>Addition to GNPA to Opening GNPA (All)</b>	<b>Addition to GNPA to Opening GNPA (Public)</b>	<b>Addition to GNPA to Opening GNPA (Private)</b>
2001	0.690772	0.661852	0.714872
2002	0.583552	0.367974	0.87099
2003	0.458032	0.314133	0.625914
2004	0.575888	0.366699	0.837373
2005	0.523062	0.38874	0.666338
2006	0.492966	0.424555	0.570497
2007	0.842054	0.522189	1.225892
2008	0.639001	0.585412	0.706881
2009	1.209088	0.72012	1.820297
2010	1.041968	1.047408	1.03399
2011	0.954005	1.19014	0.616671
2012	1.172031	1.355472	0.875702
2013	1.281889	1.167225	1.434775
2014	1.336839	1.277127	1.420434
2015	1.061354	0.88219	1.324128
2016	1.397933	1.332772	1.484815

**Source: Annual Reports of the Banks**

**Figure 5.2.2.8 Trend of Slippage Ratio**



A look into the Slippage ratio of Public Banks has been showing declining trend when compared with the base year 2001 up to 2008 and from 2009 onwards there is rise in slippage ratio till 2014 and in the year 2015 it is showing a decline and in the year 2016 there is rise in slippage ratio. Overall there is a fluctuation in the slippage ratio. Slippage as shown by the figure and table is more in the post implementation of Basel II norms due to disclosure norms on asset classification.

As far as slippage of Private Banks is concerned it is more inclined compared to Public Banks as in all years the rate of slippage is more for Private Banks compared to public Banks. In the year 2002, 2004, 2007 and 2009 then fluctuating trend up to 2012, further showing increase in 2013 and marginal decrease in 2014 and 2015 and increased to 1.48% in 2016. When compared with 2001 slippage is doubled in the year 2016.

Slippage ratio on an average of 40 banks under study is showing fluctuating trend up to 2006 and after that showing increasing trend till 2016 when compared with the year 2001. There is rise approximately by double.

On an average the result reveals that slippage ratio is more for private banks compared to public, which means as lower slippage ratio of Public banks show better quality of assts.

### 5.2.3 Testing of Hypotheses

**Table 5.2.3.1 Results of Hypothesis Testing across a group of all Banks Prior to and Post implementation of Basel II Norms in India**

**A) The ratio of Gross Non Performing Assets to Gross Loans across all Banks**

Hypothesis	Test	Significance	Decision
i) <b>H<sub>0</sub></b> ) There is no significant difference between the ratio of Gross Non Performing Assets to Gross Loans across all Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As per the results of Wilcoxon Sign Rank Test given in table 5.2.3.1 covering sub tables A to E , six asset quality ratios have been used to evaluate the quality of Assets across a group of all 40 Banks prior to and post implementation of Basel II Norms in Banks in India.

The result of Wilcoxon Sign Rank Test for Null hypothesis for the ratio of Gross Non Performing Assets to Gross Loans in the pre and post Basel II period as displayed in (A) above shows that the ratio is significant at 0.000% level of significance. The difference in this ratios prior to and post implementation of Basel II norms is found to be statistically significant as the

$p$  value is less than 0.05, there by rejecting the null hypothesis. Thus the study concludes that there was a statistical difference in the ratio of Gross Non Performing Assets to Gross Loans in the pre and post Basel II period and both period show different asset quality.

**B) The ratio of the ratio of Net Non Performing Assets to Net Advances across all Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
ii) <b>Ho)</b> There is no significant difference between the ratio of the ratio of Net Non Performing Assets to Net Advances across all Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The ratio of asset quality Net Non Performing Assets to Net Advances for the tested hypothesis is significant at 0.000% level of significance as depicted by above table (B). The difference in the ratio of Net Non Performing Assets to Net Advances prior to and post implementation of Basel II norms is found to be statistically significant as the  $p$  value is less than 0.05, as a result the null hypothesis has been rejected. The study concludes that this ratio of asset quality was different in the pre and post implementation of Basel II norms in India.

**C) The ratio of Loan Loss Provision to Total Loan across all Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>iii) Ho:</b> There is no significant difference between the ratio of Loan Loss Provision to Total Loan across all Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.050	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The result of Wilcoxon Sign Rank Test for point (C) finds that the ratio of LLP to Total Loan is significant at 0.050 % level of significance. When p value is up to 0.05% the null hypothesis can be rejected and as a result the null hypothesis has been rejected and the researcher conclude that there is significant difference in the asset quality in the pre and post Basel II period when asset quality is evaluated considering the ratio of LLP to Total Loans.

**D) The ratio of Gross Non Performing Assets to Total Assets across all Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>iv) Ho:</b> There is no significant difference between the ratio of Gross Non Performing Assets to Total Assets across all Banks Prior to and post implementation of Basel II norms in India	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The another ratio of asset quality Gross Non Performing Assets to Total Assets for the tested hypothesis is found significant at 0.000% level of significance as shown by above table (D) and the difference in this ratio prior to and post implementation of Basel II norms is found to be statistically significant being  $p$  value less than 0.05. Thus the study rejects the null hypothesis and conclude that the ratio of Gross Non Performing Assets to Total Assets was different across a group of all banks prior to and post implementation of Basel II norms in Indian Banks.

**E) The ratio of Net Non Performing Assets to Total Assets across all Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
v) <b>Ho:</b> There is no significant difference between the ratio of Net Non Performing Assets to Total Assets across all Banks Prior to and post implementation of Basel II norms in India	Wilcoxon Sign Rank Test	.059	Retain the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The result of Wilcoxon Sign Rank Test for the asset quality ratio NNPA's to Total Assets across a group of all banks show that the  $p$  value being greater than 5% level of significance is not found to be statistically significant. Thus the researcher has failed to reject the null hypothesis, and conclude that the ratio of NNPA's to Total Assets asset was not different during pre and post Basel II period and the asset quality across group of all banks with regard to this ratio was the same.

#### F) The ratio of Total investment to Total Asset across all Banks

Hypothesis	Test	Significance	Decision
vi) <b>Ho:</b> There is no significant difference between the ratio of Total investment to Total Asset across all Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The sixth asset quality ratio which is tested for the hypothesis is the ratio of Total investment to Total Asset and the ratio is found to be significant at 0.000% level of significance as revealed by table (E). The difference in this ratio prior to and post implementation of Basel II norms was found to be statistically significant being  $p$  value less than 0.05. Thus the study rejects the null hypothesis and conclude that the ratio of Total investment to Total Asset was different across a group of all banks prior to and post implementation of Basel II norms in Indian Banks

#### Discussion

Thus the most important asset quality indicators GNPA's ratios, NNPA's ratio, GNPA's to Total Assets, LLP to LN, and Total Investment to Total Assets across all the banks in the pre and post Basel II period were found to be significant at 5% level of significance, there by rejecting the five null hypotheses. As far as these five assets quality ratios under study are considered these ratios were found to be different across the group of all banks thereby presenting different asset quality in the pre and post Basel II period.

As far as one ratio of asset quality is concerned the, the ratio of Net Non Performing Assets to Total Assets, the ratio was not found to be significant, where the study has retained the null hypothesis and conclude that this ratio was same across a group of all Banks in the pre and post Basel Period and asset quality with reference to this particular proxy for Credit Risk was the same.

**Table 5.2.3.2 Results of Hypothesis testing across a group of Private Banks Prior to and Post implementation of Basel II Norms in India.**

**A) The ratio of Gross Non Performing Assets to Gross Loans across a group of Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
i) <b>Ho:</b> There is no significant difference between the ratio of Gross Non Performing Assets to Gross Loans across a group of Private Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The Hypothesis results as depicted by the Table No. 5.2.3.2 (A to F) presents the six asset quality ratios which have been used to test the asset quality across a group of Private Banks during pre and post Basel II norms in Indian Banks.

The result of Wilcoxon Sign Rank Test for asset quality ratio, the Gross Non Performing Assets to Gross Loans of a group of Private Banks was found

to be statistically significant at 5% level of significance level. The p value being less than 0.05% the null hypothesis has been rejected. The study concludes that the asset quality ratio, the Gross Non Performing Assets to Gross Loans of a group of Private Banks was different in pre and post period and accordingly a group of Private Banks had different asset quality prior to post Basel II period.

**B) The ratio the Net Non Performing Assets to Net Advances across a group of Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>ii) Ho:</b> There is no significant difference between the ratio the Net Non Performing Assets to Net Advances across a group of Private Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The result of Wilcoxon Sign Rank Test as depicted by above table (B) for asset quality ratio, the Net Non Performing Assets to Net Advances across a group of Private Banks was found to be statistically significant at 5% level of significance level. The p value being less than 0.05% the null hypothesis has been rejected. The study concludes that the asset quality ratio, the Net Non Performing Assets to Net Advances of a group of Private Banks was different in pre and post period and accordingly a group of Private Banks had different asset quality prior to post Basel II period.

**C) The ratio of Loan Loss Provision to Total Loans across a group of Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>iii) Ho:</b> There is no significant difference between the ratio of Loan Loss Provision to Total Loans across a group of Private Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	0.061	Retain the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As revealed by the results of Wilcoxon Sign Rank Test in above table (C) the ratio of Loan Loss Provision to Total Loans was not found to be significant. The *p* value was 0.061 which is more than the significance level of 5%, thereby resulting in retaining of Null hypothesis. To conclude there was no difference in this asset quality ratio across a group of Private Banks in pre and post Basel II period.

**D) The ratio of Gross Non Performing Assets to Total Assets across a group of Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>iv) Ho)</b> There is no significant difference between the ratio of Gross Non Performing Assets to Total Assets across a group of Private Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The result of Wilcoxon Sign Rank Test for asset quality ratio of Gross Non Performing Assets to Total Assets was found to be statistically significant at 5% level of significance level. The p value being less than 0.05% the null hypothesis has been rejected. The study concludes that the asset quality of a group of Private Banks with reference to the ratio of Gross Non Performing Assets to Total Assets was different in pre and post period.

**E) The ratio of Net Non Performing Assets to Total Assets across a group Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
v) <b>H<sub>0</sub></b> ) There is no significant difference between the ratio of Net Non Performing Assets to Total Assets across a group Private Banks Prior to and post implementation of Basel II norms in India	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The result of Wilcoxon Sign Rank Test for asset quality ratio of Net Non Performing Assets to Total Assets across a group of Private Banks was found to be statistically significant at 5% level of significance level. The p value being less than 0.05% the null hypothesis has been rejected. The study concludes that the asset quality ratio, the Net Non Performing Assets to Total Assets of a group of Private Banks was different in pre and post period and accordingly a group of Private Banks had different asset quality prior to post Basel II period.

**F) The ratio of Total investment to Total Asset across a group of Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>vi) Ho)</b> There is no significant difference between the ratio of Total investment to Total Asset across a group of Private Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The result of Wilcoxon Sign Rank Test for asset quality ratio of Total investment to Total Asset across a group of Private Banks was found to be statistically significant at 5% level of significance. The p value being less than 0.05% the null hypothesis has been rejected. The study concludes that the asset quality ratio Total investment to Total Asset of a group of Private Banks was different in pre and post period.

**Discussion**

Out of six Null Hypotheses, the results of hypotheses related to five asset quality ratios have found to be statistically significant and accordingly have been rejected, as the difference in these ratios across a group of Private Banks was found to be statistically significant at 5% significance level.

The difference in the ratio of Gross Non Performing Assets to Gross Loans, the ratio of Net Non Performing Assets to Net Advances, the ratio of Gross Non Performing Assets to Total Assets , Net Non Performing Assets to

Total Assets ,and the ratio of Total investment to Total Assets were statistically significant, the  $p$  value = 0.000, accordingly the same has been rejected and implies difference in these asset quality on account of these five ratios of Private Banks prior to and post implementation of Basel II norms.

On the contrary the ratio of Loan Loss Provision to Total Loans was not significant as the  $p$  value was equal to 0.061, more than the significance level of 5%, resulting in retaining of Null hypothesis, where the quality with reference to this ratio prior to and post Basel II didn't show any difference in this asset quality ratio.

**Table 5.2.3.3 Results of Hypothesis Testing across a group of Public Banks Prior to and Post implementation of Basel II Norms in India.**

**A) The ratio of Gross Non Performing Assets to Gross Loans across a group of Public Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>1)Ho</b> There is no significant difference between the ratio of Gross Non Performing Assets to Gross Loans across a group of Public Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.045	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The Hypothesis results as depicted by the Table No. 5.2.3.3 (A to F) presents the six asset quality ratios which have been used to test the asset quality across a group of Public Banks during the period prior to and post implementation of Basel II norms in Indian Banks.

The result of Wilcoxon Sign Rank Test for asset quality ratio, the Gross Non Performing Assets to Gross Loans of a group of Private Banks was found to be statistically significant at 5% level of significance level. The p value .045 being less than the level of significance of 0.05% the null hypothesis has been rejected. The study concludes that the asset quality ratio, the Gross Non Performing Assets to Gross Loans of a group of Public Banks was different in pre and post period and accordingly a group of Public Banks had different asset quality prior to post Basel II period.

**B) The ratio of Net Non Performing Assets to Net Advances across a group of Public Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
ii) <b>H<sub>0</sub></b> There is no significant difference between the ratio of Net Non Performing Assets to Net Advances across a group of Public Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.185	Retain the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As revealed by the results of Wilcoxon Sign Rank Test in above table (B) the ratio of Net Non Performing Assets to Net Advances across a group of Public Banks was not found to be significant. The *p* value was 0.185 which is more than the significance level of 5%, thereby the Null hypothesis has been retained. To conclude there was no difference in the asset quality as the ratio of Net Non Performing Assets to Net Advances of a Public Banks across a group of Public Banks in pre and post Basel II period was found to be insignificant

**C) The ratio of Loan Loss Provision to Total Loans across a group of Public Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
iii) <b>H<sub>0</sub></b> There is no significant difference between the ratio of Loan Loss Provision to Total Loans across a group of Public Banks Prior to and post implementation of Basel II Norms in India.	Wilcoxon Sign Rank Test	.431	Retain the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As revealed by the results of Wilcoxon Sign Rank Test in above table (C) the ratio of Loan Loss Provision to Total Loans across a group of Public Banks was not found to be significant. The *p* value was 0.431 which is more than the significance level of 5%; thereby the Null hypothesis has been retained. To conclude there was no difference in the asset quality as the ratio of a Loan Loss Provision to Total Loans across a group of Public Banks in pre and post Basel II period was found to be insignificant.

**D) The ratio of Gross Non Performing Assets to Total Assets across a group of Public Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
iv) <b>H<sub>0</sub></b> There is no significant difference between the ratio of Gross Non Performing Assets to Total Assets across a group of Public Banks Prior to and post implementation of Basel II norms in India.	Wilcoxon Sign Rank Test	.550	Retain the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As revealed by the results of Wilcoxon Sign Rank Test in above table (D) the ratio of Gross Non Performing Assets to Total Assets across a group of Public Banks was not found to be significant. The *p* value was found at 0.550 which is more than the significance level of 5%, resulting in retaining of the Null hypothesis. To conclude there was no difference in the asset quality as the ratio of Gross Non Performing to Total Assets across a group of Public Banks in pre and post Basel II period was found to be insignificant

**E) The ratio of Net Non Performing Assets to Total Assets across a group of Public Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
v) <b>H<sub>0</sub></b> : There is no significant difference between the ratio of Net Non Performing Assets to Total Assets across a group of Public Banks Prior to and post implementation of Basel II norms in India	Wilcoxon Sign Rank Test	.167	Retain the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As revealed by the results of Wilcoxon Sign Rank Test in above table (E) the ratio of Net Non Performing Assets to Total Assets across a group of Public Banks was not found to be significant. The *p* value was 0.167 which is more than the significance level of 5%, thereby the Null hypothesis has been retained. To conclude there was no difference in the asset quality as the ratio of Net Non Performing Assets to Total Assets across a group of Public Banks in pre and post Basel II period was found to be insignificant.

**F) The ratio of Total investment to Total Asset across a group of Public Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
vi) <b>H<sub>0</sub></b> There is no significant difference between the ratio the ratio of Total investment to Total Asset across a group of Public Banks Prior to and post Implementation of Basel II Norms in India.	Wilcoxon Sign Rank Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The result of Wilcoxon Sign Rank Test for asset quality ratio, the ratio of Total investment to Total Asset across a group of Public Banks was found to be statistically significant at 5% level of significance level. The p value .000 being less than the level of significance of 0.05% the null hypothesis has been rejected. The study concludes that the asset quality ratio, the ratio of Total investment to Total Asset across a group of Public Banks was different in pre and post period and accordingly a group of Public Banks had different asset quality prior to post Basel II period.

**Discussion**

Out of six asset quality ratios across a group of Public banks prior to and post implementation of Basel II norms in India, only two asset quality ratios viz., the ratio of GNPA to Total Loans and Total Investment to Total Asset have reached the level of significance where the null hypothesis for both

these ratios have been rejected with a confidence level of 95% and the researcher arrives to the conclusion that there was difference in the Total Investment to Total Asset ratio and GNPA Ratio across Public banks in pre and post Basel II period and as a result the asset quality in the pre and post Basel II was not the same .

The four asset quality ratios viz., the Net Non Performing Assets to Net Advances, the Loan Loss Provision to Total Loans, the Gross Non Performing Assets to Total Assets and the Net Non Performing Assets to Total Assets were not found to be significant, as a result for these four ratios the asset quality across a group of Public Banks was the same in pre and post Basel II period.

**Table 5.2.3.4 Results of Independent Samples Mann Whitney U Test across Categories of Ownership**

**A) The ratio of Gross Non Performing Assets to Gross Loans across a group of Public and Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
1)Ho There is no significant difference in the ratio of Gross Non Performing Assets to Gross Loans across a group of Public and Private Banks	Independent Samples Mann Whitney U Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

The table 5.2.3.4 (A-F) above presents the result of Independent Samples Mann Whitney U Test and under this a comparison is made across ownership between the asset quality ratios of a group of Public and Private Banks to test

whether the average quality performance over a period of 16 years from 2001 to 2016 is the same across the ownership.

The same six asset quality ratios have been used and hypotheses have been tested by applying the non parametric Independent Samples Mann Whitney U test.

As depicted by above table 5.13 (A) the difference in the ratio of GNPA to TL has been found to be statistically significant at 5% level of significance, where the  $p$  value = 0.000 whereby the null hypothesis has been rejected to conclude that across ownership the asset quality ratio of GNPA's to TL was different over a period of 16 years and the private and Public Banks had different asset quality.

**B) The ratio of Net Non Performing Assets to Net Advances across a group of Public and Private Banks**

Hypothesis	Test	Significance	Decision
2)H <sub>0</sub> There is no significant difference in the ratio of Net Non Performing Assets to Net Advances across a group of Public and Private Banks	Independent Samples Mann Whitney U Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As depicted by above table 5.2.3.4 (B) the difference in the ratio of NNPA to NA has been found to be statistically significant at 5% level of significance, where the  $p$  value = 0.000 whereby the null hypothesis has been rejected to conclude that across ownership the asset quality ratio of NNPA's to NA was different over a period of 16 years and the private and Public Banks had different asset quality.

**C) The ratio of Loan Loss Provision to Total Loans across a group of Public and Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>3)Ho</b> There is no significant difference in the ratio of Loan Loss Provision to Total Loans across a group of Public and Private Banks	Independent Samples Mann Whitney U Test	.720	Retain the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As depicted by above table 5.2.3.4 (C) the difference in the ratio of LLP to TL has been found to be statistically not significant at 5% level of significance, where the  $p$  value = 0.720 whereby the null hypothesis has been retained to conclude that across ownership the asset quality ratio of LLP to TL was not different over a period of 16 years and the private and Public Banks had same and equal asset quality.

**D) The ratio of Gross Non Performing Assets to Total Assets across a group of Public and Private Banks**

<b>Hypothesis</b>	<b>Test</b>	<b>Significance</b>	<b>Decision</b>
<b>4)Ho</b> There is no difference in the ratio of Gross Non Performing Assets to Total Assets across a group of Public and Private Banks	Independent Samples Mann Whitney U Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As depicted by above table 5.2.3.4 (D) the difference in the ratio of GNPA to TA has been found to be statistically significant at 5% level of significance, where the  $p$  value = 0.000 whereby the null hypothesis has been rejected to conclude that across ownership the asset quality ratio of GNPA to

TA was different over a period of 16 years and the private and Public Banks had different asset quality.

**E) The ratio of Net Non Performing Assets to Total Assets across a group of Public and Private Banks**

Hypothesis	Test	Significance	Decision
5)H <sub>0</sub> There is no difference in the ratio of Net Non Performing Assets to Total Assets across a group of Public and Private Banks	Independent Samples Mann Whitney U Test	.000	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As depicted by above table 5.2.3.4 (E) the difference in the ratio of NNPA to TA has been found to be statistically significant at 5% level of significance, where the  $p$  value = 0.000 whereby the null hypothesis has been rejected to conclude that across ownership the asset quality ratio of NNPA to TA was different over a period of 16 years and the private and Public Banks had different asset quality.

**F) The ratio of Total Investment to Total Asset across a group of Public and Private Banks**

Hypothesis	Test	Significance	Decision
6)H <sub>0</sub> There is no difference in the ratio of Total investment to Total Asset across a group of Public and Private Banks	Independent Samples Mann Whitney U Test	.018	Reject the Null Hypothesis

**Source: Annual Reports of Public and Private Banks under study and the output generated from SPSS 22**

As depicted by above table 5.2.3.4 (F) the difference in the ratio of TI to TA has been found to be statistically significant at 5% level of significance, where the  $p$  value = 0.018 whereby the null hypothesis has been rejected to conclude that across ownership the asset quality ratio of TI to TA was different over a period of 16 years and the private and Public Banks had different asset quality.

#### 5.2.4 Discussion

**Table 5.2.4.1 Summary of Results of Asset Quality Ratios across a group of Commercial, Private and Public Banks prior to and post Basel II Norms based on Wilcoxon Sign Rank Test**

Sr. No.	Ratios	Significant Ratios			Insignificant Ratios		
		All	Private	Public	All	Private	Public
1.	GNPA to GL	✓	✓	✓	-	-	-
2.	NNPA to NA	✓	✓	-	-	-	✓
3.	LLP to TL	✓	-	-	-	✓	✓
4.	GNPA to TA	✓	✓	-	-	-	✓
5.	NNPA to TA	-	✓	-	✓	-	✓
6.	TI to TA	✓	✓	✓	-	-	-

Source: Authors deductions based on Wilcoxon Sign Rank Test Results from Table 5.9 (A- F), 5.10 (A-F) and 5.11(A-F)

## **A) Discussion on Asset Quality Ratios across a group of All, Private and Public Banks prior to and post Basel II Norms based on Wilcoxon Sign Rank Test**

The current research work by the researcher has considered six assets quality ratios to evaluate the quality of assets across the group of All, Private and Public banks under study and presents the summary of the results of Wilcoxon Sign Rank Test.

### **Significant Results**

The 1<sup>st</sup> ratio used in the study was the GNPA to GL and the ratio is significant for a group of All, Private and Public Banks indicating difference in asset quality across a group of all 40 banks under study, a group of 16 Private Banks and a group of 24 Public Banks in pre and post Basel II period.

The 2<sup>nd</sup> ratio used in the study is the NNPA to NA and the ratio was significant for a group of All 40 Banks and a group of 16 Private Banks indicating difference in asset quality of only two groups viz., All Banks and 16 Private Banks in pre and post Basel Period.

The 3<sup>rd</sup> ratio LLP to TL was significant only for one group consisting of All 40 Banks together indicating difference in asset quality of an entire group in pre and post Basel II period.

The 4<sup>th</sup> ratio GNPA to TA was significant for a group of all and Private Banks indicating that the quality of assets was different across a group of all and a group of Private Banks in pre and post Basel II period.

The 5<sup>th</sup> ratio NNPA to TA was found significant only for a group of Private Banks indicating difference in asset quality across a group of Private Banks in pre and post Basel II period.

The 6<sup>th</sup> ratio used in the study to evaluate the quality was TI to TA and the ratio was found to be significant for all three groups: a group of All, Public and Private Banks indicating difference in quality across all three groups in pre and post Basel II period.

Thus the two ratios the ratio of GNPA to TL and TI to TA were significant for all three groups considered under study.

### **Insignificant Results**

The 2<sup>nd</sup> ratio used in the study was the NNPA to NA and the ratio was found to be insignificant for a group of 24 Public Banks indicating no difference in asset quality across a group of Public Banks in pre and post Basel Period.

The 3<sup>rd</sup> ratio LLP to TL was insignificant for two groups consisting of Private and Public Banks indicating no difference in asset quality across a Private and Public group in pre and post Basel II period.

The 4<sup>th</sup> ratio GNPA to TA was insignificant for a group of Public Banks indicating that the quality of assets was not different across a group of Public Banks in pre and post Basel II period.

The 5<sup>th</sup> ratio NNPA to TA was found to be insignificant for two groups' viz., a group of all and Public Banks indicating no difference in asset quality across a group of Public and All Banks in pre and post Basel II period.

Thus out of all four insignificant results all four ratios were insignificant for a group of Public Banks viz. the NNPA to NA, LLP to TL, GNPA to TA and NNPA to TA indicating same or equal asset quality in pre and post Basel II period, not showing any difference in post Basel II period. But for a Private group only one ratio is insignificant i.e. the ratio of LLP to TL and for a group of all Banks taken together the ratio of NNPA to TA was found to be insignificant indicating no difference in asset quality.

**Table 5.2.4.2 Summary of Asset Quality Ratios across ownership using Independent Samples Mann Whitney U Test.**

<b>Sr. No.</b>	<b>Ratio</b>	<b>Significant Ratios</b>	<b>Insignificant Ratios</b>
<b>1.</b>	<b>GNPA to GL</b>	✓	-
<b>2.</b>	<b>NNPA to NA</b>	✓	
<b>3</b>	<b>LLP to TL</b>	-	✓
<b>4.</b>	<b>GNPA to TA</b>	✓	-
<b>5.</b>	<b>NNPA to TA</b>	✓	-
<b>6.</b>	<b>TI to TA</b>	✓	-

**Source: Authors deductions from Table No. 13(A-F)**

## **B) Discussion of Asset Quality Ratio across Ownership using Independent Samples Mann Whitney U Test.**

### **Significant Results**

Based on the above table 5.2.4.2 deduced from table 5.13 (A-F) the compiled results have been presented as follows.

Out of all together six asset quality ratios five ratios were found to be statistically significance and thereby the null hypotheses have been rejected. The difference in the ratio of GNPA's, the ratio of NNPA's, the ratio of GNPA's to Total Asset, the ratio of NNPA's to Total Asset and the ratio of Total investment to Total Asset have been found to be statistically significant at 5% significance level as a result it is concluded that asset quality across ownership of Public and Private Banks was different on an average over a period of 16 years.

### **Insignificant Results**

The ratio of Loan Loss Provision to Total Loans was not found to be significant and accordingly null hypothesis has been retained to conclude that the ratio Loan Loss Provision to Total Loans was the same across the categories of ownership between public and private banks over a period of 16 years and the asset quality as represented by this ratio.

### 5.3 Summary

An Asset quality which is a measure of the total risk tied to assets owned by an individual or a corporate body is a terminology very common in the banking industry and involves determination of the value of assets at risk to know the amount of provision to be made to make for loan losses.

The asset quality comprises credit risk related to the loan and investment and therefore the chapter has dealt with the assessment and analysis of asset quality with the help of six asset quality ratios by way of trend analysis and hypothesis have been tested whether these ratios were different bank group wise during pre and post implementation of Basel II in Indian Commercial Banks and also across ownership over the years by applying non parametric Wilcoxon Sign Rank Test and Independent Mann Whitney U Test respectively, where the results have deferred according to the groups and the ownership categories. The ratio of GNPA to TL and Total Investments to Total Assets were found to be significant for all three groups under study viz., all, Private and a Public Banks as depicted by Wilcoxon Sign Rank Test. Similarly trend of different ratios more or less shows the same results in the period prior to and post implementation Basel II norms in Indian Banks.

## **CHAPTER VI**

### **ANALYSIS AND DISCUSSION ON DETERMINANTS OF CREDIT RISK**

#### **6.1 Background**

The earlier chapter presented the analysis and discussion on quality of assets using trend analysis of different asset quality ratios in the period prior to and post implementation of Basel II norms in Indian Banks. Hypotheses were tested to assess asset quality across different groups.

After analyzing the quality of the assets of the banks the need arises to know the causes or factors influencing and determining the credit risk to know reasons for mounting NPAs and this chapter deals with the same and accordingly uses the ratio of GNPA's to Total Loans as a proxy to measure the Credit Risk.

Independent variables used in the study include two types of factors viz., Macroeconomic and Bank Specific. Study has used five Macroeconomic factors the GDP, Exchange Rate, Interest Rate, Inflation and Unemployment Rate. The Bank Specific factors include Credit Growth, Operating Efficiency, CAR, Loan Loss Provision and Size represented by Total Assets. Two dummy variables have been used in viz., Ownership Structure taking the value of 0 for Public Banks and 1 for Private Banks and Basel II period taking value as 1 for post Basel period and 0 for pre Basel II period.

Multiple Regression has been applied to study the determinants of Credit Risk across the group of all, Private and Public Banks separately considering both Macroeconomic and Bank specific factors together , considering only Bank specific and Macroeconomic factors without dummy for Basel II. Beside this dummy variable for Basel II is included and a group of all 40 banks are studied to find the influence of Basel II period on the determinants to influence Credit Risks.

Hausman test was applied to make a choice between Fixed Effect and Random effect Model. The results of the test show Fixed Effect Model. Both autocorrelation and Heteroscedasticity was tested and to remove Heteroscedasticity, the robust standard error has been used.

The determinants of Credit Risk have been studied by presenting the trend of some ratios for a group of all, Private and Public Banks and results are drawn using descriptive statistics, Correlation and Regression analysis.

## 6.2 Analysis

### 6.2.1 Trend Analysis

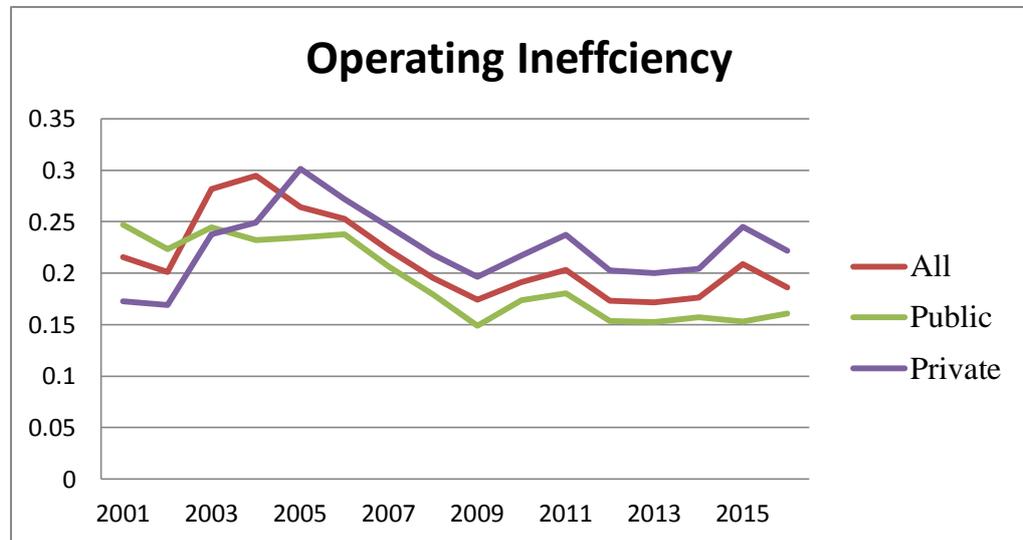
The trend of following parameters has been presented.

**Table 6.2.1.1 Trend of Operating Inefficiency Ratio**

<b>Year</b>	<b>All Banks</b>	<b>Public Banks</b>	<b>Private Banks</b>
2001	0.215795	0.246995	0.172594
2002	0.201168	0.223557	0.169184
2003	0.281871	0.244434	0.238025
2004	0.294885	0.231942	0.249299
2005	0.264178	0.234561	0.301199
2006	0.252677	0.237974	0.271974
2007	0.222496	0.206108	0.245031
2008	0.195219	0.179292	0.218115
2009	0.174378	0.149109	0.196544
2010	0.191134	0.173933	0.216935
2011	0.203394	0.180707	0.237426
2012	0.173119	0.153424	0.20266
2013	0.171772	0.152749	0.200305
2014	0.176226	0.157387	0.204486
2015	0.209064	0.153295	0.244858
2016	0.186395	0.16079	0.221849

Source: Annual Report of Banks and author's calculation

**Figure 6.2.1.1 Trend of Operating Inefficiency Ratio of Banks under study**

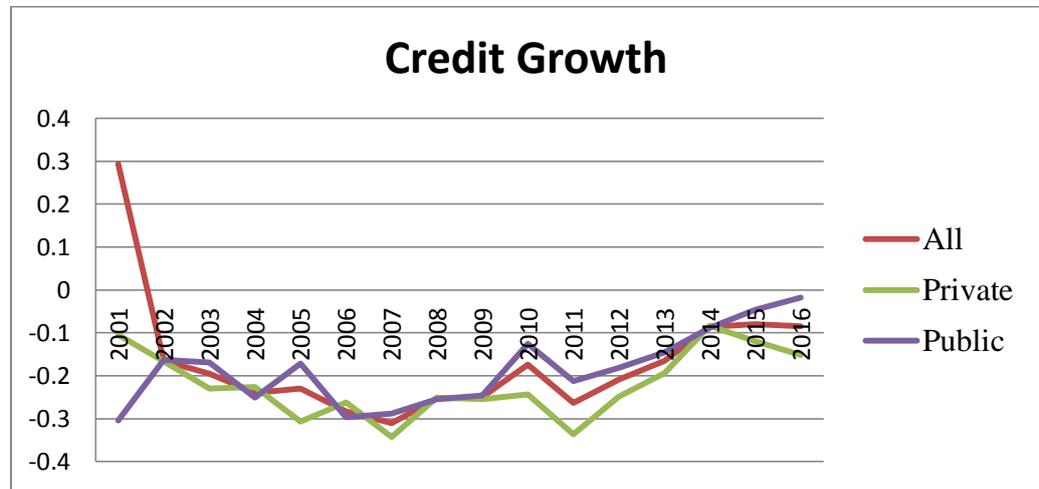


The Table and Figure 6.2.1.1 reveal that the operating Efficiency Ratio of all 40 Commercial banks under study show overall a fluctuating trend when compared with the base year to the latest year under study. In initial phase the ratio is showing rising rate resulting in low efficiency and in the most recent year of study the ratio has gone down showing improvement in the efficiency.

When it comes to a group of Public Banks under study the ratio of Operating Efficiency has been showing declining rate and high efficiency over a period of 16 years from the base year to year ending March 2016.

Overall the Efficiency Ratio of Private Banks when compared to Public Banks is showing fluctuation and the ratio has been showing rising trend and thus the efficiency of Public better is better than Private Banks.

**Figure 6.2.1.2. Trend of Rate of Credit Growth of Banks under study**



The credit growth as disclosed by Figure 6.2.1.2 for a group of all Commercial banks under study is showing a fall in growth rate till 2009 from the base year 2001, in 2011 the Credit Growth is low, 2012 and 2013 is showing slight increase in comparison to 2011 and from 2014 to 2016 the ratio is stable.

The Credit Growth ratio of Private Banks show a decline from 2001 to 2008, from 2008-2010 it is stable, in 2011 it is decreased, 2012 to 2014 shows slightly rising trend and 2015 and 2016, there is hike in the ratio.

The Credit Growth ratio of Public Banks shows a fluctuating trend, thereby showing increase in 2010, in 2011 growth is negative and showing rising trend from 2014 to 2016 as disclosed by fig.6.2.1.2

The Credit Growth remained negative for all three categories of banks.

## 6.2.2 Descriptive Statistics

**Table 6.2.2.1 Descriptive Statistics of Bank Specific and Macroeconomic determinants for a group of all Commercial Banks.**

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
GNPA_ Ratio	498	4.45	3.65	0	24.11
CAR	616	12.96	3.77	0.3434	59.42
LLP	558	0.04	0.22	-0.0071	3.04
Oper_ Ineff.	599	0.21	0.19	0.0019	2.67
Credit_ Gr.	552	-0.19	0.20	-0.9156	0.99
T_ Assets	607	8966614	8.29E+07	978.42	1.68E+09
OWN	628	0.40127	0.4905	0	1
GDP_ Growth	628	7.28	1.93	3.80	10.25
Inflation_ Rate	628	6.83	2.76	3.68	11.99
Unemp_ Rate	628	3.84	0.29	3.5	4.4
Exchange_ Rate	628	50.46	7.70	41.34	67.19
Lending_ Rate	628	10.48	0.99	8.25	12.25

**Source: Author's Compilation from the financial statements of Banks, Macroeconomic indicators World Bank and RBI analyzed in STATA 12**

In order to describe the basic characteristics of the variables used for this objective, several descriptive statistics have been calculated and the above Table 6.2.2.1 presents the descriptive statistics of the data, containing sample means, maximums, minimums and standard deviations for a group of all banks, group of Private Banks displayed by Table 6.2.2.2 and Public Banks as revealed by Table 6.2.2.3.

All the variables exhibit a positive mean except Credit Growth and the sum squared deviation row represents the net change over the sample period

The table 6.2.2.1 above, for all Banks considered in the study shows that the ratio of GNPA's which has been used as a dependent variable ranged from zero percent to 24.11%, the average being 4.45%. from 2001 to 2016, over a period of 16 years.

CAR showed an average of 12.97% and ranged from 0.34% to 59.42%, deviation being 3.80%. Loan Loss Provision on an average was 0.04 variations of 0.22 % and maximum being 3.05%.

Operating Inefficiency Ratio averaged 0.21 %, showing a variation of 0.1921275 % and maximum being 2.67 %. Credit Growth showed a mean of -0.199, where minimum growth showed is -0.92% and max was 0.99%.

Total minimum Assets showed a mean of 8966614. Average mean of GDP growth stood at 7.28%, inflation rate being 6.83%, unemployment rate being 3.85%, Exchange rate being 50.46 and Lending Rate 10.49%.

**Table 6.2.2.2 Descriptive Statistics of Macroeconomic and Bank Specific Factors of a group of Private Banks**

Variable	Observation	Mean	Std. Dev.	Min	Max
GNPA_ Ratio	178	3.76	3.50	0	19
CAR	242	14.19	5.49	0.3434	59.42
LLP	224	0.079	0.32	0.0003	3.04
Oper_ Inefficiency	243	0.24	0.26	0.0150	2.67
Credit_ Growth	231	-0.24	0.17	-0.9156	0.19
T_Assets	248	6837504	1.06E+08	978.42	1.68E+09
GDP_ Growth	252	7.30	1.92	3.8039	10.25
Inflation_ Rate	252	6.82	2.76	3.6848	11.99
Unemp_ Rate	252	3.84	0.29	3.5	4.4
Exchange_ Rate	252	50.49	7.75	41.3485	67.19
Lending Rate	252	10.47	1.00	8.25	12.25

**Source: Annual Reports of Banks, Macroeconomic indicators World Bank and RBI and Authors calculation**

The table 6.2.2.2 shows summary statistics of Bank specific and Macroeconomic indicator for a group of Private Banks included in the study. The rate of GNPA's of Private Banks averaged at 3.77%, showing a deviation of 3.50, and minimum was Zero percent and maximum was 19%.

On an average CAR stood at 14.20%, showing a deviation of 5.49, with a maximum of 59.42. The Loan Loss Provision showed a mean of 0.079421, minimum was 0.000287 and maximum stood at 3.04. The mean rate of Operating Efficiency was 0.25, with a deviation of 0.27. Credit Growth is showing an average mean of -0.24 with a maximum of 0.20.

**Table 6.2.2.3 Descriptive Statistics of Macroeconomic and Bank Specific Factors of a group of Public Banks**

**Source: Annual Reports of Banks, Macroeconomic indicators World**

<b>Variable</b>	<b>Observe.</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
GNPA_ Ratio	320	4.84	3.69	0.17	24.11
CAR	374	12.17	1.56	7.33	20.1
LLP	334	0.020	0.09	-0.00711	1.3731
Oper _ Ineffec.	356	0.19	0.11	0.0019	1.84
Credit_ Gr	321	-0.17	0.22	-0.7887	0.99
T_ Assets	359	1.04E+07	6.16E+07	2476.446	6.10E+08
GDP_ Growth	376	7.26	1.95	3.80	10.25
Inflation Rate	376	6.85	2.77	3.68	11.99
Unemp_ Rate	376	3.85	0.29	3.5	4.4
Exchange Rate	376	50.45	7.68	41.34	67.19
Lending Rate	376	10.45	0.99	8.25	12.25

**Bank and RBI and Authors calculation**

The mean as disclosed by above table 6.2.2.3 of GNPA's ratio of Public bank is 4.83, with a variation of 3.69, and minimum and maximum of 0.17 and 24.11% respectively.

The average CAR stood at 12.17 with a maximum of 20%. The ratio of Operating Efficiency averaged at 0.1971805. The minimum Credit Growth was -0.78 and maximum was 0.99 with an average of -0.17. The mean of Operating Inefficiency Ratio stood at 0.19.

**6.2.3 Correlation Analysis**

The table 6.2.3.1 given below depicts the correlation Matrix for a group of All Commercial Banks. The correlation coefficient shows a weak Correlation between the dependent variable GNPA's, the credit risk indicator

and all independent variables used in the Regression Analysis. Positive correlation exists between Credit Growth and GNPA, Inflation Rate and GNPA show negative correlation. Overall correlation is weak but showing negative association of GNPA with CAR, LLP, Operating Inefficiency, Ownership, GDP, inflation and Lending.

The Correlation Matrix table 6.2.3.2 of a group of Private Banks show negative association between the Credit Risk GNPA Ratio and CAR, LLP, Total Assets, Inflation, and Exchange rate and shows positive relationship with Operating Efficiency and Credit Growth. The results show weak correlation ship between dependent and independent variables

The Table 6.2.3.3 depicts the Correlation Matrix for a group of Public Banks that exists between the dependent variable GNPA Ratio and independent variable. The LLP show positive correlation with the dependent variable along with Credit Growth, Total Assets and GDP Growth Rate, while CAR shows negative association.

**Table 6.2.3.1 Coefficient Correlation, Bank Specific and Macroeconomic Factors of a group of all Commercial Banks**

	<b>GNPA_%</b>	<b>CAR</b>	<b>LLP</b>	<b>Op_Inef</b>	<b>C_Gr.</b>	<b>T_ASS</b>	<b>OWN</b>	<b>GDP</b>	<b>Inf.</b>	<b>U_Rate</b>	<b>Ex_Rate</b>	<b>Lend</b>
<b>GNPA Ratio</b>	1.00											
<b>CAR</b>	-0.16	1.00										
<b>LLP</b>	-0.07	0.05	1.00									
<b>O_Inff</b>	-0.05	0.00	-0.01	1.00								
<b>C_Gr</b>	0.33	-0.18	-0.11	-0.05	1.00							
<b>T_ASS</b>	0.02	-0.04	-0.03	-0.01	0.18	1.00						
<b>OWN</b>	-0.07	0.27	0.16	-0.05	-0.15	-0.11	1.00					
<b>GDP</b>	-0.03	-0.04	0.04	0.08	-0.06	-0.03	0.00	1.00				
<b>Inf. Rate</b>	-0.52	0.17	0.06	-0.06	-0.14	0.04	0.00	-0.02	1.00			
<b>U_Rate</b>	0.06	0.00	0.04	0.15	-0.17	-0.06	-0.05	-0.03	-0.21	1.00		
<b>Ex_Rate</b>	0.23	-0.10	-0.09	-0.07	0.31	0.05	0.05	-0.18	-0.21	-0.68	1.00	
<b>Lending Rate</b>	-0.16	0.01	0.09	-0.01	-0.15	-0.04	-0.04	0.09	0.14	0.35	-0.51	1.00

**Table 6.2.3.2 Coefficient Correlation of Macroeconomic and Bank Specific factors of a group of Private Banks**

	<b>GNPA_ Ratio</b>	<b>CAR</b>	<b>LLP</b>	<b>Oper _ Inef</b>	<b>Credit~ Gr</b>	<b>T_ASS</b>	<b>GDP_ Gr.</b>	<b>Inflat ~n</b>	<b>Unemp -Rate</b>	<b>Exchan ge</b>	<b>Len ding</b>
<b>GNPA_ Ratio</b>	1										
<b>CAR</b>	-0.1398	1									
<b>LLP</b>	-0.1455	0.0385	1								
<b>Oper. Ineffec</b>	0.0962	-0.0235	0.0341	1							
<b>Credit _ Gr</b>	0.3823	-0.2482	-0.1711	0.1211	1						
<b>T_ASSETS</b>	-0.1618	0.0682	0.2966	0.0427	0.0472	1					
<b>GDP_ Growth</b>	0.0732	-0.0997	0.0295	0.0812	0.0457	-0.1132	1				
<b>Inflation Rate</b>	-0.3264	0.218	0.1953	-0.099	-0.2389	-0.0207	-0.059	1			
<b>Unemp _ rate</b>	0.3036	-0.0101	-0.0096	-0.0361	-0.0239	-0.293	-0.0112	-0.1576	1		
<b>Exchange</b>	-0.1229	-0.0886	-0.1019	0.0546	0.1978	0.3366	-0.1813	-0.2681	-0.688	1	
<b>Lending</b>	0.0321	0.0015	0.0774	-0.0153	-0.0268	-0.2356	0.1317	0.1307	0.3541	-0.4985	1

**Table 6.2.3.3 Coefficient Correlation for Macroeconomic and Bank Specific factors of Public Banks**

	<b>GNPA</b>	<b>CAR</b>	<b>LLP</b>	<b>Oper. _ Ineffic.</b>	<b>Credit~ Growth</b>	<b>T_ Assets</b>	<b>GDP_ Growth</b>	<b>Inflat.</b>	<b>Unemp _Rate</b>	<b>Exchan ge</b>	<b>Lendi ng</b>
<b>GNPA Ratio</b>	1										
<b>CAR</b>	-0.3626	1									
<b>LLP</b>	0.3486	-0.0984	1								
<b>Oper. _ Inffic.</b>	-0.0634	0.0837	-0.0467	1							
<b>Credit_ Gr</b>	0.3075	-0.1633	0.1966	-0.0672	1						
<b>T_ Assets</b>	0.0103	-0.0442	0.1843	-0.0182	0.1854	1					
<b>GDP_ Growth</b>	-0.0794	0.0693	-0.0661	0.0913	-0.1054	-0.0333	1				
<b>Inflation</b>	-0.6242	0.2728	-0.1596	-0.0788	-0.1004	0.0531	-0.0072	1			
<b>Unemp _ Rate</b>	-0.0718	0.1296	-0.3079	0.1821	-0.2363	-0.0854	-0.0451	-0.2346	1		
<b>Exchange</b>	0.4332	-0.3454	0.4721	-0.0798	0.384	0.0733	-0.1788	-0.1858	-0.6767	1	
<b>Lending</b>	-0.2692	0.0866	-0.2827	-0.0115	-0.2069	-0.0596	0.0735	0.1397	0.349	-0.5186	1

#### **6.2.4 Results of Panel Regression Model**

Results of Panel Regression are presented below as per the models considered for the study depending upon the independent variables consisting of Macroeconomic and Bank Specific factors.

Accordingly the results of regression are presented for the Six Models.

**Table 6.2.4.1 Results of Panel Regression Model One - Macroeconomic and Bank Specific Factors from 2001 to 2016 for a group of All Commercial Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect Model</b>
	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>
Credit_Growth	4.395 (5.96)**	3.665 (4.78)**	3.665 (2.47)*
LLP_LN	0.035 -0.06	1.413 -1.76	1.413 (3.88)**
Oper _ Inef.	-0.076 -0.11	-0.215 -0.29	-0.215 -0.66
CAR	-0.043 -1.21	-0.033 -0.81	-0.033 -0.77
T_ Assets	0 -0.41	0 -0.13	0 -0.32
OWN	-0.486 -1.44	-	-
GDP_Growth	-0.043 -0.55	-0.029 -0.38	-0.029 -0.4
Unemp._ Rate	1.176 -1.59	1.132 -1.55	1.132 (2.08)*
Exchange_Rate	0.029 -1.05	0.037 -1.37	0.037 -1.53
Lending_Rate	-0.055 -0.38	-0.048 -0.33	-0.048 -0.64
Inflation_Rate	-0.54 (9.28)**	-0.558 (9.62)**	-0.558 (6.98)**
Constant	4.747 -0.99	3.928 -0.82	3.928 -1.2
Observations	437	437	437
Number of code	38	38	38
R-squared		0.36	0.36
* significant at 5%; ** significant at 1%			

The above table 6.2.4.1 presents the results of Panel Regression Model One covering the bank specific and Macroeconomic determinants of Credit Risk for a group of all Indian Commercial Banks for a study period from 31/3/2001 - 31/3/ 2016.

As depicted by the Robust Fixed Effect Model the two bank specific factors Credit Growth and the ratio of LLP to LN are significant and both positively decides the Credit Risk. The Credit Growth is significant at 5% level of significance and LLP to LN is significant at 1% level of significance.

Out of the five Macroeconomic determinants only two factors Unemployment Rate positively and Inflation rate negatively and significantly contribute to Credit Risk at 5% and 1% level of significance respectively.

The Bank Specific factors Operating Inefficiency and CAR show insignificant and negative association and Size as represented by Total assets is insignificant but show positive association. Amongst Macroeconomic indicators GDP and Lending Rate are insignificant and showing negative association while Exchange Rate is positively associated but insignificant.

Thus R2 explains 36% variation in Credit Risks of a group of all Indian Commercial Banks when Macro and Bank Specific factors taken together, where two bank specific positively decides Credit Risks and out of two macroeconomic indicator Unemployment positively determines and Inflation negatively decides the Credit Risks over a study period of 16 years from 2001 to 2016.

**Table 6.2.4.2 Results of Panel Regression Model One -Macroeconomic and Bank Specific Factors from 2001 to 2016for a group of Private Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect Model</b>
	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>
Credit_ Growth	5.702	5.312	5.312
	(3.98)**	(3.46)**	(4.46)**
LLP _LN	-0.343	1.614	1.614
	-0.48	-1.48	(3.85)**
Oper _ Inef.	0.148	0.61	0.61
	-0.17	-0.65	-1.71
CAR	-0.013	-0.023	-0.023
	-0.32	-0.5	-1.09
T_ Assets	0	0	0
	-0.4	-1.25	-2.09
GDP_ Growth	0.044	0.056	0.056
	-0.31	-0.4	-0.47
Unemp. _ Rate	1.573	1.823	1.823
	-1.23	-1.42	-1.9
Exchange_ Rate	-0.045	-0.054	-0.054
	-0.93	-1.08	-1.23
Lending_ Rate	-0.024	-0.08	-0.08
	-0.1	-0.33	-0.46
Inflation_ Rate	-0.335	-0.345	-0.345
	(3.09)**	(3.19)**	-2.09
Constant	4.004	3.358	3.358
	-0.48	-0.4	-0.6
Observations	159	159	159
Number of code	15	15	15
R-squared		0.24	0.24
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.2 presents the results of Panel Regression Model One covering the bank specific and Macroeconomic determinants of Credit

Risk for a group of all Indian Private Banks for a study period from 31/3/2001  
- 31/3/ 2016.

As depicted by the Robust Fixed Effect Model the two bank specific factors viz., Credit Growth and the ratio of LLP to LN positively decides the Credit Risk and were significant at 1% level of significance.

Out of five Macroeconomic indicators all are insignificant and Inflation, Lending and Exchange Rate show negative association, while GDP and Unemployment show positive association. Size and Operating Inefficiency show insignificant and positive association, while CAR shows negative and insignificant association with Credit Risks.

The R2 explains 24% variation in Credit Risks of a group of Private Banks was on account of above two significant factors over a study period of 16 years from 2001 to 2016.

**Table 6.2.4.3 Results of Panel Regression Model One -Macroeconomic and Bank Specific Factors from 2001 to 2016 for a group of Public Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect Model</b>
	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>
Credit_ Growth	3.08	2.273	2.273
	(3.88)**	(2.74)**	-1.38
LLP_LN	1.756	-0.722	-0.722
	-0.67	-0.26	-0.24
Oper _ Inef.	1.464	0.364	0.364
	-1.12	-0.25	-0.58
CAR	-0.479	-0.288	-0.288
	(4.25)**	(2.20)*	-1.24
T_ Assets	0	0	0
	-0.54	-0.16	-0.34
GDP_ Growth	-0.112	-0.075	-0.075
	-1.27	-0.86	-0.9
Unemp_ Rate	0.528	0.811	0.811
	-0.62	-0.96	-1.42
Exchange_ Rate	0.058	0.075	0.075
	-1.8	(2.32)*	-2.03
Lending_ Rate	-0.162	-0.092	-0.092
	-0.96	-0.55	-1.41
Inflation_ Rate	-0.64	-0.666	-0.666
	(10.08)**	(10.38)**	(9.04)**
Constant	12.804	7.827	7.827
	(2.20)*	-1.32	-1.29
Observations	278	278	278
Number of code	23	23	23
R-squared		0.51	0.51
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.3 presents the results of Panel Regression Model One covering the bank specific and Macroeconomic determinants of Credit

Risk for a group of Indian Public Banks for a study period from 31/3/2001 - 31/3/2016.

The Results of Robust Fixed Effect Model for a group of Public Banks show that out of 11 independent variables included in the study for a group of Public Banks only one factor decides the Credit Risk and rest all indicators are insignificant. Amongst Bank Specific factors no factor is significant cause and decides the Credit Risk as all factors show insignificant association.

Out of five Macroeconomic indicators four are insignificant except Inflation Rate and show negative association with Credit Risk of a group of Public Banks and significant at 1% level of significance.

The GDP and Lending Rates show negative and insignificant association with the Credit Risk of a group of Public Banks while Unemployment and Exchange Rate show positive association.

The R<sup>2</sup> explains 51% variation in Credit Risks of a group of Public Banks was on account of Inflation Rate over a study period of 16 years from 2001 to 2016.

**Table 6.2.4.4 Panel Regressions Model Two - Bank Specific Factors from 2001 to 2016 for a group of Commercial Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>
Credit_Growth	5.521	5.098	5.098
	(6.87)**	(5.98)**	(3.32)**
LLP_LN	-0.271	0.987	0.987
	-0.39	-1.06	(2.51)*
Oper_Inef.	0.755	0.673	0.673
	-0.94	-0.78	-0.98
CAR	-0.101	-0.114	-0.114
	(2.50)*	(2.49)*	-1.58
T_ASSETS	0	0	0
	-0.99	-0.31	-0.79
OWN	-0.388		
	-1.05		
Constant	6.579	6.489	6.489
	(11.74)**	(9.81)**	(6.47)**
Observations	437	437	437
Number of code	38	38	38
R-squared		0.1	0.1
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.4 presents the results of Panel Regression Model Two covering the Bank Specific determinants of Credit Risk for a group of Indian Commercial Banks for a study period from 31/3/2001 - 31/3/ 2016.

The Results of Robust Fixed Effect Model for a group of Commercial Banks show that out of six independent variables representing Bank Specific factors only two factors decides the Credit Risk and rest all indicators are insignificant. The Credit Growth was found to be significant @ 1% and positively contributes to Credit Risks, while LLP to GL was significant @ 5% level of significance and positively contributes to Credit Risks.

The Operating Inefficiency and size were insignificant to decide Credit Risk but show positive relationship with Credit Risks and CAR was insignificant and negatively associated with the group of Indian Commercial Banks.

The R<sup>2</sup> explains 10% Variation in Credit Risk of a group of Commercial Banks on account of Credit Growth and LLP to LN over a study period of 16 years from 2001 to 2016.

**Table 6.2.4.5 Panel Regressions Model Two - Bank Specific Factors from 2001 to 2016 for a group of Private Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>
Credit_Growth	5.501	5.248	5.248
	(3.71)**	(3.29)**	(3.43)**
LLP_LN	-0.249	0.554	0.554
	-0.33	-0.49	-1.24
Oper_Inef	0.726	0.795	0.795
	-0.81	-0.81	(2.36)*
CAR	-0.044	-0.058	-0.058
	-1.03	-1.25	-1.96
T_Assets	0	0	0
	-1.36	-0.38	-0.46
Constant	5.562	5.566	5.566
	(6.91)**	(5.64)**	(13.86)**
Observations	159	159	159
Number of code	15	15	15
R-squared		0.09	0.09
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.5 presents the results of Panel Regression Model Two covering the Bank Specific determinants of Credit Risk for a group of Indian Private Banks for a study period from 31/3/2001 - 31/3/ 2016.

The Results of Robust Fixed Effect Model for a group of Private Banks show that out of six independent variables representing Bank Specific factors only two factors decides the Credit Risk and rest all indicators are insignificant. The Credit Growth was found to be significant @ 1% and positively contributes to Credit Risks, while Operating Inefficiency was

significant @ 5% level of significance and positively contributes to Credit Risks.

The LLP to TL and size are insignificant and show positive association, while CAR is insignificant and negatively related to Credit Risks of Private Banks.

R<sup>2</sup> explains 9% variation in Credit Risks of Private Banks on account of Credit Growth and Operating Inefficiency over a study period of 16 years from 2001 to 2016.

**Table 6.2.4.6 Panel Regressions Model Two - Bank Specific Factors from 2001 to 2016 for a group of Public Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Random Effect</b>
	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>
Credit_Growth	4.995	4.438	4.438
	(5.38)**	(4.41)**	(2.09)*
LLP_LN	6.165	4.092	4.092
	-1.94	-1.2	-0.8
Oper_Inef	1.196	0.813	0.813
	-0.76	-0.45	-0.36
CAR	-0.735	-0.696	-0.696
	(5.54)**	(4.49)**	(2.24)*
T_Assets	0	0	0
	-1.13	-0.13	-0.23
Constant	14.013	13.532	13.532
	(8.62)**	(7.25)**	(3.45)**
Observations	278	278	278
Number of code	23	23	23
R-squared		0.17	0.17
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.6 presents the results of Panel Regression Model Two covering the Bank Specific determinants of Credit Risk for a group of Indian Public Banks for a study period from 31/3/2001 - 31/3/ 2016.

The Results of Robust Fixed Effect Model for a group of Public Banks show that out of six independent variables representing Bank Specific factors only two factors decides the Credit Risk for a group of Public Banks and rest all indicators are insignificant. The Credit Growth was found to be significant @ 5% and positively contributes to Credit Risks, while CAR was also found

to be significant @ 5% level of significance and negatively contributes to Credit the Risks of Public Banks.

The LLP to TL, size and Operating Efficiency are insignificant and show positive association with Credit Risks of Public Banks.

R2 explains 17% variation in the Credit Risks of Public Banks on account of Credit Growth and CAR over a study period of 16 years from 2001 to 2016.

**Table 6.2.4.7 Panel Regression Model Three - Macroeconomic Factors from 2001 to 2016 for a Group of All Commercial Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>
GDP_ Growth	-0.159	-0.147	-0.147
	(2.16)*	(2.00)*	-1.82
Inflation_ Rte	-0.68	-0.675	-0.675
	(12.35)**	(12.30)**	(8.36)**
Lending_ Rate	0.013	0.001	0.001
	-0.09	-0.01	-0.01
Unemp_ Rate	0.807	0.726	0.726
	-1.12	-1.02	-1.53
Exchange_ Rate	0.037	0.041	0.041
	-1.41	-1.57	-1.69
OWN	-1.011		
	(2.62)**		
Constant	5.727	5.521	5.521
	-1.23	-1.2	-1.93
Observations	498	498	498
Number of code	39	39	39
R-squared		0.34	0.34
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.7 presents the results of Panel Regression Model Three covering Macroeconomic determinants of Credit Risk for a group of Indian Commercial Banks for a study period from 31/3/2001 - 31/3/ 2016.

As depicted by the Robust Fixed Effect Model out of the five Macroeconomic determinants only Inflation Rate was found to be significant

at 1% level of significance and show negative association with Credit Risks of a group of Commercial Banks.

The Macroeconomic indicators GDP Growth Rate, Unemployment Rate, Exchange Rate and Lending Rate were found to be insignificant and GDP Growth Rate shows negative association while Unemployment Rate, Exchange Rate and Lending Rate show positive association with the Credit Risks of a group of Commercial Banks.

Thus  $R^2$  explains 34% variation in Credit Risks of a group of Commercial Banks when Macroeconomic determinants are considered, where only Inflation Rate is significant and negatively determines the Credit Risks of a group of Commercial Banks.

**Table 6.2.4.8 Panel Regression Model Three - Macroeconomic Factors from 2001 to 2016 for a Group of Private Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>
GDP_ Growth	-0.094	-0.041	-0.041
	-0.69	-0.31	-0.3
Unemp_ Rate	1.696	1.606	1.606
	-1.33	-1.29	-1.63
Exchange_ Rate	-0.038	-0.026	-0.026
	-0.83	-0.57	-0.58
Lending_ Rate	0.125	0.078	0.078
	-0.5	-0.32	-0.46
Inflation_ Rate	-0.477	-0.453	-0.453
	(4.65)**	(4.49)**	(2.69)*
Constant	2.206	1.853	1.853
	-0.27	-0.23	-0.33
Observations	178	178	178
Number of code	16	16	16
R-squared		0.2	0.2
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.8 presents the results of Panel Regression Model Three covering Macroeconomic determinants of Credit Risk for a group of Indian Private Banks for a study period from 31/3/2001 - 31/3/ 2016.

As depicted by the Robust Fixed Effect Model out of the five Macroeconomic determinants only Inflation Rate was found to be significant at 1% level of significance and showed negative association with the Credit Risks of a group of Private Banks.

The Macroeconomic indicators GDP Growth Rate, Unemployment Rate , Exchange Rate and Lending Rate were found to be insignificant and GDP and Exchange Rate shows negative association while Unemployment Rate and Lending Rate show positive association with the Credit Risks of a group of Private Banks .

Thus R2 explains 20% variation in Credit Risks of a group of Private Banks when macroeconomic determinants are considered, where only Inflation Rate is significant showing negative association with the Credit Risks of a group of Private Banks.

**Table 6.2.4.9 Panel Regression Model Three - Macroeconomic Factors from 2001 to 2016 for a Group of Public Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>
GDP_ Growth	-0.195	-0.195	-0.195
	(2.38)*	(2.37)*	-1.93
Unemp_ Rate	0.367	0.297	0.297
	-0.45	-0.37	-0.64
Exchange Rate	0.092	0.091	0.091
	(3.06)**	(3.01)**	(3.46)**
Lending_ Rate	-0.011	-0.007	-0.007
	-0.07	-0.04	-0.12
Inflation_ Rate	-0.798	-0.796	-0.796
	(13.13)**	(13.02)**	(9.34)**
Constant	5.981	6.242	6.242
	-1.14	-1.19	-1.97
Observations	320	320	320
Number of code	23	23	23
R-squared		0.49	0.49
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.9 presents the results of Panel Regression Model Three covering Macroeconomic determinants of Credit Risk for a group of Indian Public Banks for a study period from 31/3/2001 - 31/3/ 2016.

As depicted by the Robust Fixed Effect Model out of the five Macroeconomic determinants only two factors were found to be significant at 1% level of significance and include the Exchange Rate showing positive association with Credit Risks of a group of Public Banks and Inflation Rate showed negative association with Credit Risk.

The Macroeconomic indicators GDP Growth Rate, Unemployment Rate and Lending Rate were found to be insignificant and GDP and Lending Rate shows negative association while Unemployment Rate show positive association with the Credit Risks of a group of Public Banks .

Thus R2 explains 49% variation in Credit Risks of a group of Public Banks when Macroeconomic determinants are considered, where only two macroeconomic indicators are significant and Exchange Rate showing positive association and Inflation Rate determines negatively the Credit Risks over a period of 16 years from 2001 to 2016.

**Table 6.2.4.10 Panel Regression Model Four - Macroeconomic and Bank Specific Determinants with Time Dummy for Basel II Period for a group of All Commercial Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>
Credit_ Growth	4.561	3.772	3.772
	(6.19)**	(4.92)**	(2.58)*
LLP_LN	-0.127	1.371	1.371
	-0.21	-1.71	(4.03)**
Oper _ Inef.	-0.021	-0.201	-0.201
	-0.03	-0.27	-0.64
CAR	-0.048	-0.038	-0.038
	-1.36	-0.95	-0.85
T_ Assets	0	0	0
	-0.48	-0.09	-0.21
Basel	-1.475	-1.554	-1.554
	-1.85	(2.00)*	(3.28)**
GDP_ Growth	-0.06	-0.045	-0.045
	-0.76	-0.58	-0.61
Unemp _ Rate	0.004	-0.114	-0.114
	0	-0.12	-0.16
Exchange_ Rate	0.046	0.056	0.056
	-1.58	-1.95	(2.38)*
Lending_ Rate	-0.341	-0.349	-0.349
	-1.61	-1.68	(2.47)*
Inflation_ Rate	-0.462	-0.477	-0.477
	(6.45)**	(6.75)**	(6.41)**
.OWN	-0.427	0	0
	-1.35	(.)	(.)
Constant	11.695	11.284	11.284
	-1.92	-1.87	(2.40)*
Observations	437	437	437
Number of code	38	38	38
R-squared		0.36	0.36
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The results of Panel Regression Model given above in table 6.2.4.10 uses Time dummy for a period prior to and post implementation of Basel II norms in India along with Bank Specific and Macroeconomic Determinants and presents the results of Random Effect, Fixed Effect Robust Fixed Effect Model.

The purpose to include Time Dummy for Basel II was to know whether the post Basel II period was significant determinant of the credit risk indicator GNPA's and accordingly used 0 for period prior to and 1 for post implementation of Basel II norms in Indian Banks. 31-3-2009 was considered as the cutoff date, for period prior to the implementation of Basel II norms in India.

When Bank Specific factors along with Macroeconomic determinants and Time dummy for Basel II are clubbed together the results of Robust Fixed Effect Model shows that Credit Growth was found to be significant at 5% level of significance and positively contributing to Credit Risks of a group of Commercial Banks. The LLP to LN was found to be significant at 1% level of significance and shows positive association with Credit Risks of a group of 40 Indian Commercial Banks.

The Basel II period was found to be significant determinant of Credit Risks as the time dummy for Basel II shows a significance level of 1% and negative association with the Credit Risks indicator.

Of the Macroeconomic determinants, Exchange Rate show positive association with Credit Risks and significant at 5% level of significance while Lending Rate was found to be significant at 5% level of significance showing

negative association along with Inflation Rate and inflation rate was found to be significant at 1% level of significance.

The Operating Inefficiency and CAR were insignificant but show negative association with Credit Risks while Size though insignificant determinant show positive association. GDP Growth Rate and Unemployment Rate show negative association but insignificant.

Thus R2 explains 36% variation in Credit Risks of a group of Commercial Banks when Bank Specific and Macroeconomic determinants are considered together along with Time dummy for Basel II and six factors were found to be significant.

**Table 6.2.4.11 Panel Regression Model Five - Bank Specific Determinants with Time Dummy for Basel II Period for a group of All Commercial Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>	<b>GNPA_ Ratio</b>
Credit_ Growth	6.136	5.664	5.664
	(7.67)**	(6.69)**	(3.42)**
LLP_ LN	-0.486	0.56	0.56
	-0.71	-0.61	-1.48
Oper_ Inef.	0.45	0.341	0.341
	-0.57	-0.4	-0.54
CAR	-0.098	-0.114	-0.114
	(2.48)*	(2.54)*	-1.54
T_ Assets	0	0	0
	-0.81	-0.1	-0.25
Basel	-1.337	-1.29	-1.29
	(4.35)**	(4.08)**	(3.06)**
OWN	-0.235	0	0
	-0.64	(.)	(.)
Constant	7.434	7.396	7.396
	(12.73)**	(10.79)**	(6.94)**
Observations	437	437	437
Number of code	38	38	38
R-squared		0.14	0.14
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.11 presents the results of Random Effect, Fixed Effect Robust Fixed Effect Model when Bank Specific Factors are considered as determinants of Credit Risks and Time dummy for Basel II period is included.

As presented by the above table the results of Robust Fixed Effect Model shows that Credit Growth was found to be significant at 1% level of

significance and positively contributing to Credit Risks of a group of Commercial Banks.

The Basel II period was found to be the significant determinant of Credit Risks as the time dummy for Basel II shows a significance level of 1% and negatively associated with the Credit Risks indicator of Indian Commercial Banks.

The remaining Bank Specific factors LLP to LN, CAR, Operating Inefficiency and Size were found to be insignificant.

Thus R<sup>2</sup> explains 14% variation in Credit Risks of a group of Commercial Banks when Bank Specific factors are considered and Credit Growth and Time dummy for Basel II found to be significant

**Table 6.2.4.12 Panel Regression Model Six – Macroeconomic Determinants with Time Dummy for Basel II Period for a group of All Commercial Banks**

	<b>Random Effect Model</b>	<b>Fixed Effect Model</b>	<b>Robust Fixed Effect</b>
	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>	<b>GNPA_Ratio</b>
GDP_Growth	-0.172	-0.16	-0.16
	(2.32)*	(2.17)*	-1.96
Inflation_Rate	-0.61	-0.604	-0.604
	(8.84)**	(8.78)**	(7.94)**
Lending_Rate	-0.242	-0.26	-0.26
	-1.15	-1.24	-2.02
Unemp_Rate	-0.208	-0.31	-0.31
	-0.22	-0.33	-0.54
Exchange_Rate	0.055	0.059	0.059
	-1.95	(2.10)*	(2.50)*
OWN	-1.003		
	(2.57)*		
Basel	-1.315	-1.343	-1.343
	-1.66	-1.71	(3.54)**
Constant	11.602	11.53	11.53
	(1.99)*	(1.99)*	(3.06)**
Observations	498	498	498
Number of code	39	39	39
R-squared		0.35	0.35
Absolute value of z statistics in parentheses			
* significant at 5%; ** significant at 1%			

The above table 6.2.4.12 presents the results of Random Effect, Fixed Effect Robust Fixed Effect Model when Macroeconomic factors are considered as determinants of Credit Risks and Time dummy for Basel II period is included.

Of the Macroeconomic determinants , Exchange Rate show positive association with Credit Risks and significant at 5% level of significance while Inflation Rate was found to be significant at 1% level of significance showing negative association

The Lending Rate, Unemployment Rate and GDP Growth Rate were found to be insignificant.

The Basel II period was found to be the significant determinant of Credit Risks as the time dummy for Basel II shows a significance level of 1% and negatively associated with the Credit Risks indicator of Indian Commercial Banks.

Thus R2 explains 35% variation in Credit Risks of a group of Commercial Banks when Macroeconomic determinants with Time Dummy for Basel II are considered together where Inflation Rate negatively and significantly and Exchange Rate positively and significantly determines the Credit Risks.

## 6.2.5 Discussion

### 6.2.5.1 Model One

**Table 6.2.5.1 Comparison of Expected Result with Actual Results for Macroeconomic and Bank Specific Determinants of Credit Risks (GNPA Ratio)**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance		
		All	Private	Public	All	Private	Public
CAR	Neg.	N	N	N	-	-	-
LLP	Postv./ Neg.	P	P	N	**	**	-
Operating Inefficiency	Postv.	N	P	P	-	-	-
Credit Growth	Postv.	P	P	P	*	**	-
Size	Neg.	P	P	P	-	-	-
Ownership					-	-	-
GDP Growth Rate	Neg. /Post.	N	P	N	-	-	-
Inflation Rate	Neg./Post	N	N	N	**	**	**
Unemployment Rate	Postv /Neg.	P	P	P	*	-	-
Exchange Rate	Postv.	P	N	P	-	-	-
Lending Rate	Postv.	N	N	N	-	-	-
R2					36%	24%	51%

Source: Authors Compilation from Regression Tables objective 2

The above table compiled from the Regression Result presents the association between the Proxy for Credit Risk GNPA's and the independent variables Bank Specific Factors and Macroeconomic determinants analysed together and the change in expected and actual sign of the independent variables with dependent.

The CAR shows negative but insignificant association with the Credit Risk of a group of All Commercial, Private and Public Banks in India. The results are in conformity with the expected signs. The negative association of regulatory measure CAR with Credit Risks indicates that higher the set aside rate of CAR will lead to lower credit Risks and will enable the banks to use this measure as cushion to absorb losses.

There exists positive and significant association between LLP to Loan of a group of All Commercial and Private Banks in India. The negative and insignificant association for a group of Public Banks has been observed. The results are in conformity with the expected results as both positive and negative association was expected based on the argument that adequate and high provision for loan losses enables to write off such losses resulting in lower credit risks and also higher the credit risk higher will be the provision as made by the group of All Commercial and Private Banks.

The Operating Inefficiency is negatively associated to Credit Risk of a group of All Commercial Banks and not significant. This ratio is positively related to a group of Private and Public Banks and is insignificant. There is difference in the expected results and the actual results for a group of All Commercial Banks and the expected result of a group of Private and Public

banks are in conformity indicating that higher the operating inefficiency higher will be the credit risk but operating inefficiency is insignificant.

The Credit Growth is positively and significantly related to Credit Risk of a group of All Commercial and Private Banks. The association with a group of Public Banks is also positive but insignificant. The results are in conformity with the expected signs of all the groups under study.

Size is insignificant and positively associated with the Credit Risk of a group of all Commercial, Public and Private Banks. The expected and actual results are not in conformity and positive association implies larger the size higher is the credit risks for all groups.

The GDP shows negative and insignificant association with the credit risks of a group of all Commercial and Public Banks, while for a Private Bank insignificant and positive association was noticed.

Inflation Rate shows significant and negative association with the credit risks of all groups, where no change in the expected and actual results was seen. The negative association implies that higher the inflation lower is the credit risks.

The unemployment rate positively contributes to credit risks in Indian Banks and significant only for a group of all Commercial Banks.

Exchange Rate is positively associated with the group of Private and all Commercial Banks and the expected and actual results are in conformity and shows negative association with a group of Public Banks.

Lending Rate is negatively associated with the credit risks of all groups and is insignificant and there is variation in expected and actual results indicating that higher the lending rate lower is the credit risks.

The  $r^2$  explains 36%, 24% and 51% variation in the credit risks due to above significant indicators of a group of All Commercial, Private and Public Banks respectively.

### 6.2.5.2 Model Two

**Table 6.2.5.2 Comparison of Expected Result with Actual Results for Bank Specific Determinants of Credit Risks (GNPA Ratio)**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance		
		All	Private	Public	All	Private	Public
<b>CAR</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>*</b>
<b>LLP</b>	<b>Postv./ Neg.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>*</b>	<b>-</b>	<b>-</b>
<b>Operating Inefficiency</b>	<b>Postv.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>-</b>	<b>*</b>	<b>-</b>
<b>Credit Growth</b>	<b>Postv.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>**</b>	<b>**</b>	<b>*</b>
<b>Size</b>	<b>Neg.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Ownership</b>		<b>N</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>R2</b>					<b>10 %</b>	<b>9%</b>	<b>17%</b>

**Source: Authors Compilation from Regression Tables objective 2**

The table compiled above presents change in the significance and sign of determinants for different groups of Banks when only Bank Specific factors are considered instead of both Macroeconomic and Bank Specific parameters are taken together.

The results confirm the proposed sign for 3 Bank Specific Factors viz. LLP, Credit Growth and CAR for all three groups under study.

The association between GNPA and CAR of a group of All Commercial and Private Banks show negative and insignificant association and there is no change in the expected and actual sign, whereas the association of CAR and GNPA of a group of Public Banks is negative and significant. The Negative association implies that adequacy of capital acts as a buffer against the anticipated losses.

The expected association of LLP to Gross Loan could be positive or negative. The association between LLP and GNPA for a group of all Commercial, Private and Public Banks show positive association and it is significant for a group of all Commercial Banks, while insignificant for a group of Private and Public Banks. Positive association implies higher the LLP rate higher will be the amount of GNPA resulting into higher provision. And negative association implies prior provision for anticipated losses results into lower Non Performing Loans.

The association between Operating inefficiency and GNPA for a group of All Commercial, Private and Public Banks is positive and significant for a group of all Commercial Banks indicating that high Operating inefficiency contributes positively towards more Credit Risks. There is no change in the expected and actual sign.

There is positive and significant association between Credit Growth and GNPA Ratio proxy for Credit Risk, which indicates growth in credit rate positively, contributes to Credit Risk as aggressive loan granting policy may result in granting loans to wrong people. There is no difference in the expected and actual sign of this ratio for all groups of banks under study.

Size represented by Total Assets shows positive but insignificant association with the proxy for Credit Risk GNPA's for a group of all, Private and Public Banks. The Negative association indicates larger the size of the bank larger is the scope for Credit Risk. Positive relations can be justified as larger the size larger is the tendency to venture into risky business resulting into more Credit Risks.

The  $r^2$  explains that only 10%, 9% and 17% variation in credit risks of a group of all Commercial, Private and Public banks is on account of above significant factors deciding credit risks.

### 6.2.5.3 Model Three

**Table 6.2.5.3 Comparison of Expected Result with Actual Results for Macroeconomic Determinants of Credit Risks (GNPA Ratio)**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance		
		All	Private	Public	All	Private	Public
GDP Growth Rate	Neg./Post.	N	N	N	-	-	-
Inflation Rate	Neg./Post	N	N	N	**	*	**
Unemployment Rate	Postv./Neg.	P	P	P	-	-	-
Exchange Rate	Postv.	P	N	P	-	-	**
Lending Rate	Postv.	P	P	N	-	-	-
					34%	20%	49%

**Source: Authors Compilation from Regression Tables objective 2**

The table compiled above presents change in the significance and sign of determinants for different groups of Banks when only Macroeconomic determinants are considered instead of both Macroeconomic and Bank Specific parameters taken together

The results confirm the proposed sign for all the Macroeconomic determinants, where GDP Growth Rate shows negative and insignificant association with GNPA of a group of all Commercial, Private and Public

Banks. The negative association implies downturn in economy and fall in GDP Rate will affect Payment capacity resulting in more NPAs and vice versa.

The Inflation Rate is significant and negatively associated with GNPA's for a group of All, Private and Public Banks and indicates that rise in Inflation Rate has not adversely affected the repayment capacity as there is no change in the amount of installments to be paid thereby no defaults and less NPAs.

The positive relation as expected was found between Unemployment Rate and GNPA's for a group of All, Private and Public Banks implies that higher the rate of unemployment in the country larger will be the NPAs.

The Exchange Rate is insignificant and positively associated with the NPAs of a group of All Commercial and shows positive association with credit risks of Public banks and significant and negative for a group of Private Banks. Positive and significant association may be due to extensive involvement of Public Banks in international transactions of the country. Appreciation in Exchange Rate positively contributes towards an increase in NPAs. The negative correlation of Exchange Rate implies appreciation in Exchange Rate will inversely add to NPAs.

Lending Rate is positively related to NPAs of a group of All Commercial and Private Banks but insignificant which indicates rise in Lending Rate encourages defaults. It is negatively associated with Public Banks and insignificant indicating that higher lending rate will reduce the default rate of Public Banks.

The  $r^2$  explains 34%, 20% and 49% variation in credit risks of a group of Commercial, Private and Public Banks respectively due to significance of above mentioned macroeconomic indicators.

#### 6.2.5.4 Model Four, Five and Six

**Table 6.2.5.4 Comparison of Expected Result with Actual Results for Bank Specific Determinants and Macroeconomic Determinants of Credit Risks (GNPA Ratio), with Dummy for Basel II**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance			
		1 All	2 All	3 All	1 All	2 All	3 All	
CAR	Neg.	N	N		-	-		
LLP	Postv./ Neg.	P	P		**	-		
Operating Inefficiency	Postv .	N	P		-	-		
Credit Growth	Postv.	P	P		*	**		
Size	Neg.	P	P		-	-		
Ownership		-	-		-	-		
GDP Growth Rate	Neg. /Post.	N			N	-		-
Inflation Rate	Neg./Post v	N		N	**		**	
Unemployment Rate	Postv /Neg.	N		N	-		-	
Exchange Rate	Postv.	P		P	*		*	
Lending Rate	Postv.	N		N	*		-	
Basel II		N		N	N	**	**	***
						<b>36%</b>	<b>14%</b>	<b>35%</b>

Source: Authors Compilation from Regression Tables objective 2

The table above helps in drawing inference regarding significant and expected and actual signs of association between the variables when a group of All Commercial Banks are considered for three categories of determinants viz., Bank Specific and Macro together, only Bank Specific and only Macroeconomic with a Dummy variable for Basel II period.

The association of CAR with Credit Risk is negative when both Bank Specific and Macroeconomic factors and also when only bank specific factors are considered and in conformity with the expected sign. The CAR is not a significant factor in deciding the Credit Risks.

The association of LLP to Credit Risk is significant and positive and results are in conformity with the expected signs of association when both macro and micro factors are analysed together.

The Operating Inefficiency to Credit Risk is insignificant and shows negative association when both bank specific and Macroeconomic determinants are considered. While when only Bank Specific Factors are considered it shows positive and insignificant association and results are in conformity with the expected sign.

Credit Growth is positively and significantly associated with Credit Risks when Bank Specific and macroeconomic determinants are combined and also when only Bank Specific factors are considered and results are in conformity with the expected sign of association.

Size show positive and insignificant association with a Credit Risk when variables are grouped based on Bank Specific with Macroeconomic factors and also when only Bank Specific factors are considered.

The GDP growth and Credit Risks show negative association with the credit risks when bank specific and macroeconomic variables are clubbed together and also macroeconomic factors

Inflation Rate is significant and negatively associated with Credit Risk and results are in conformity with the expected sign.

The Unemployment Rate is negatively associated with Credit Risk and confirms with the expected sign.

The Exchange Rate show significant and positive association with the Credit Risks and in conformity with the expected sign.

Lending Rate and Credit Risk are significantly and negatively associated and actual results are in conformity with the expected signs of association when two categories of variables are grouped together.

The Basel II time dummy was specially incorporated to see change in the results and the Basel II dummy is significant in all three cases showing negative association with credit risks which also implies that post Basel II period was significant in determining the Credit Risks when both Bank Specific and Macroeconomic indicators taken together and separately when only Bank Specific or Macroeconomic factors are considered.

R2 explains 36%, 14%, and 35% variation in credit risks on account of significant contribution of above factors for a group of all Commercial Banks.

### **6.3 Summary**

The chapter has dealt with the bank specific and macroeconomic determinants in influencing credit risk for a group of all Commercial banks and also for a group of private and public banks under study. Along with macro and bank specific factors dummy variable for Basel II Time period is included to see its influence on credit risks of a group of all Commercial banks. The determinants are studied using regression analysis by way of Six Models and finally discussion is carried out by compiling the results from the regression results of all six models. The results with regard to factors show different implications for different groups considered under study but Inflation rate is the determining factor of credit risks.

## **CHAPTER VII**

### **ANALYSIS AND DISCUSSION ON CREDIT RISK AND ITS EFFECT ON THE PERFORMANCE OF BANKS**

#### **7.1. Background**

Earning of profits is the ultimate goal of commercial banks and accordingly all the core strategies are planned and designed in the direction of fulfilling of this objective. But when bank plans to maximise its profitability, it has two options either to increase the exposure to risk or to cut down the operating cost. Koch and MacDonald (2000) argue that a bank's profitability will generally vary directly with the riskiness of its portfolio and operations.

Management of trade off between the risks and return is of paramount importance for maintaining the profitability of the banks. Of all the risk faced by the banks, the Credit Risks arises from the asset that generates substantial amount of interest income and thereby affect the performance of the banks largely.

As a result, in order to increase the return, banks need to know which risk factors have greater impact on profitability which eventually leads to bank financial performance and credit risk is the most significant factors for commercial banks. This means the probability where the credit risk influences the profitability is large. As a result the Credit Risk is found to be the most important determinant of Bank Performance and the need arises to study its

effect on the performance and build a strong Credit Risk Management System to have quality loan portfolio required for robust performance not only of the Commercial Banks but the overall economy of a country.

Consequently this study seeks to find out the relationship that exists between credit risk and bank performance of select banks in India. The research work for this objective employs dependent, independent and control variable. The Performance represents the dependent variable and Credit risk as the independent variable and Bank Size Log of Total Assets and Deposits represents Control Variables and accordingly the independent variable is the presumed cause and the dependent variable is the presumed effect

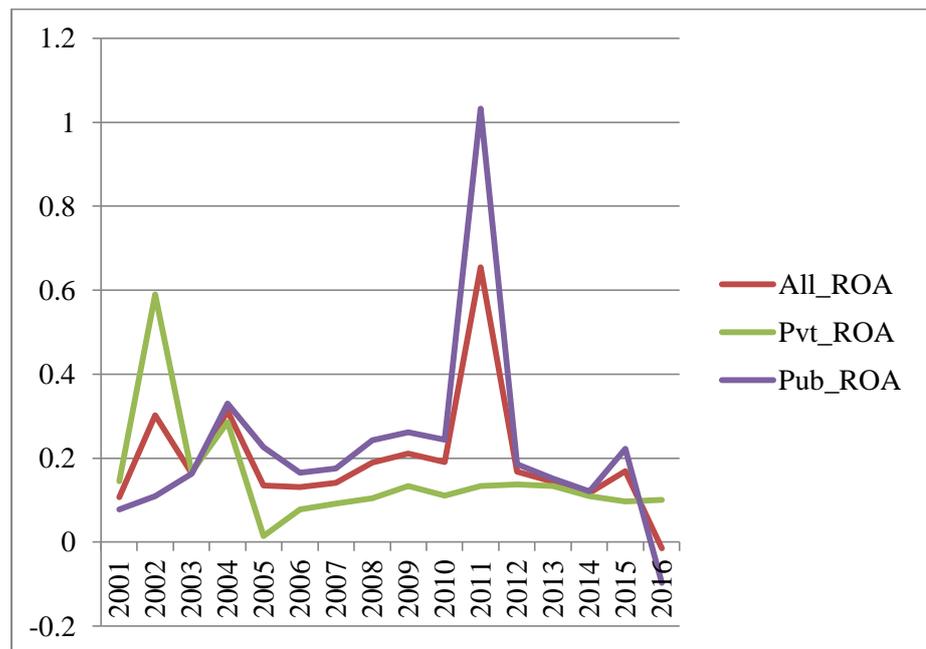
The proxy for credit risk used in the study include Gross Non Performing Asset ratio, Loan Loss Provision to Total Advances, Capital Adequacy Ratio, Credit Deposit Ratio, Loan Loss Provision to Non Performing Assets, Loan Loss Provision to Assets, Advances to Assets and Operating Expenses to Gross Loans, Deposits and Log of Total Assets to represent size.

Return on Assets, Return on Equity and Net Interest Margin has been used as proxy for performance representing dependent variable and presents the analysis and discussion.

## 7.2 Analysis

### 7.2.1 Trend Analysis

**Figure 7.2.1.1 Trend of Rate of ROA of Banks under study**



The rate of ROA as depicted by figure 7.2.1.1 above shows that a group of Public Sector banks show a low rate in 2001 less than 0.1 and in the year 2004 it shows highest rate of approximately 0.3, from 2005 to 2010 it is showing a decline, in 2012-13 it is showing a fall in rate. The year 2015 is showing a rise of approximately 0.2 and 2016 is showing negative ROA.

On the contrary the rates disclosed by the above figure for Private Banks is less than 0.2 in 2001, and in 2002 it has gone high to 0.6. There is a decline to 0.2 in 2003 and the year 2005 also showing a decline, after that though there is fluctuation at stabilized rate till 2016.

The figure of ROA for all the banks taken together show a high rate of 0.3 in 2004, negative in 2016 and as high as 0.6 in 2011.

The results of 1<sup>st</sup> two years of Private Banks show a high rate of ROA compared to Public Banks, latter phase though there is increase in the ROA of Public than Private it shows negative rate in the last year of study

**Figure 7.2 .1.2 Trend of Rates of ROE**

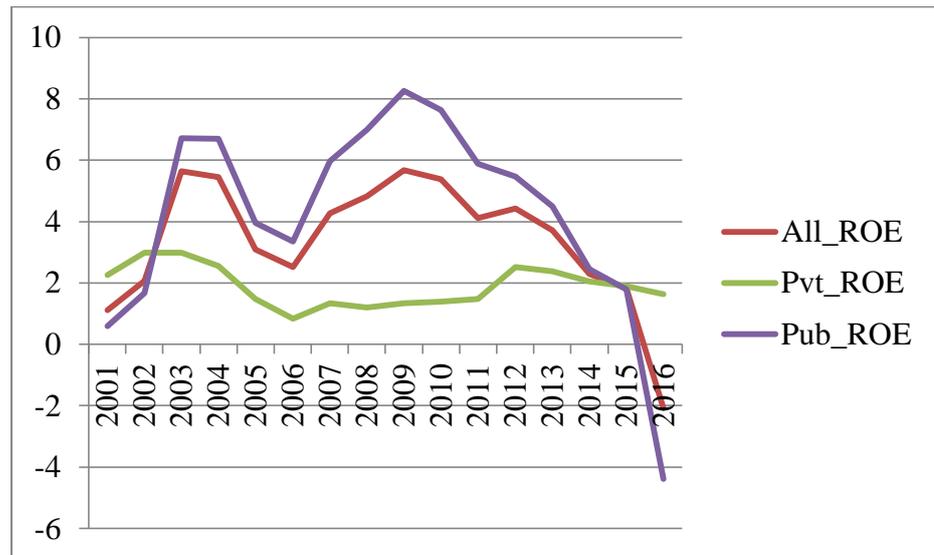


Figure 7.2.1.2 presents the growth of Rate of ROE and the figure shows that there is increase in the rate of ROE when all banks under study are observed from the base year to the last year under study. In 2003 it has reached at height of 5.00 and above. There is fluctuation but it shows a rising trend when compared with the base year 2001, though compared with the previous year there is a decline. It shows negative rate in 2016.

The trend of ROE of a group of Private Banks under study show a rising trend till 2004 and then the downward movement when the same is

compared with the base year. The period from 2005 to 2010 there is a decline. But when compared with earlier year there is a growth till 2012 and then showing declining rate till 2016. ROE of Private Banks show positive growth rate.

Public Banks under study show rising trend and 2004 and 2005 marked a rate of 6.71 and 6.70 respectively. Though there is fluctuation but shows a rise when compared with the base year. The results shows a negative rate of 4.3793 2016.

The ROE results of Public bank are much better than the Private Banks as it is showing the improvement till 2015. But Private Banks show stable results from 2012.

**Table 7.2.1.3. Rate of Net Interest Margin (NIM)**

Year	NIM( All)	NIM( Private)	NIM ( Public)
2001	0.178079	0.382138	0.029673
2002	0.27633	0.359443	0.231577
2003	0.542591	0.542575	0.5426
2004	0.460213	0.294525	0.54858
2005	1.500627	1.563665	1.441297
2006	1.645272	1.620049	1.665185
2007	1.565511	1.623738	1.523164
2008	1.354422	1.629028	1.182793
2009	1.371152	1.71784	1.140026
2010	1.390363	1.768296	1.154154
2011	1.457512	1.898377	1.156922
2012	1.321094	1.658982	1.123992
2013	1.334547	1.761551	1.067669
2014	1.327287	1.653944	1.100047
2015	1.27315	1.661404	0.990783
2016	1.328074	1.722775	1.027349

**Source: Annual Reports of Banks and Authors calculations**

**Figure 7.2.1.3 Trend of Net Interest Margin**

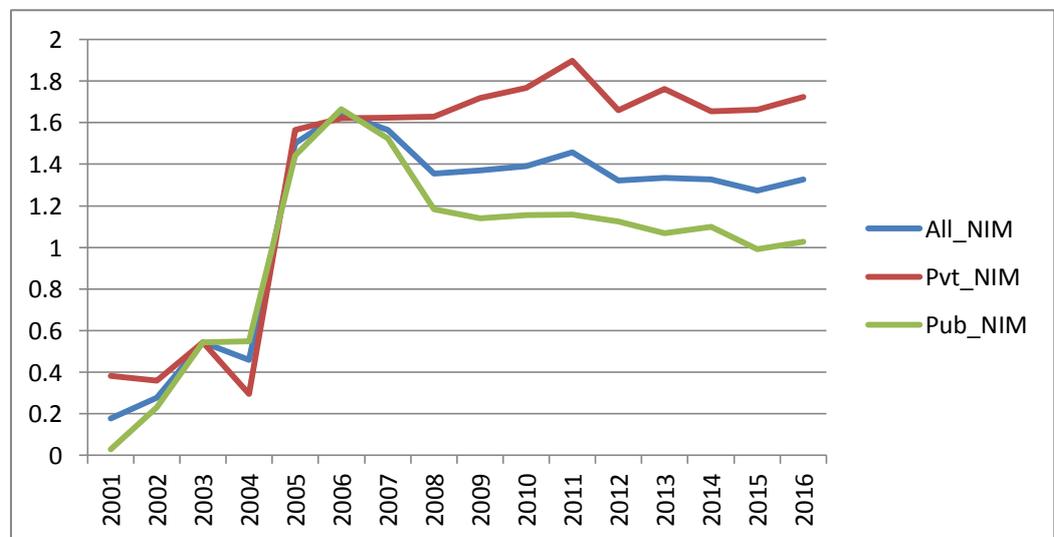


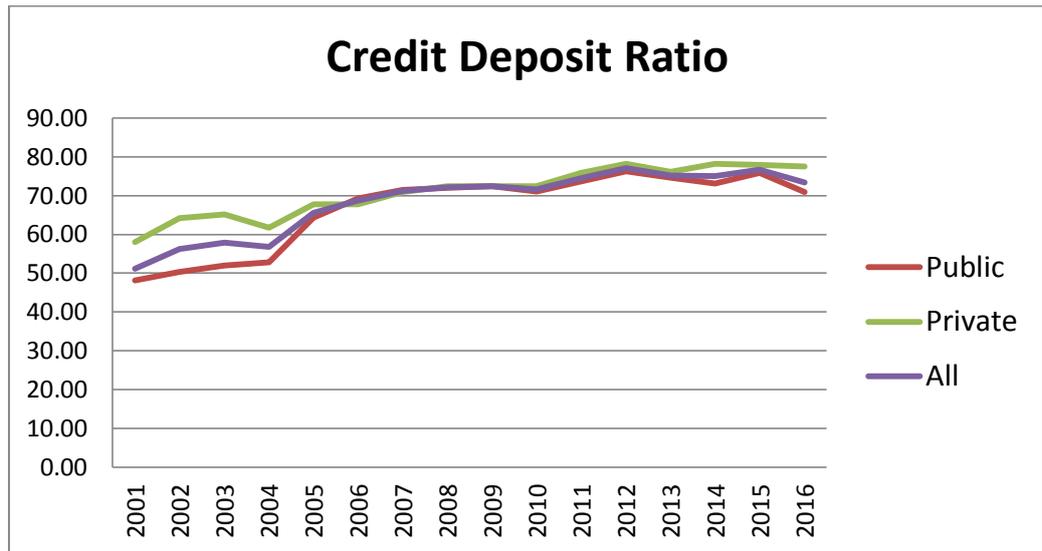
Table 7.2.1.3 and Figure 7.2.1.3 present the movement of NIM of all Banks, a group of Public and a Private Banks under study. One common feature which figure depicts is that whether all banks or a group of Public or a Private, it shows hike in the year 2005.

For Public Banks thereafter the figure shows decline till 2007 and then the rate is stable with very slight fluctuation till 2016.

As far as groups of Private Banks are concerned the NIM shows height of approximately 1.8 in 2011 and after that showing downward trend.

As disclosed by figure 7.2.1.3 the year 2005 shows rise of approximately 1.6 for all banks, then moving in the downward direction showing decline till 2007 and then there is slight rise and decline in 2012 and the rates are stable showing little variation.

**Figure 7.2.1.4 Trend of Credit Deposit Ratios of Banks under Study**



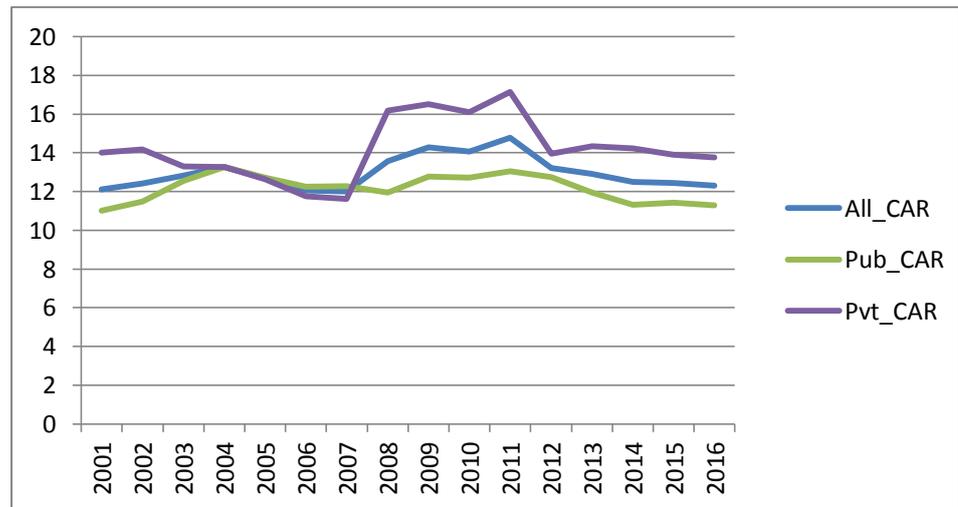
The Credit Deposit Ratio as depicted in Figure 7.2.1.4 below show that there is increase this ratio over a period of 16 years with regard to all banks under study taken together, Private Banks and also a group of Public Bank. The ratio for Public Bank was 48.12 in 2001, increased to 70.85 in 2016, for Private Bank it stood at 58.08 in 2001 higher than Public and reached to 77.45 in 2016. For all the banks together the CD Ratio stood at 73.40 as on 31<sup>st</sup> March 2016. As per Notification of RBI banks have been advised to increase the Ratio to 60 and all banks under study on an average achieved the same.

**Table 7.2.1.5 Rate of Capital Adequacy Ratio of Banks under study**

	<b>CAR</b>	<b>CAR</b>	<b>CAR</b>
<b>Year</b>	<b>All</b>	<b>Public</b>	<b>Private</b>
2001	12.09	11.02	14.00
2002	12.41	11.49	14.18
2003	12.82	12.54	13.28
2004	13.25	13.25	13.26
2005	12.67	12.72	12.62
2006	12.05	12.24	11.75
2007	12.00	12.28	11.60
2008	13.57	11.94	16.17
2009	14.27	12.77	16.52
2010	14.06	12.71	16.09
2011	14.77	13.04	17.14
2012	13.21	12.74	13.96
2013	12.90	11.95	14.33
2014	12.48	11.32	14.22
2015	12.43	11.41	13.90
2016	12.30	11.29	13.76

**Source: Annual Reports of Banks and Authors calculations**

**Figure 7.2.1.5 Trend of Capital Adequacy Ratio of Banks under Study**



As depicted by Table and Figure 7.2.1.5 a group of all Commercial, Private and Public banks under study have maintained the Capital Adequacy

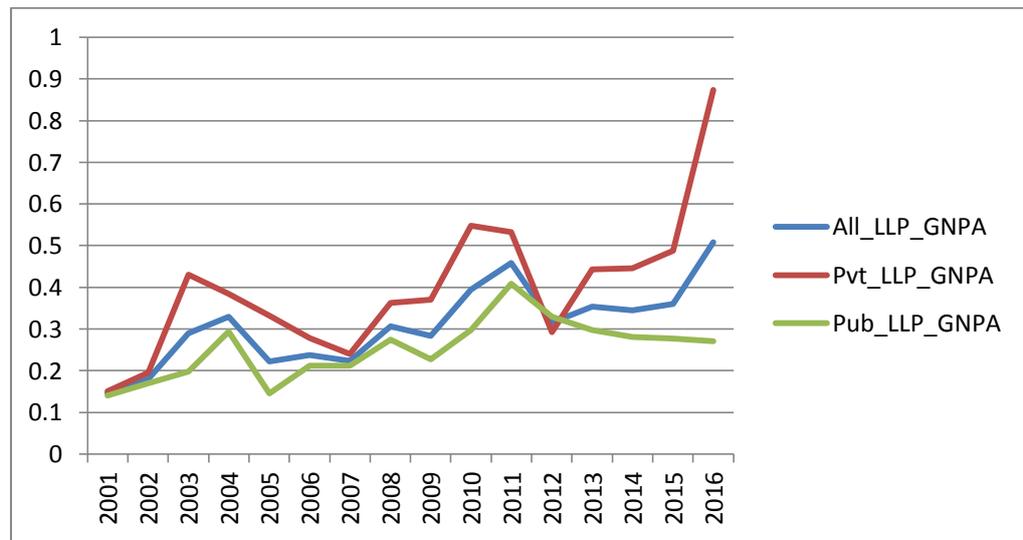
as per RBI guidelines. The table shows that Private Banks have shown better and higher CAR compared to the Public Banks.

**Table 7.2.1.6 Loan Loss Provision to Gross Non Performing Assets**

<b>Year</b>	<b>LLP_GNPA (All Banks)</b>	<b>LLP_GNPA ( Private Banks)</b>	<b>LLP_GNPA ( Public Banks)</b>
2001	0.14486	0.150357	0.140147
2002	0.179771	0.195019	0.169606
2003	0.289318	0.429709	0.198065
2004	0.329495	0.383917	0.293213
2005	0.222609	0.332536	0.14566
2006	0.236963	0.278362	0.212501
2007	0.223105	0.23971	0.212312
2008	0.30685	0.361981	0.274272
2009	0.283404	0.369778	0.227073
2010	0.394005	0.547963	0.297781
2011	0.458429	0.532018	0.408254
2012	0.31578	0.292962	0.329669
2013	0.353912	0.443441	0.297957
2014	0.344369	0.445522	0.281148
2015	0.359788	0.487655	0.276397
2016	0.508637	0.874117	0.27028

Source: Annual Reports of Banks and Authors Calculation

**Figure 7.2.1.6 Trend of Loan Loss Provision to Gross Non Performing Assets**



The above table 7.2.1.6 and Figure 7.2.1.6 present the ratio of LLP to GNPA.

The group of Public Banks under study shows a rising trend from 2001 to 2016 but show static movement in 2005 when comparison is made with the base year. The LLP to GNPA ratio is almost doubled from the base year to the most recent period under study.

The LLP to GNPA ratio of Private Banks under study also show rising trend but this ratio is worse than the ratio of a group of Public Banks. The ratio is almost increased by approximately more than 5 and half times when comparison of base year and most recent year is made. The rate for the year 2001 was 0.15 and the year 2016 showed an increase up to 0.87.

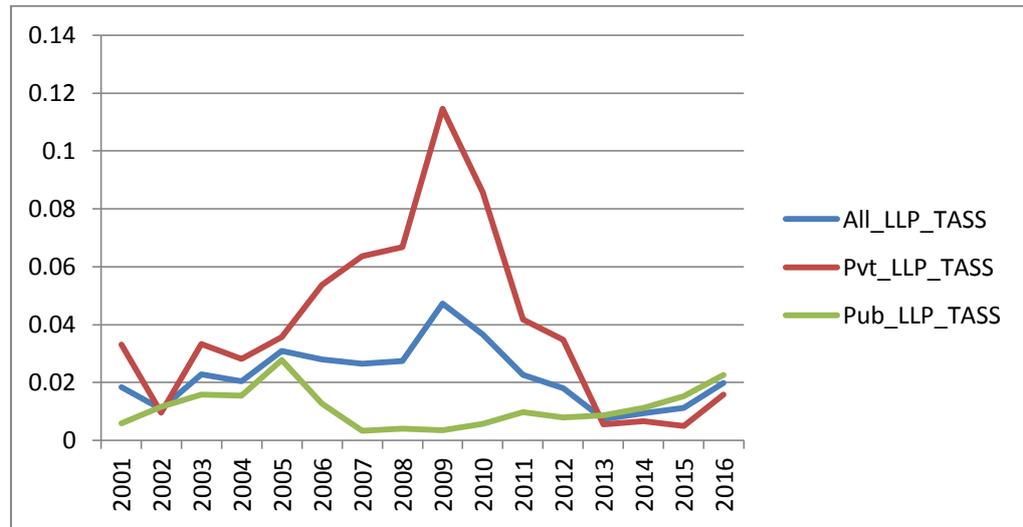
When all 40 Commercial banks under study are considered the ratio of LLP to GNPA shows a rising trend and approximately shows a rise of little less than 4 times.

**Table 7.2.1.7 Loan Loss Provision to Total Assets**

<b>Year</b>	<b>LLP_TASS ( All Public)</b>	<b>LLP_TASS ( Private Banks)</b>	<b>LLP_TASS ( Public)</b>
2001	0.0184	0.0331	0.0058
2002	0.0108	0.0095	0.0116
2003	0.0228	0.0332	0.0158
2004	0.0203	0.0281	0.0154
2005	0.0310	0.0356	0.0277
2006	0.0279	0.0537	0.0126
2007	0.0264	0.0637	0.0034
2008	0.0274	0.0668	0.0041
2009	0.0473	0.1145	0.0035
2010	0.0365	0.0857	0.0058
2011	0.0227	0.0417	0.0097
2012	0.0181	0.0347	0.0079
2013	0.0074	0.0055	0.0086
2014	0.0094	0.0065	0.0112
2015	0.0112	0.0049	0.0152
2016	0.0199	0.0158	0.0225

**Source: Annual Reports of Banks and Authors Calculation**

**Figure 7.2.1.7 Trend of Loan Loss Provision to Total Assets**



As revealed by table 7.2.1.7 and figure 7.2.1.7 the rate of LLP to TASS of all banks under study from 2003 shows a rising trend till 2010 and after that there is declining trend indicating fall in the ratio. But the rate of last year is 0.0199 which is more than the base year 2001 where the rate was 0.0184.

As revealed by the above table the group of Public Banks show fluctuation and there is downward trend when compared with all banks and public banks under study. The highest rate of approximately 0.35 is shown by the year 2005.

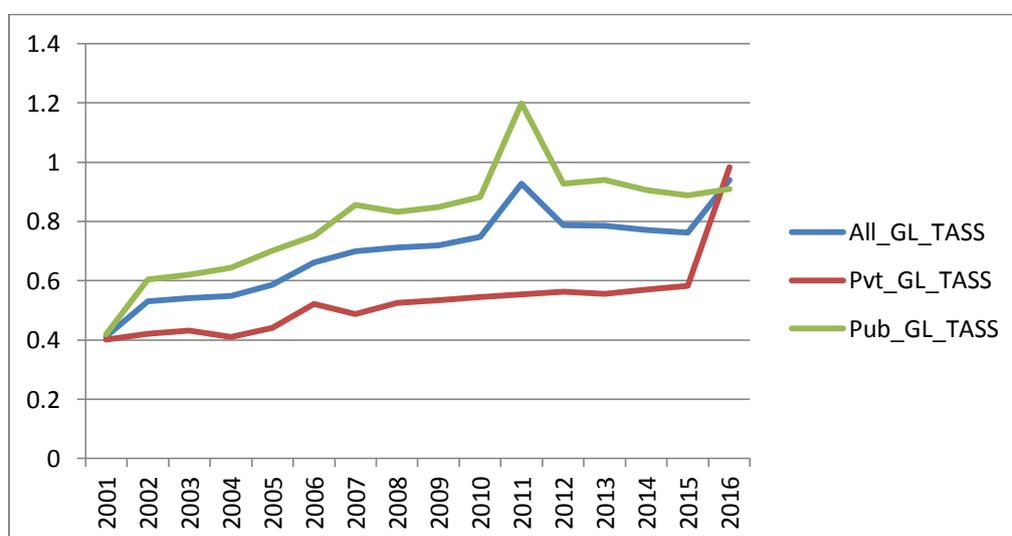
For a group of Private Banks under study the year 2009 showed the highest rate of 0.11, after that showing a declining trend with slight fluctuation and upward movement in the year 20016.

**Table 7.2.1.8 Gross Loans to Total Assets**

<b>Year</b>	<b>Gross Loans to Total Assets (All)</b>	<b>Gross Loans to Total Assets ( Private)</b>	<b>Gross Loans to Total Assets ( Public)</b>
2001	0.410926	0.40079	0.418395
2002	0.530314	0.420395	0.603594
2003	0.540951	0.431159	0.619373
2004	0.549123	0.40949	0.644327
2005	0.585402	0.439873	0.701825
2006	0.660856	0.521801	0.751545
2007	0.699972	0.48668	0.855094
2008	0.711593	0.525376	0.833039
2009	0.718991	0.533143	0.848276
2010	0.746987	0.544052	0.882276
2011	0.926823	0.553779	1.198128
2012	0.787562	0.563406	0.927661
2013	0.785929	0.555412	0.939606
2014	0.771977	0.570547	0.906264
2015	0.762382	0.581811	0.887996
2016	0.94029	0.983318	0.910358

**Source: Annual Reports of Banks and Authors Calculation**

**Figure 7.2.1.8 Trends of Gross Loans to Total Assets**



As depicted by above Figure 7.2.1.8 and Table 7.2.1.8 the ratio of Gross Loans to Total Assets for all 40 Banks under study reveals increasing trend from 0.41 to 0.94, which means proportion of Total Loans to Total Assets has been showing an increase by more than double and out of every Rs. 100 the component of amount of Loans in the latest year under study is Rs. 94.

As far as a group of Private Banks under study is concerned there is a rising trend and reaching to the height of 0.98 in the latest period as on 31<sup>st</sup> March 2016, resulting in a loans advanced to 98% of the Total Assets held.

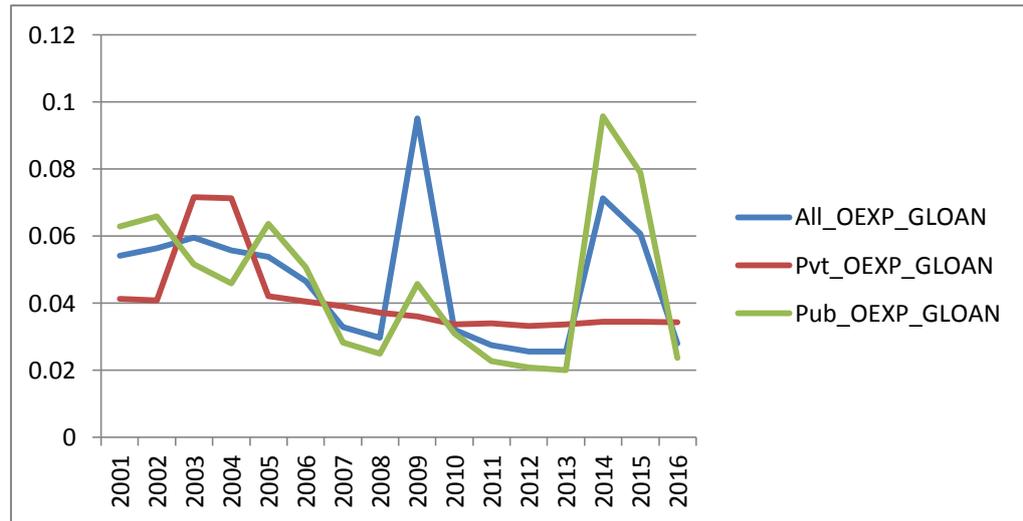
A group of Public Banks under study also showing a similar situation of increasing trend and the composition of Loans to Total Assets which was approximately 42% in 2001 increased to 91% in 2016.

**Table 7.2.1.9 Operating Expenses to Gross Loans**

<b>Year</b>	<b>Operating Exp to Gross loan( All)</b>	<b>Operating Exp to Gross loans (Private)</b>	<b>Operating Exp to Gross loans ( Public)</b>
2001	0.0540	0.0412	0.0628
2002	0.0563	0.0408	0.0659
2003	0.0595	0.0715	0.0515
2004	0.0556	0.0712	0.0457
2005	0.0537	0.0421	0.0635
2006	0.0465	0.0404	0.0506
2007	0.0327	0.0390	0.0282
2008	0.0297	0.0371	0.0248
2009	0.0950	0.0359	0.0456
2010	0.0319	0.0336	0.0308
2011	0.0273	0.0339	0.0226
2012	0.0255	0.0330	0.0207
2013	0.0254	0.0335	0.0200
2014	0.0712	0.0344	0.0957
2015	0.0606	0.0344	0.0789
2016	0.02797	0.0342	0.0235

Source: Annual Reports of Banks and Authors Calculation

**Figure 7.2.1.9 Trend of Rate of Operating Expenses to Gross Loans**



The ratio of Operating expenses to Total loan representing Cost per Loan is given in above Table 7.2.1.9 and Figure 7.2.1.9.

The Cost per Loan ratio of All Banks under study is showing a fluctuating trend and from 2005 the ratio has been declining. In the year 2005 the ratio as 0.053 and in 2016 declined to 0.0279, thereby showing a fall in the rate of cost per loan.

The Cost per loan of a group of Private Banks under study shows a fluctuating trend till 2005 and from 2006 till 2013 there is a downward trend and slight rise from 2014 till the latest year under study. The year 2006 showed a rate of 0.040 while the year 2013 shows 0.033.

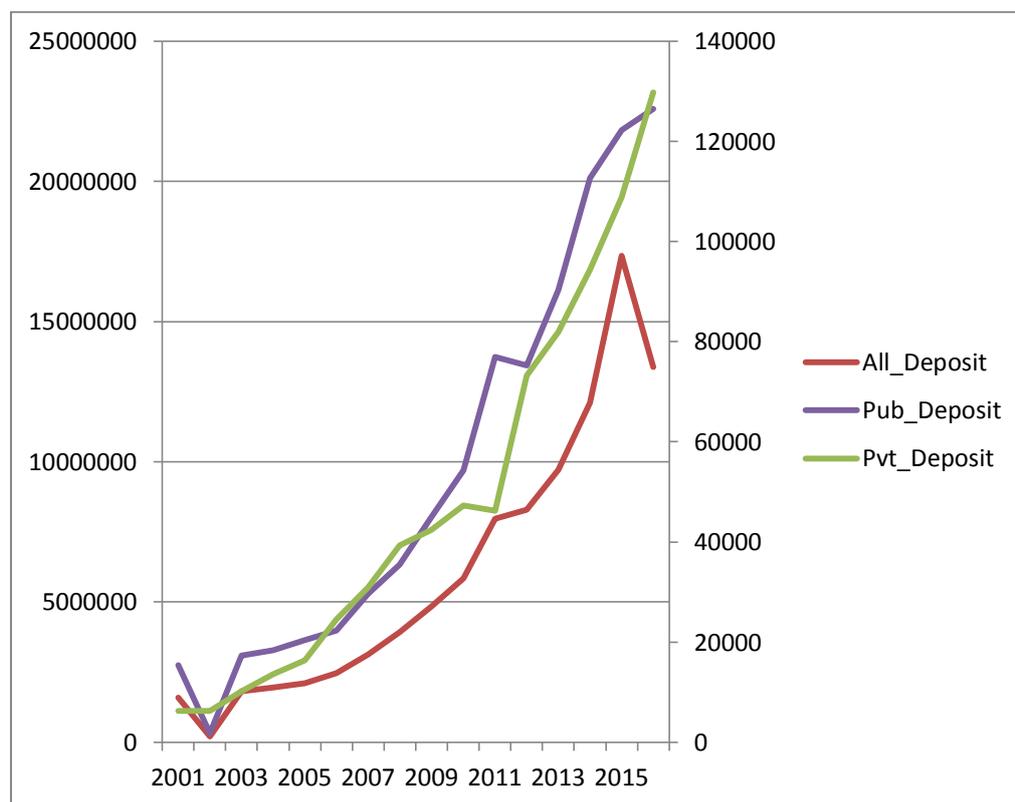
The Cost per Loan as disclosed by group of Public Banks has also been showing a fluctuating trend and downward movement from 2006 when compared with the base year 2001 till 2013. Last two years of the period under study show rise in the ratio and again there is decline in the ratio to 0.0235 by 33.33% when compared with the base year.

**Table 7.2.1.10 Total Deposits of Banks**

<b>Year</b>	<b>Deposit ( All)</b>	<b>Deposit ( Private)</b>	<b>Deposit ( Public)</b>
2001	1588489	6204	2754382
2002	195502	6270	321657
2003	1809996	10232	3095542
2004	1953225	13624	3275680
2005	2111357	16394	3634966
2006	2454641	24581	3973428
2007	3131057	30935	5287664
2008	3916981	39356	6340497
2009	4829181	42355	8020398
2010	5842540	47278	9706047
2011	7974377	46188	13740333
2012	8301339	73207	13443920
2013	9707821	81961	16125060
2014	12109658	94344	20119868
2015	17341391	108893	21829786
2016	13372928	129828	22585520

**Source: Annual Reports of Banks and Authors Calculation**

**Figure 7.2.1.10 Trends of Total Deposits**



As per Figure 7.2.1.10 given above a group of Public and All Banks under study are represented on the Left Axis and a group of Private Banks on Right axis.

The Deposits as disclosed by the above Table 7.2.1.10 for a group of Private Sector Banks show a rising trend. Year 2001 show deposits of Rs. 6204 Crores, which has increased to 129828 Crores in 2016.

The Deposits of a group of Public Sector Banks also show a rising trend as disclosed by the above figure 7.2.1.10 In the year 2001 the deposits of a group of Public Banks were Rs. 2754382 Crores, which has gone down to Rs. 321657 in 2002, and then showing an increasing trend from 2003 till the

latest year of period under study. The year 2003 shows a deposit of Rs. 3095542 Crores, grown to Rs. 22585520 Crores, in 2016.

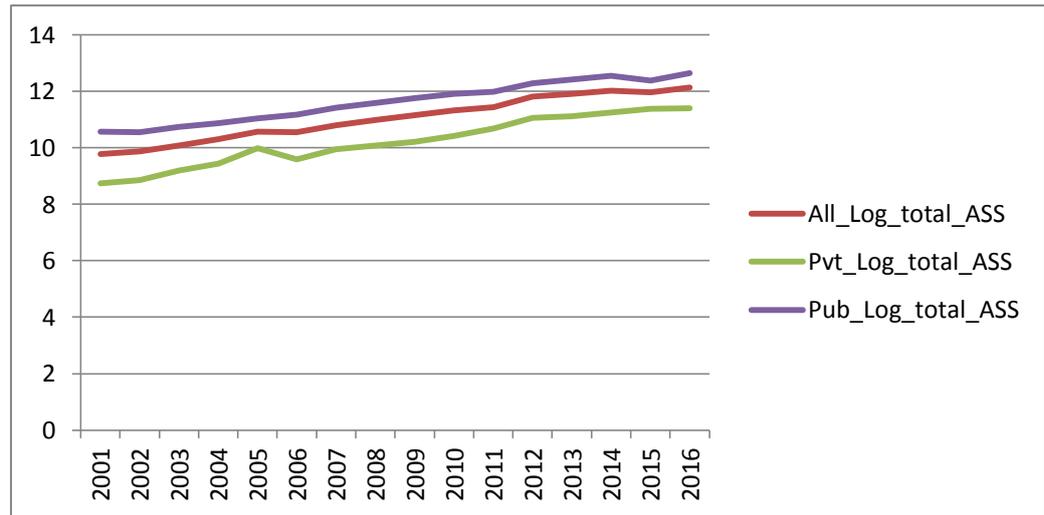
The Deposits of All Banks under study in the year 2001 shows Rs. 1588489 Crores. In 2002 shows a fall to Rs. 195502 due to decrease in deposits of Public group. There is change in the scene from 2003 showing an increase to Rs. 1809996 Crores to Rs.13372928 in 2016.

**Table 7.2.1.11 Size represented by Log of Total Assets**

<b>Year</b>	<b>Log of Total Assets ( All)</b>	<b>Log of Total Assets ( Private)</b>	<b>Log of Total Assets ( Public)</b>
2001	9.7689	8.7497	10.5736
2002	9.8686	8.8537	10.5445
2003	10.0867	9.1868	10.7294
2004	10.2974	9.4460	10.8778
2005	10.5771	9.9938	11.0436
2006	10.5423	9.5854	11.1664
2007	10.8009	9.9424	11.4253
2008	10.9928	10.0750	11.5914
2009	11.1453	10.2148	11.7656
2010	11.3149	10.4186	11.9124
2011	11.4416	10.6890	11.9890
2012	11.8063	11.0507	12.2785
2013	11.9021	11.1178	12.425
2014	12.0273	11.2413	12.5513
2015	11.9730	11.3834	12.3833
2016	12.1311	11.3948	12.6434

Source: Annual Reports of Banks and Authors Calculation

**Figure 7.2.1.11 Trend of Logs of Total Assets**



The above Table and Figure 7.2.1.11 reveal that the log of Assets representing bank size is showing an increasing trend for all banks a group of Public and a group of Private Banks under study. The year 2001 shows 9.76 as the log of asset for all banks under study, which is increased to approximately 12.13 in 2016.

Whereas a group of Private Banks under study show 8.749 as the rate of log of assets in 2001 and showing an increase of 11.39 in 2016. While a group of Public Banks show a log of Total Assets at 10.57 in 2001 and 12.64 in 2016.

## 7.2.2 Descriptive Statistics

**Table 7.2.2.1 Summary Statistics of a group of All Commercial Banks**

<b>Variables</b>	<b>Observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
ROA	607	0.19	0.89	-1.25	19.55
ROE	501	3.37	8.33	-33.11	55.82
NIM	535	1.24	1.48	-0.29	7.16
GNPA Ratio	498	4.45	3.65	0	24.11
LLP to Loan	558	0.04	0.22	-0.00	3.046
CAR	616	12.96	3.77	0.34	59.42
C D RATIO	566	69.65	14.57	8.87	202.84
LLP_GNPA	566	0.31	0.32	-0.21	3.91
LLP_TASS	571	0.02	0.10	-0.00	1.64
GL_TASS	605	0.70	0.90	5.45E-05	6.83
OEXP_GLOA N	599	0.55	12.62	0.000026	308.99
Log of Total Assets	607	11.07	1.93	6.88	21.24
Total Deposit	611	5077221	3.98E+0 7	176.514	5.13E+08

**Source: Annual Reports of the Banks under study and Authors Calculation**

The above Table 7.2.2.1 presents the descriptive of all independent and dependent variable used in the study.

The ROA of All Banks under study on and average stood at 0.19, with a maximum of -1.25 and maximum of 19.55, showing a deviation from mean of 0.894.

The ROE another dependent variable representing Performance shows a mean of 3.37, with a deviation from mean of 8.33 and minimum ROE was .33.11 and maximum stood at 55.82.

The NIM averaged at 1.24 with a deviation of 1.48 and the minimum stood at -0.29 and maximum 7.16.

The average of GNPA ratio stood at 4.45, with a deviation of 3.65, minimum was Zero and the maximum was 24.11.

The minimum LLP to Loan was -0.0007, and averaged at 0.044.

The mean of CAR stood at 12.96, minimum was 0.343 and maximum was 59.42.

The CD Ratio on an average stood at 69% with a deviation of 14.5. The minimum CD was 8.87 and maximum CD was 202.84.

The average mean of The LLP to GNPA and LLP to Total Assets stood at 0.31 and 0.022 respectively. For both the ratios minimum stood at -0.2 and -0.003.

The mean of Gross Loan to Total Assets was 0.7, deviation from mean @ 0.90 and with a minimum of 5.45 and max 6.83.

The Cost per Loan averaged at 0.554, showing a deviation of 12.58 and maximum stood at 308.99.

The log of total assets shows an average mean of 11.07, deviation from mean is @ 1.93 and minimum and maximum was 6.88 and 21.24 respectively.

The mean of Total Deposits stood at 5077221.

**Table 7.2.2.2 Summary Statistics of a group of Private Banks**

<b>Variable</b>	<b>Observations</b>	<b>Mean</b>	<b>Std. Dev</b>	<b>Min</b>	<b>Max</b>
ROA	247	.148	.41	-0.03	4.25
ROE	177	1.84	4.96	-0.71	22.73
NIM	216	1.50	1.55	-0.29	5.61
GNPA Ratio	178	3.76	3.50	0	19
LLP to LN	224	.079	.32	0.00028	3.04
CAR	242	14.19	5.49	0.3434	59.42
CD RATIO	224	71.75	13.53	36.14	114.77
LLP_GNPA	223	.407	.47	0.0014	3.91
LLP_TASS	224	.0396	.16	1.07E-06	1.64
GL_TASS	247	.535	.43	0.0000545	6.83
O Exp to Gross Loan	243	.0406	0413754	0.0024	0.49
Log of Total Asset	248	10.23	1.62	6.88	21.24
Total Deposit	247	49232.68	86002.2	176.51	546424.2

**Source: Annual Reports of Banks and Authors Calculation**

The above Table 7.2.2.2 presents summary statistics of a group 16 Private Banks under study. The mean of ROA stood at .15, showing deviation of .41, with a minimum of -0.03 and maximum of 4.25.

ROE shows a mean of 1.84, with a deviation of 4.96. Minimum ROA stood at -0.7134, and maximum was 22.73.

NIM averaged at 1.5, showing a deviation of 1.55 and maximum stood at 5.61.

The mean of ratio of GNPA stood at 3.76, showing a deviation of 3.50 and the maximum ratio stood 5.61.

The average rate of LLP was .079 and the maximum stood at 3.04.

The CAR on an average was 14.19 and the minimum was 0.34 and maximum 59.42.

The CD ratio on an average was 71.75 % with a maximum of 114.77%.

The LLP to GNPA averaged at .407, with a deviation of .47 and maximum was 3.91.

The mean of LLP to Total Assets was .039, showing a deviation of .169 and maximum ratio stood at 1.64.

Gross Loans to Total Assets shows an average mean of .53. The standard deviation was .43 and the maximum was 6.83.

Cost per Loan average rate was .40 showing a deviation of .041, with a minimum of 0.002 and maximum of 0.490.

The average size of Private Banks was 10.23, with a maximum of 6.88 and maximum 21.24.

The Deposits shows an average mean of 49232, with a maximum of 546424 and minimum of 176.514.

**Table 7.2.2.3 Descriptive Statistics of a group of Public Banks**

Variable	Observations	Mean	Std. Dev.	Min	Max
ROA	360	0.22	1.11	-1.25	19.55
ROE	324	4.20	9.59	-33.11	55.82
NIM	319	1.06	1.40	0.0002	7.16
GNPA Ratio	320	4.83	3.68	0.17	24.11
LLP to LN	334	0.02	0.09	-0.00711	1.37
CAR	374	12.17	1.56	7.33	20.1
CD Ratio	342	68.28	15.08	8.87	202.84
LLP_GNPA	343	0.25	0.15	-0.218	1.34
LLP_TASS	347	0.01	0.03	-0.0037	0.47
GL_TASS	358	0.81	1.10	0.0064	6.74
Oper. EXP_GLOAN	356	0.91	16.3748	0.000026	308.99
Log of Assets	359	11.65	1.92	7.81	20.22
Total Deposit	364	8489069	5.12E+07	3526	5.13E+08

**Source: Annual Reports of Banks under study**

The Table 7.2.2.3 presents summary statistics of a group of Public Banks under study and provide summary of dependent and independent variables used to achieve the 3<sup>rd</sup> objective.

The mean of ROA is 0.227, showing a deviation of 1.11, with a minimum of -1.25 and the maximum ROA earned was 19.55.

The ROE shows an average mean of 4.20, and the deviation was 9.59. The minimum ROE earned was -33.11 and maxim was @ 55.82.

The NIM averaged at 1.06, showing a deviation of 1.4, with a minimum of 0.0002 and maximum was 7.16.

The summary of independent variables used for this objective is given below:

The GNPA on an average stood at 4.83 showing a deviation of 3.68. The minimum GNPA Ratio was 0.17 and maximum reached a height of 24.11.

LLP to Loan showing an average of 0.02, with a deviation 0.09 and maximum LLP to Loan stood at 1.37.

The mean of CAR was 12.17, the minimum CAR was maintained @ 7.33 and maximum was @ 20.1.

The CD ratio minimum was @ 8.87 and Maximum was 202.84, showing a deviation of 15.08 and mean of 68.28.

The mean of LLP to GNPA stood at 0.25 and maximum was 1.34.

The mean of LLP to TASS was 0.011, showing a deviation of 0.033 and maximum was 0.47.

The mean of GL to TASS is revealed at 0.81, while showing minimum as 0.0064, maximum is 6.74.

The Cost per Loan Asset shows a deviation of 16.37 and the mean stood at 0.91, and maximum was 308.99.

The log of Total Assets shows a mean of 11.65 and a deviation of 1.92. The minimum was 7.81 and maximum was 20.22.

The Deposits of Public Banks averaged at 8489069, with a minimum of 3526

### 7.2.3 Correlation Analysis

**Table 7.2.3.1 Correlation Matrix of a group of All Commercial Banks for Model 1 ROA**

	ROA	GNPA Ratio	LLP to Loan	CAR	CD RATIO	LLP_G NPA	LLP_T ASS	GL_T ASS	OEXP_G~N	Log of Total Assets	Total Deposits
ROA	1										
GNPA Ratio	-0.0666	1									
LLP to Loan	-0.0096	0.0593	1								
CAR	-0.0561	0.2059	0.0531	1							
CD RATIO	-0.1798	-0.358	0.0081	0.1558	1						
LLP_GNPA	0.026	0.1449	0.3508	0.0983	0.2826	1					
LLP_TASS	-0.013	0.0621	0.99	0.0512	0.0288	0.3552	1				
GL_TASS	-0.0295	0.0398	0.0375	0.0425	0.0848	0.0056	0.056	1			
OEXP_GLOA N	0.0656	0.0505	0.0095	0.0147	0.005	-0.0436	-0.0105	-0.01	1		
Log of Total Assets	0.0408	0.0822	0.0282	0.1522	0.2874	0.0938	0.0196	0.1843	0.0006	1	
Total Deposits	0.0301	0.0101	0.0286	0.0374	0.0579	-0.0101	-0.031	0.0421	-0.0059	0.6589	1

**Table 7.2.3.2 Correlation Matrix of a group of All Commercial Banks for Model 2 ROE**

	ROE	GNPA Ratio	LLP to Loan	CAR	CD Ratio	LLP_G NPA	LLP_T ASS	GL_T ASS	O EXP_G ~N	Log OF Total Assets	Total Deposits
ROE	1										
GNPA Ratio	-0.2231	1									
LLP to Loan	-0.0638	-0.0593	1								
CAR	-0.0337	-0.2059	0.0531	1							
CD RATIO	0.0004	-0.358	0.0081	0.1558	1						
LLP_GNPA	-0.1045	-0.1449	0.3508	0.0983	0.2826	1					
LLP_TASS	-0.0724	-0.0621	0.99	0.0512	0.0288	0.3552	1				
GL_TASS	-0.0778	-0.0398	-0.0375	-0.0425	0.0848	0.0056	0.056	1			
O Exp. To G LOAN	0.1016	0.0505	0.0095	0.0147	0.005	-0.0436	-0.0105	-0.01	1		
Log of Total Assets	0.1524	0.0822	0.0282	0.1522	0.2874	0.0938	0.0196	0.1843	0.0006	1	
T_Deposits	0.084	0.0101	0.0286	0.0374	0.0579	-0.0101	-0.031	0.0421	-0.0059	0.6589	1

**Table 7.2.3.3 Correlation Matrix of a group of All Commercial Banks for Model 3 NIM**

	<b>NIM</b>	<b>GNPA Ratio</b>	<b>LLP to loan</b>	<b>CAR</b>	<b>CD Ratio</b>	<b>LLP_G NPA</b>	<b>LLP_T ASS</b>	<b>GL_T ASS</b>	<b>O Exp to G Loan</b>	<b>Log of Total Assets</b>	<b>Total Deposit</b>
NIM	1										
GNPA Ratio	0.012	1									
LLP to Loan	-0.0785	-0.0593	1								
CAR	0.1377	0.2059	0.0531	1							
CD RATIO	-0.1141	-0.358	0.0081	0.1558	1						
LLP_GNPA	-0.1434	-0.1449	0.3508	0.0983	0.2826	1					
LLP_TASS	-0.0842	-0.0621	0.99	0.0512	0.0288	0.3552	1				
GL_TASS	-0.081	0.0398	0.0375	0.0425	0.0848	0.0056	0.056	1			
O Exp. G Loan	0.0946	0.0505	0.0095	0.0147	0.005	-0.0436	-0.0105	-0.01	1		
Log of Total Assts	0.0381	0.0822	0.0282	0.1522	0.2874	0.0938	0.0196	0.1843	0.0006	1	
Total Deposit	0.1326	0.0101	0.0286	0.0374	0.0579	-0.0101	-0.031	0.0421	-0.0059	0.6589	1

In order to know the nature of the correlation that exists between the dependent and the independent variables Pearson correlation analysis has been carried out. The correlation matrix that is shown in Table 7.2.3.1 provides an insight into the independent variables that are significantly correlated to the dependent variable ROA.

The results indicate that bank performance as represented by ROA model 1 is negatively correlated with Non-Performing Loan Ratio, LLP to Loan, CAR, CD, and LLP to Total Assets and Gross Loans to Total Assets. It implies that as the value of non-performing loan ratio and all these other ratio increases, the performance of banks will decline.

On the contrary bank performance indicator ROA is positively correlated with the ratio of LLP to GNPA's, Cost per Loan Assets, log of Total Assets representing size and Total Deposits, which implies that as the value of cost per loan assets and other three ratios increases, the performance of bank also improves.

The Table 7.2.3.2 shows the correlation that exist between dependent variable ROE, Model 2 and other independent variables. The ROE shares negative association with GNPA's, LLP to Loan, CAR. LLPA to GNPA, LLP to Total Assets and Gross Loans to Total Assets, The rise in credit risk indicators reduces the ROE.

While CD Ratio, Cost per Loan Ratio, log of Total Assets and Total Deposits show positive relationship with ROE, where increase in these variables increases the ROE.

The 3<sup>rd</sup> Model uses NIM as Performance indicator and Table 7.2.3.3 given above expresses the association between NIM and the independent variables used in the model.

The model 3 shows positive association between NIM and five independent variables viz., GNPA, CAR, Cost per Loans, size, and Deposits, where increase in these five independent variables results in increased NIM. But NIM shares negative relationship with GNPA, C D Ratio, LLP to GNPA, and LLP to Total Assets and Gross Loans to Total Assets.

All three different models show different relationship with the independent variables. LLP to Loans share inverse relationship with all three profitability indicators along with LLP to Total Assets and Gross Loans to Total Assets.

Whereas all three parameters of Profitability ROE,ROA,NIM share positive relationship with Deposits, log of Assets and cost per Loan Assets.

**Table 7.2.3.4 Correlation Matrix of a group of Private Banks - Model 1 ROA**

	ROA	GNPA Ratio	LLP to LN	CAR	CD RATIO	LLP_GNPA	LLP_TASS	GL_TASS	Ope. Exp G Loan	Log of Assets	Total Deposits
ROA	1										
GNPA Ratio	-0.0551	1									
LLP to Loans	-0.1007	-0.1386	1								
CAR	-0.1341	-0.1448	0.0129	1							
CD RATIO	-0.0544	-0.5155	0.0178	0.1869	1						
LLP_GNPA	-0.1849	-0.1802	0.3518	0.0187	0.4162	1					
LLP_TASS	-0.098	-0.141	0.9982	0.0158	0.0271	0.3535	1				
GL_TASS	0.1997	-0.0718	-0.0232	-0.0286	0.1086	-0.0151	-0.0078	1			
O Exp G Loan	-0.3066	0.1993	0.2816	0.0332	-0.0584	0.1006	0.2718	-0.1639	1		
Log of Total Assets	-0.1215	-0.2719	0.2703	0.1399	0.4121	0.4053	0.2715	-0.1542	0.1629	1	
Total Deposit	-0.1356	-0.175	0.2065	0.0696	0.4687	0.3595	0.2151	0.0187	0.0128	0.7036	1

**Table 7.2.3.5 Correlation Matrix of a group of Private Banks - Model 2 ROE**

	ROE	GNPA Ratio	LLP to LN	CAR	CD Ratio	LLP_GNPA	LLP_TASS	GL_TASS	Ope. Exp G Loan	Log of Assets	Total Deposits
ROE	1										
GNPA Ratio	-0.0976	1									
LLP to Loans	-0.1241	-0.1386	1								
CAR	-0.1241	-0.1448	0.0129	1							
CD RATIO	-0.1262	-0.5155	0.0178	0.1869	1						
LLP_GNPA	-0.188	-0.1802	0.3518	0.0187	0.4162	1					
LLP_TASS	-0.0975	-0.141	0.9982	0.0158	0.0271	0.3535	1				
GL_TASS	0.006	-0.0718	-0.0232	-0.0286	0.1086	-0.0151	-0.0078	1			
O Exp G Loan	-0.259	0.1993	0.2816	0.0332	0.0584	0.1006	0.2718	-0.1639	1		
Log of Total Assets	-0.0492	-0.2719	0.2703	-0.1399	0.4121	0.4053	0.2715	-0.1542	-0.1629	1	
Total Deposit	-0.1136	-0.175	0.2065	0.0696	0.4687	0.3595	0.2151	0.0187	-0.0128	0.7036	1

**Table 7.2.3.6 Correlation Matrix of a group of Private Banks - Model 3 NIM**

	NIM	GNPA Ratio	LLP to LN	CAR	CD Ratio	LLP_GNPA	LLP_TASS	GL_TASS	O Exp G Loan	Log to Asset	T Deposit
NIM	1										
GNPA Ratio	0.1564	1									
LLP to LN	-0.194	0.1386	1								
CAR	0.2159	0.1448	0.0129	1							
CD Ratio	0.4019	0.5155	0.0178	0.1869	1						
LLP_GNPA	0.2557	0.1802	0.3518	0.0187	0.4162	1					
LLP_TASS	0.1917	-0.141	0.9982	0.0158	0.0271	0.3535	1				
GL_TASS	0.1126	0.0718	0.0232	0.0286	0.1086	-0.0151	-0.0078	1			
O Exp to G Loan	0.2524	0.1993	0.2816	0.0332	0.0584	0.1006	0.2718	-0.1639	1		
Log to Assets	0.3071	0.2719	0.2703	0.1399	0.4121	0.4053	0.2715	-0.1542	-0.1629	1	
T_DEPOSIT	0.2483	-0.175	0.2065	0.0696	0.4687	0.3595	0.2151	0.0187	-0.0128	0.7036	1

Table 7.2.3.4 presents Correlation Matrix of a group of Private Banks and shows correlation between the Performance indicator ROA and the independent variables.

The table shows inverse relationship between the ROA and GNPA's Ratio, LLP to LN, CAR, CD, LLP to GNPA, LLP to TASS, Cost per Loan, size and Deposits, where increase in these independent variables will affect the performance indicator ROA negatively.

While the ROA shares positive relationship with GL to TASS, indicating increase in GL to TASS would also bring increase in ROA.

The ROE a Performance indicator used in the Model 2, Table 7.2.3.5 shares positive relationship only with two independent variables viz., GNPA's Ratio and GL to Total Assets, indicating rise in these two independent variables leading to rise in ROE.

The association between ROE and other independent variables used in the study is negative and these variables include LLP to LN, CAR, CD, LLP to TASS, Cost per Loan Asset, size and Deposits, indicating opposite effect of independent variable on the other.

The 3<sup>rd</sup> Model considers NIM as the Performance indicators and Table 7.2.3.6 depicts positive association of NIM with GNPA's, CAR and Gross Loans to Total Assets. Positive association between these variables will bring increase in the other variable.

The results also show that NIM is negatively associated with LLP to GL, CD, LLP to GNPA, and LLP to TASS, Cost per Loan Assets, Size and Deposits. Negative relation will inversely affect the change in the other variable.

All three performance indicator used in the study share negative association with LLP to GL, CD, LLP to GNPA, LLP to TASS, Cost per Loan Assets , Size and Deposits. But association of all three indicators of Performance share different association with CAR and GNPA. The association of ROA, ROE and NIM is positive with GL to TASS.

**Table 7.2.3.7 Correlation Matrix of a group of Public Banks - Model 1 ROA**

	ROA	GNPA Ratio	LLP to Loan	CAR	CD Ratio	LLP to GNPA	LLP to TASS	GL_TASS	O Exp. Loan	Log to Assets	Total Deposits
ROA	1										
GNPA Ratio	-0.0798	1									
LLP to LN	0.0729	0.133	1								
CAR	-0.0879	-0.5306	0.0721	1							
CD Ratio	-0.2176	-0.2892	0.0713	0.1836	1						
LLP_GNPA	0.2153	-0.1286	-0.011	0.1347	0.1568	1					
LLP_TASS	0.0469	0.1058	0.8371	0.0936	0.0213	0.0799	1				
GL_TASS	-0.0512	-0.0533	0.0418	0.0136	0.0963	0.1508	0.3607	1			
O EXP_G LOAN	0.0647	-0.0633	0.0165	0.1048	0.0092	-0.1056	0.0205	-0.0161	1		
Log to Assets	0.0368	-0.0919	0.1269	0.0276	0.3102	0.1265	0.1798	-0.2754	0.0162	1	
T Deposit	0.0248	-0.0022	0.0507	0.0295	0.081	0.0583	0.0613	-0.0612	0.0101	0.753	1

**Table 7.2.3.8 Correlation Matrix of a group of Public Banks - Model 2 ROE**

	ROE	GNPA Ratio	LLP to Loan	CAR	CD Ratio	LLP to GNPA	LLP to TASS	GL_TASS	O Exp. Loan	Log to Assets	Total Deposits
ROE	1										
GNPA Ratio	-0.294	1									
LLP to LN	-0.0649	0.133	1								
CAR	0.1653	-0.5306	-0.0721	1							
CD Ratio	0.0463	-0.2892	-0.0713	0.1836	1						
LLP_GNPA	-0.0516	-0.1286	-0.011	0.1347	0.1568	1					
LLP_TASS	-0.1046	0.1058	0.8371	-0.0936	0.0213	0.0799	1				
GL_TASS	-0.1062	-0.0533	-0.0418	0.0136	0.0963	0.1508	0.3607	1			
O EXP_G LOAN	0.1059	-0.0633	-0.0165	0.1048	0.0092	-0.1056	-0.0205	-0.0161	1		
Log to Assets	0.1608	-0.0919	-0.1269	0.0276	0.3102	0.1265	-0.1798	-0.2754	-0.0162	1	
T Deposit	0.0793	-0.0022	-0.0507	-0.0295	0.081	0.0583	-0.0613	-0.0612	-0.0101	0.7531	1

**Table 7.2.3.9 Correlation Matrix of a group of Public Banks - Model 3 NIM**

	NIM	GNPA Ratio	LLP to Loan	CAR	CD Ratio	LLP to GNPA	LLP to TASS	GL_TASS	O Exp. Loan	Log to Assets	Total Deposits
NIM	1										
GNPA Ratio	-0.0363	1									
LLP to LN	0.1059	0.133	1								
CAR	0.0465	-0.5306	-0.0721	1							
CD Ratio	0.0286	-0.2892	-0.0713	0.1836	1						
LLP_GNPA	-0.0972	-0.1286	-0.011	0.1347	0.1568	1					
LLP_TASS	0.0612	0.1058	0.8371	-0.0936	0.0213	0.0799	1				
GL_TASS	-0.1222	-0.0533	-0.0418	0.0136	0.0963	0.1508	0.3607	1			
O EXP_G LOAN	0.1176	-0.0633	-0.0165	0.1048	0.0092	-0.1056	-0.0205	-0.0161	1		
Log to Assets	0.1947	-0.0919	-0.1269	0.0276	0.3102	0.1265	-0.1798	-0.2754	-0.0162	1	
T Deposit	0.1697	-0.0022	-0.0507	-0.0295	0.081	0.0583	-0.0613	-0.0612	-0.0101	0.7531	1

The above Table 7.2.3.7, 7.2.3.8, and 7.2.3.9 presents the Correlation Matrix for ROA, ROE, and NIM, three Profitability indicators used in Model 1, 2 and 3 and the relationship these variables share with the independent variables of a group of Public Banks.

The ROA as shown by Table 7.2.3.7 is positively related to LLP to LN, LLP to GNPA, and LLP to TASS, Cost per Loan Assets, Size and Deposits, while share inverse association with GNPA, CAR, CD and GL to TASS.

The ROE 2<sup>nd</sup> Performance Parameter depicted in Table 7.2.3.8 share inverse association with GNPA, LLP to LN, LLP to GNPA and LLP to Total Assets. The ROE is positively related to CAR, CD, Cost per Loan, Size and Deposit.

The NIM as appearing in Table 7.2.3.9 is having positive association with LLP to LN, CAR, CD, and LLP to TASS, Cost per Loan, Size and Deposit. The NIM is showing negative correlation with GNPA, LLP to GNPA and GL to TASS.

The ROA, ROE and NIM show negative association with GNPA and GL to TASS. All three Performance indicators are showing positive association with Cost per Loan Assets, Size and Deposits.

## 7.2.4 Regression Analysis

**Table 7.2.4.1 Results of Regression: Model 1 ROA for a group of All Commercial Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>ROA</b>	<b>ROA</b>	<b>ROA</b>
GNPA Ratio	-0.0381**	-0.0266	-0.0381
	(0.0150)	(0.0189)	(0.0247)
LLP Loan	-0.694	-0.405	-0.694
	(1.910)	(1.962)	(0.873)
CAR	-0.00674	-0.0121	-0.00674*
	(0.0130)	(0.0135)	(0.00363)
CDRATIO	-0.0214***	-0.0223***	-0.0214
	(0.00462)	(0.00507)	(0.0175)
LLP_GNPA	0.247	0.229	0.247
	(0.158)	(0.166)	(0.307)
LLP_TASS	0.910	0.426	0.910
	(3.587)	(3.675)	(1.255)
GL_TASS	-0.00883	-0.0160	-0.00883
	(0.0652)	(0.0664)	(0.0186)
OEXP_GLOAN	0.00442	0.00449	0.00442***
	(0.00325)	(0.00331)	(0.000180)
Log to Asset	0.0536	0.0416	0.0536
	(0.0378)	(0.0409)	(0.0342)
T_DEPOSIT	-3.61e-10	-1.05e-10	-3.61e-10
	(1.39e-09)	(1.43e-09)	(9.92e-10)
Constant	1.287**	1.518**	1.287
	(0.514)	(0.599)	(0.911)
<b>Observations</b>	<b>434</b>	<b>434</b>	<b>434</b>

R-squared		0.061	
Number of Year	16	16	16
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

The above table 7.2.4.1 presents the Regression Results of Model 1, where ROA is used as the dependent variable and the results of Random Effect, Fixed Effect and Robust Random Effect Models has been presented to know the effect of Credit Risk indicators on the Performance.

The results of Random Effect Model show that CD Ratio is significant at 0.01% level of significance and showing negative relationship with ROA and GNPA Ratio is significant at 0.05% level of significance sharing negative association with ROA.

The results of Fixed Effect Model also shows inverse association of CD Ratio with ROA and significant at 0.01% level of significance.

The results of Robust Random Effect Model show that CAR shares negative relationship with ROA and significant 0.9% level. The Cost per Loan ratio is significant at 0.01% and shares positive association with ROA.

While other independent variables are not significant but show positive or negative association with ROA. There is inverse association of GNPA Ratio with ROA but not significant.

LLP to Loan, CD Ratio, GL to TASS and Deposits is insignificant and there is negative relationship with ROA.

LLP to TASS and LLP to GNPA and Size are insignificant but show positive association with ROA.

**Table 7.2.4.2 Results of Regression: Model 2 ROE for a group of All Commercial Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>ROE</b>	<b>ROE</b>	<b>ROE</b>
GNPA Ratio	-0.517***	-0.475***	-0.517*
	(0.143)	(0.163)	(0.312)
LLP to Loan	0.499	0.383	0.499
	(15.83)	(16.00)	(7.690)
CAR	-0.0872	-0.0915	-0.0872*
	(0.107)	(0.108)	(0.0457)
CD Ratio	-0.0371	-0.0143	-0.0371
	(0.0423)	(0.0445)	(0.0304)
LLP_GNPA	-2.106	-1.815	-2.106*
	(1.394)	(1.424)	(1.130)
LLP_TASS	-5.045	-5.581	-5.045
	(29.42)	(29.69)	(13.76)
GL_TASS	-0.193	-0.0948	-0.193
	(0.535)	(0.539)	(0.153)
O Exp. to G Loan	0.0402	0.0380	0.0402***
	(0.0257)	(0.0259)	(0.00186)
Log to Asset	0.937***	1.099***	0.937***
	(0.323)	(0.332)	(0.270)
T Deposit	-8.16e-09	-1.14e-08	-8.16e-09
	(1.12e-08)	(1.13e-08)	(1.63e-08)
Constant	0.0329	-3.842	0.0329
	(4.606)	(4.922)	(3.107)
Observations	370	370	370
R-squared		0.093	

Number of Year	16	16	16
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

The Table 7.2.4.2 presents the Regression Results of Fixed Effect, Random Effect and Robust Random Effect for Model 2 ROE of all Banks under study.

The Random Effect Model shows that there is negative relationship between GNPA Ratio and ROE and is significant at 0.01% level. Size share positive association ship with ROE and is significant at 99% confidence level. Other independent variables show insignificant association.

Like Random Effect Model, Fixed Effect Model also shows significant and negative relationship of GNPA Ratio with ROE and is significant at 0.01% level. Size is also significant at 0.01% level and positively associated with the performance. The other variables are insignificant in influencing Performance.

Size and Cost per Loan are significant at 99% confidence level and are positively related to Performance indicator ROE as revealed by Robust Random Effect.

LLP to GNPA, CAR and GNPA Ratio are significant in influencing Performance as indicated by ROE and are negatively associated with ROE. All these three independent variables show a significance level of 0.05%

Robust Random Effect show LLP to Loan is insignificant and is positively associated with ROE. On the contrary, the CD Ratio, LLP to TASS, GL to TASS and Deposit show negative association with ROE.

**Table 7.2.4.3 Results of Regression: Model 3 NIM for a group of All Commercial Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>NIM</b>	<b>NIM</b>	<b>NIM</b>
GNPA Ratio	-0.00475	0.0254	-0.00475
	(0.0222)	(0.0278)	(0.0186)
LLP Loan	-1.850	-2.371	-1.850
	(2.867)	(2.935)	(2.244)
CAR	0.0615***	0.0651***	0.0615***
	(0.0189)	(0.0194)	(0.0106)
CDRATIO	0.00869	0.00144	0.00869
	(0.00690)	(0.00744)	(0.00728)
LLP_GNPA	-0.193	-0.142	-0.193
	(0.230)	(0.241)	(0.194)
LLP_TASS	2.488	3.413	2.488
	(5.388)	(5.499)	(4.391)
GL_TASS	-0.161*	-0.192**	-0.161**
	(0.0946)	(0.0957)	(0.0808)
OEXP_GLOAN	0.00681	0.00722	0.00681***
	(0.00470)	(0.00477)	(0.000234)
Log to Asset	-0.110**	-0.126**	-0.110***
	(0.0557)	(0.0596)	(0.0318)
T_DEPOSIT	5.66e-09***	5.83e-09***	5.66e-09***
	(2.02e-09)	(2.07e-09)	(1.39e-09)
Constant	1.313*	1.836**	1.313**
	(0.764)	(0.873)	(0.604)
Observations	412	412	412
R-squared		0.085	
Number of Year	16	16	16
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

Table 7.2.4.3 presents Regression Result of Model Three which uses NIM as the Performance indicator and show significance and association between the independent and dependent for all banks using Fixed Effect, Random Effect and Robust Random Effect.

Under Random Effect CAR and Deposits are significant and are positively related to dependent variable NIM. GL to TASS is negatively related to NIM but significant at 0.1% level. Size is negatively associated with NIM and significant at 0.05% level. Other independent variables are insignificant to influence NIM.

Under Fixed Effect CAR and Deposits are significant at 0.1% and are negatively associated with the NIM. GL to TASS and Cost per Loan is significant at 0.05% and inversely related. Other variables including GNPA are insignificant.

Under Robust Random Effect CAR, Cost per Loan and Deposits are significant at 0.01% level and show positive association with NIM. Size negatively influences NIM and significant at 0.01%. GL to TASS show negative relationship and significant at 0.05%.

The GNPA Ratio, LLP to LN and LLP to GNPA are insignificant in influencing NIM but share negative association with dependent variable NIM. On the other hand the CD and LLP to TASS are also insignificant but are positively related to NIM.

**Table 7.2.4.4 Results of Regression: Model 1 ROA for a group of Private Banks**

	Random Effect	Fixed Effect	Robust Effect	Random
Variables	ROA	ROA	ROA	
GNP Ratio	-0.00608	-0.0147	-0.00608	
	(0.00975)	(0.00995)	-0.00803	
LLP to Loan	0.155	0.0539	0.155	
	(1.111)	(1.113)	(0.247)	
CAR	-0.00663	-0.00573	-0.00663***	
	(0.00458)	(0.00464)	(0.00214)	
CDRATIO	-1.13e-05	-0.000111	-1.13e-05	
	(0.00261)	(0.00261)	(0.00169)	
LLP_GNPA	-0.0506	-0.0560	-0.0506**	
	(0.0585)	(0.0583)	(0.0205)	
LLP_TASS	-0.257	-0.113	-0.257	
	(2.084)	(2.086)	(0.416)	
GL_TASS	0.0718	0.0895	0.0718***	
	(0.0541)	(0.0548)	(0.0141)	
OEXP_GLOAN	-5.541**	-4.835**	-5.541***	
	(2.339)	(2.322)	(1.333)	
Log_Total_ASS	-0.0344	-0.00847	-0.0344**	
	(0.0336)	(0.0363)	(0.0166)	
T_DEPOSIT	2.61e-08	-1.31e-07	2.61e-08	
	(4.35e-07)	(4.37e-07)	(1.11e-07)	
Constant	0.827**	0.535	0.827***	
	(0.385)	(0.415)	(0.180)	
Observations	156	156	156	
R-squared		0.139		
Number of Year	16	16	16	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.2.4.4 presents Regression Results of a group of Private Banks and using ROA as Model 1 representing Performance indicator. The Fixed Effect, Random Effect and Robust Random Effect show the level of significance and the close association ship between dependents of all Three Models and independent variable.

Random Effect Model while using ROA as the Performance indicator show that Cost per Loan influences ROA negatively and significant at 0.05%. Out of 10 independent variables rest nine are insignificant.

Fixed Effect Model for ROA also reveals the same results where Cost per Loan is significant at 0.05% and is showing negative association with ROA. Remaining all variables is insignificant.

While the results of Robust Random Effect for ROA shows that CAR is significantly influences the Performance at 0.01% level and is having negative relationship. GL to Total Assets is also significant at 0.01% but is positively related to ROA. Size is also significant and negatively associated with ROA and significant at 0.05%.

LLP to GNPA negatively influences ROA and is significant at 0.05%.

The other variables do not play significant role in influencing ROA. GNPA Ratio, CD Ratio and LLP to TASS, negatively influences ROA LLP to LN and Deposits positively influences ROA.

**Table 7.2.4.5 Results of Regression Model 2 ROE for a group of Private Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>ROE</b>	<b>ROE</b>	<b>ROE</b>
GNPA Ratio	-0.190	-0.359	-0.190
	(0.213)	(0.224)	(0.130)
LLP to Loan	1.864	0.165	1.864
	(22.20)	(22.54)	(3.325)
CAR	-0.0822	-0.0602	-0.0822**
	(0.0814)	(0.0836)	(0.0417)
CD RATIO	-0.0319	-0.0368	-0.0319
	(0.0581)	(0.0590)	(0.0229)
LLP_GNPA	-1.338	-1.426	-1.338**
	(1.130)	(1.143)	(0.552)
LLP_TASS	-2.563	0.0686	-2.563
	(41.25)	(41.86)	(5.796)
GL_TASS	-0.445	-0.285	-0.445
	(0.947)	(0.971)	(0.407)
O Exp to G Loan	-107.8**	-96.35**	-107.8***
	(46.54)	(46.99)	(22.64)
Log to Assets	-0.148	0.168	-0.148
	(0.649)	(0.702)	(0.257)
T Deposits	-1.56e-06	-3.93e-06	-1.56e-06
	(8.09e-06)	(8.29e-06)	(2.25e-06)
Constant	13.51	9.945	13.51***
	(8.495)	(9.066)	(4.018)
Observations	115		115
R-squared		115	
Number of Year	16	0.142	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The Table 7.2.4.5 given above presents the results of Model 2 ROE using Fixed, Random and Robust Random Effect Model.

As shown by Table 7.2.4.5, Random Effect Model shows that Cost per Loan is significant in influencing ROE with negative association and showing a significance level of 0.05%.

All other remaining variables are insignificant in influencing the ROE.

Under Fixed Effect Model also the only determinant factor at 5% level of significance is Cost per Loan Asset and is showing negative association with ROE. Other variables are insignificant.

Under Robust Random Effect Model the significant factors influencing ROE include CAR, LLP to GNPA and Cost per Loan Asset.

CAR and LLP to GNPA are significant at 5% and are negatively related. Cost per Loan is significant at 1% and inverse relationship exists with ROE.

While independent variables GNPA Ratio, CD, LLP to TASS, GL to TASS, Size and Deposits are insignificant but show negative association with ROE. The LLP to LN is insignificant but positively related with ROE.

**Table 7.2.4.6 Results of Regression Model 3 NIM for a group of Private Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>NIM</b>	<b>NIM</b>	<b>NIM</b>
GNPA Ratio	0.0333	0.0442	0.0333
	(0.0470)	(0.0536)	(0.0458)
LLP_LN	-3.459	-3.143	-3.459*
	(5.263)	(5.786)	(1.879)
CAR	0.0649***	0.0626**	0.0649***
	(0.0213)	(0.0242)	(0.0177)
CDRATIO	0.0123	0.0139	0.0123
	(0.0129)	(0.0137)	(0.0127)
LLP_GNPA	-0.261	-0.276	-0.261
	(0.278)	(0.303)	(0.313)
LLP_TASS	5.257	4.768	5.257
	(9.864)	(10.84)	(3.407)
GL_TASS	0.360	0.304	0.360*
	(0.253)	(0.285)	(0.196)
O Exp. to G Loan	1.490	0.949	1.490
	(11.38)	(12.15)	(4.155)
Log to Asset	0.177	0.114	0.177
	(0.150)	(0.191)	(0.133)
T Deposit	-5.61e-06***	-5.33e-06**	-5.61e-06***
	(2.08e-06)	(2.28e-06)	(1.61e-06)
Constant	-1.954	-1.383	-1.954
	(1.723)	(2.177)	(1.465)
Observations	150	150	150
R-squared		0.171	
Number of Year	15	15	15

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.2.4.6 given above presents the results of Model 3 NIM using Fixed, Random and Robust Random Effect Model for a group of Private Banks under study.

Under Robust Random Effect Model for Model 3 NIM, the result shows that CAR is positively related and significant at 1% level of significance, while Deposits are negatively associated but significant at 1% level.

The LLP to LN shows negative association and significant at 10% level. GL to TASS is showing positive association and significant at 10% level.

GNPA Ratio, CD, LLP to TASS, Cost per Loan and Size are positively related to NIM but insignificant, whereas LLP to GNPA show negative association but not significant.

As depicted by Random Effect Model presented in Table 7.26 CAR and Deposits are significant at 1% level but CAR is positively related to NIM and Deposits share a negative association.

As far as Fixed Effect model is concerned CAR is significant at 0.05%, showing positive association and Deposits are also significant at 0.05% but negatively related to NIM.

**Table 7.2.4.7 Results of Regression Model 1 ROA for a group of Public Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust R E</b>
<b>Variables</b>	<b>ROA</b>	<b>ROA</b>	<b>ROA</b>
GNPA_Ratio	-0.0736***	-0.0315	-0.0736
	(0.0231)	(0.0351)	(0.0456)
LLP-LN	1.656	0.582	1.656***
	(2.902)	(3.093)	(0.588)
CAR	-0.184***	-0.204***	-0.184
	(0.0642)	(0.0712)	(0.145)
CDRATIO	-0.0350***	-0.0383***	-0.0350
	(0.00720)	(0.00853)	(0.0255)
LLP_GNPA	2.113***	1.841***	2.113
	(0.543)	(0.620)	(1.757)
LLP_TASS	0.542	2.606	0.542
	(5.176)	(5.421)	(1.321)
GL_TASS	-0.00893	-0.0525	-0.00893
	(0.0930)	(0.0977)	(0.0273)
O Exp. to G Loan	0.00666*	0.00643	0.00666***
	(0.00383)	(0.00394)	(0.00168)
Log to Asset	0.123*	0.112	0.123**
	(0.0663)	(0.0722)	(0.0570)
T_Deposit	-2.08e-09	-1.83e-09	-2.08e-09
	(1.93e-09)	(2.04e-09)	(1.35e-09)
Constant	3.217***	3.717***	3.217
	(1.144)	(1.273)	(2.735)
Observations	278	278	278
R-squared		0.161	
Number of Year	16	16	16
*** p<0.01, ** p<0.05, * p<0.1			
Standard errors in parentheses			

The above Table 7.2.4.7 presents the Regression Results of Public Banks for Model 1 ROA under Random Effect, Fixed Effect and Robust Random Effect.

As depicted by Random Effect Model GNPA Ratio, CAR and CD, is significant at 0.01% level and shows inverse relationship with ROA. Whereas LLP to GNPA is significant at 1% level and shows positive relationship.

The Random Effect also show Cost per Loan Asset and Size are positively related to ROA at 0.1% level of significance.

As disclosed by Fixed Effect CAR and CD, are significant at 1% showing negative association with ROA, whereas LLP to GNPA is significant at 1% level and showing positive relationship with ROA.

The Robust Random Effect Model shows that LLP to LN, and Cost per Loan Asset are significant at 0.01%, and share positive association with ROA. Size is significant at 0.05% level and positively related to ROA.

The Robust Random Effect shows that GNPA Ratio, CAR, CD, LLP to TASS and Deposits are insignificant in influencing ROA but show negative association.

The ratio of LLP to GNPA is also insignificant but there is positive association.

**Table 7.2.4. 8 Results of Regression: Model 2 ROE for a group of Public Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>ROE</b>	<b>ROE</b>	<b>ROE</b>
GNPA_ Ratio	-0.683***	-0.349	-0.683*
	(0.189)	(0.265)	(0.365)
LLP_ LN	1.110	1.831	1.110
	(22.07)	(22.81)	(10.98)
CAR	0.0556	-0.253	0.0556
	(0.520)	(0.550)	(0.361)
C D Ratio	-0.0564	-0.0178	-0.0564
	(0.0559)	(0.0637)	(0.0437)
LLP_ GNPA	-6.285	-7.332	-6.285*
	(4.481)	(4.978)	(3.803)
LLP_ TASS	-2.628	3.026	-2.628
	(39.21)	(39.87)	(22.03)
GL_ TASS	-0.210	-0.00984	-0.210
	(0.722)	(0.735)	(0.271)
O Exp. to G Loan	0.0380	0.0342	0.0380***
	(0.0290)	(0.0290)	(0.00526)
Log Total_ Asset	1.141**	1.686***	1.141***
	(0.516)	(0.540)	(0.381)
T_ Deposit	-1.29e-08	-2.35e-08	-1.29e-08
	(1.48e-08)	(1.51e-08)	(1.81e-08)
Constant	-1.073	-7.905	-1.073
	(9.151)	(9.686)	(5.720)
Observations	255	255	255
R-squared		0.087	
Number of Year	16	16	16

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7.2.4.8 presents the results of Model 2 ROE of Public Banks in terms of Random Effect, Fixed Effect and Robust Random Effect.

The Random Effect Model for a group of Public Banks shows that GNPA Ratio is positively associated with Performance indicator ROE and is significant at 0.01%. Size is also significant and the level of significance is 0.05% and there is positive association with the ROA. Other variables are insignificant in influencing ROE.

The results of Fixed Effect Model reveals that only one variable Size influences the ROE at a significance level of 0.01%, also showing positive association with ROE. Remaining all variables are insignificant, but show either positive or negative association with ROE.

The result of Robust Random Effect Model establishes negative association between ROE and GNPA Ratio and LLP to GNPA, and shows a significance level of 0.1%. The negative association will lead to inverse impact of independent variable on the dependent ROE. The results of Robust also shows that Cost per Loan Asset and Size are significant at 0.01% and there is positive association of this variable with ROE.

The other independents variables are not significant in influencing the ROE of a group of Public Banks.

The LLP to LN show positive association with ROE along with CAR, while CD, LLP to TASS, GL to TASS and Deposits have negative association with ROE.

**Table 7.2.4.9 Results of Regression: Model 3 NIM for a group of Public Banks**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>NIM</b>	<b>NIM</b>	<b>NIM</b>
GNPA_Ratio	-0.0169 (0.0282)	0.0625 (0.0416)	-0.0169 (0.0169)
LLP_LN	0.0699 (3.599)	-2.009 (3.828)	0.0699 (2.863)
CAR	0.0566 (0.0801)	0.0934 (0.0884)	0.0566 (0.0656)
CDRATIO	-0.00123 (0.00875)	-0.0126 (0.0101)	-0.00123 (0.00799)
LLP_GNPA	-0.213 (0.650)	-0.244 (0.754)	-0.213 (0.434)
LLP_TASS	5.291 (6.476)	9.268 (6.725)	5.291 (5.707)
GL_TASS	-0.142 (0.112)	-0.212* (0.116)	-0.142* (0.0847)
OEXP_GLOAN	0.00744* (0.00451)	0.00780* (0.00460)	0.00744*** (0.000593)
Log_total_Assets	0.0450 (0.0811)	0.0326 (0.0862)	0.0450 (0.0436)
T_Deposit	2.60e-09 (2.33e-09)	2.87e-09 (2.41e-09)	2.60e-09** (1.29e-09)
Constant	0.130 (1.378)	0.322 (1.540)	0.130 (0.846)
Observations	262	262	262
R-squared		0.080	

Number of Year	16	16	16
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

The above Table 7.2.4.9 presents the results of Regression for Model 3 NIM, the third indicator of Performance for a group of Public Banks under study.

The results as presented by the Table 7.2.4.9, under Random Effect reveals that only Cost per Loan Asset is significant at 0.1% level and there is positive association of this variable with the NIM. Rest all independent variables are insignificant.

The Fixed Effect Model shows that Cost per Loan Asset is significant at 0.10% level and the association with NIM is positive and the other variable GL to TASS is also significant at 0.10% showing negative relation with NIM. The only two variables under Fixed Effect Model are significant and rest all independent variables are insignificant to influence NIM.

The results of Robust Random Effect for NIM for a group of Public Banks show that there is negative association of GL to TASS with the NIM and shows a significance level of 0.10%. While the Cost per Loan Asset is significant at 0.01% showing positive association with NIM. The Deposits are also significant showing positive association with NIM and significant at 0.05%. The other variables are insignificant in influencing the Performance indicator NIM and include GNPA Ratio, CD, LLP to GNPA and all are showing negative association with NIM. The LLP to LN, CAR, LLP to TASS and Size are also insignificant but share positive associations with NIM.

**Table 7.2.4.10 Result of Regression: Model 1 ROA with Time Dummy for Basel II**

	Random Effect	Fixed Effect	Robust Random Effect
Variables	ROA	ROA	ROA
GNPA_ Ratio	-0.0383**	-0.0827***	-0.0383
	(0.0150)	(0.0154)	(0.0251)
LLP_ LN	-0.490	-3.572*	-0.490
	(1.921)	(1.822)	(0.582)
CAR	-0.00743	-0.00132	-0.00743
	(0.0130)	(0.0143)	(0.00990)
CD Ratio	-0.0224***	-0.0334***	-0.0224
	(0.00473)	(0.00603)	(0.0207)
LLP_ GNPA	0.222	0.213	0.222
	(0.160)	(0.171)	(0.290)
LLP_ TASS	0.588	6.567*	0.588
	(3.603)	(3.379)	(0.853)
GL_ TASS	-0.0118	-0.0394	-0.0118
	(0.0653)	(0.119)	(0.0307)
O Exp. G Loan	0.00461	0.00341	0.00461***
	(0.00326)	(0.00326)	(0.000357)
Log to Total Asset	0.0413	0.0398	0.0413
	(0.0399)	(0.122)	(0.0481)
T_DEPOSIT	-1.11e-10	-2.09e-09	-1.11e-10
	(1.41e-09)	(1.95e-09)	(1.22e-09)
Basel II	0.111	0.200	0.111
	(0.115)	(0.169)	(0.207)
Constant	1.450***	2.320*	1.450
	(0.541)	(1.285)	(1.416)
Observations	434	434	434
R-squared		0.122	
Number of code	38	38	38
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

The above Table 7.2.4.10 presents the results of Regression Model 1 ROA, where the additional variable called Time Dummy for Basel II has been included in the study to analyse the effect of this variable in influencing the effect of credit risk on the performance in the post implementation of Basel II period. The same has been included to see the effect on a group of all 40 Commercial Banks under study.

The above Random Effect Model for ROA with dummy variable for Basel II Period reveals that only GNPA Ratio and CD are significant in influencing the effect on ROA. The GNPA Ratio shows negative association with ROA and significant at 0.05% level. The CD Ratio is significant at 0.01% level and shows inverse relationship with the ROA.

The LLP to LN, CAR and Deposits are non significant but show inverse relationship. Similarly LLP to GNPA, LLP to TASS, Cost per Loan Asset and size are also insignificant but show positive association. The Dummy Basel is insignificant but show positive association with ROA.

The Fixed Effect Model for ROA with dummy variable for Basel II Period reveals that GNPA Ratio and CD are significant at 0.01% and showing inverse association with ROA. LLP to LN is also significant but at 0.10% and showing negative association with ROA. The LLP to TASS is also significant at 0.10% and is having positive association with ROA.

CAR and Deposits are not significant but are negatively related to ROA. The other Three Variables viz., LLP to GNPA, Cost per Loan Assets and size are insignificant but show positive association with ROA. Under this Fixed Effect Model also the dummy representing Basel II is insignificant in influencing the effect on ROA.

The Robust Random Effect Model for ROA with dummy variable for Basel II Period reveals that only Cost per Loan Asset is significant in influencing ROA at 0.01% level and showing positive association with the ROA.

GNPA Ratio, LLP to LN, CAR, CD and Deposits are not significant factors but all show inverse relationship with the ROA. The results also show that there is a positive association between ROA and LLP to GNPA, LLP to TASS and size but are not significant.

The dummy variable for Basel II is insignificant in influencing the effect of Credit Risks on performance indicators represented by ROA in the period prior to and post implementation of Basel II norms in India.

**Table 7.2.4.11 Result of Regression: Model 2 ROE with Time Dummy for Basel II**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
Variables	ROE	ROE	ROE
GNPA_Ratio	-0.786***	-0.789***	-0.786***
	(0.100)	(0.101)	(0.250)
LLP- LN	-12.73	-12.90	-12.73**
	(11.63)	(11.51)	(5.907)
CAR	0.00363	-0.0361	0.00363
	(0.0881)	(0.0898)	(0.0488)
CD RATIO	-0.0455	-0.00294	-0.0455
	(0.0375)	(0.0405)	(0.0421)
LLP_GNPA	-0.552	0.224	-0.552
	(1.094)	(1.113)	(0.477)
LLP_TASS	22.24	22.74	22.24**
	(21.54)	(21.30)	(10.65)
GL_TASS	-0.351	-0.695	-0.351
	(0.726)	(0.870)	(0.359)
O Exp. G Loan	0.00878	0.00700	0.00878**
	(0.0198)	(0.0198)	(0.00372)
Log_ to Asset	0.464	-1.654*	0.464
	(0.531)	(0.854)	(0.914)
T_Deposit	-3.53e-08***	-4.72e-08***	-3.53e-08***
	(1.13e-08)	(1.19e-08)	(6.72e-09)
Basel II	-1.688*	0.568	-1.688
	(0.884)	(1.120)	(1.129)
Constant	6.118	26.83***	6.118
	(6.054)	(8.919)	(9.669)
Observations	370	370	370
R-squared		0.228	
Number of code	35	35	35
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

The above Random Effect Model for ROE with dummy variable for Basel II Period given in Table 7.2.4.11 reveals that GNPA Ratio and Deposits are significant factors in influencing ROE at 0.01% level and association of these two variables with ROE is negative. The dummy used for Basel II is significant at 0.10% level showing negative association with ROE implies significant impact of Credit Risks on Performance in the Post Basel Period.

The Random Effect Model for ROE with dummy for Basel II also show that GL to TASS, LLP to LN, CD and LLP to GNPA are not significant in influencing ROE and are having negative association. Further to note that CAR, LLP to TASS, Cost per Loan Assets and size are not significantly influencing the Performance represented by ROE but show positive association.

The above Fixed Effect Model for ROE with dummy variable for Basel II Period given in Table 7.2.4.11 reveals that GNPA Ratio and Deposits are significant at 0.01% showing negative association with ROE. There is also negative association between Size and ROE and significant at 0.10%

The Fixed Effect Model for ROE with dummy for Basel II also show that GL to TASS, LLP to LN, CAR and CD are non significant in determining Performance, ROE, but are negatively related. The other indicators LLP to GNPA, LLP to TASS, and Cost per Loan Asset are not significant to influence ROE but show positive association.

The dummy variable representing Basel II period in Fixed Effect Model is insignificant and doesn't influence ROE but positively related to ROE.

The above Robust Random Effect Model for ROE with dummy variable for Basel II Period given in Table 7.2.4.11 also reveals that GNPA Ratio is significant in influencing ROA at 0.01% level and show negative association. Deposits show positive association with ROE and significant at 0.01%. The LLP to LN is significant at 0.05 levels and is negatively associated with ROE. The LLP to TASS and Cost per Loan Assets are positively influencing the ROE and significant at 0.05%.

The Robust Random Effect Model for ROE with dummy variable for Basel II Period show that CD, LLP to GNPA and GL to TASS are insignificant and do not influence ROE but there is negative association.

The CAR and Size are insignificant and show positive association with ROE.

Dummy for Basel II is insignificant in influencing ROE in prior to and post Basel period thereby showing same effect on the performance indicator ROE.

**Table 7.2.4.12 Result of Regression: Model 3 NIM with Time Dummy for Basel II**

	<b>Random Effect</b>	<b>Fixed Effect</b>	<b>Robust Random Effect</b>
<b>Variables</b>	<b>NIM</b>	<b>NIM</b>	<b>NIM</b>
GNPA_RATIO	-0.00602 (0.00566)	-0.00598 (0.00567)	-0.00602 (0.00620)
LLP_LN	-0.717 (0.684)	-0.714 (0.685)	-0.717** (0.326)
CAR	0.0248*** (0.00516)	0.0245*** (0.00518)	0.0248*** (0.00460)
CD Ratio	-0.00374* (0.00226)	-0.00364 (0.00228)	-0.00374 (0.00255)
LLP_GNPA	0.0508 (0.0621)	0.0545 (0.0623)	0.0508 (0.0723)
LLP_TASS	1.324 (1.268)	1.327 (1.270)	1.324** (0.628)
GL_TASS	-0.0253 (0.0445)	-0.0252 (0.0452)	-0.0253 (0.0284)
O. Exp G Loan	0.00650*** (0.00118)	0.00651*** (0.00118)	0.00650*** (0.000146)
Log to Assets	-0.0892** (0.0453)	-0.0972** (0.0477)	-0.0892* (0.0520)
T_DEPOSIT	-9.98e-10 (6.99e-10)	-1.11e-09 (7.04e-10)	-9.98e-10*** (2.46e-10)
Basel II	0.00686 (0.0606)	0.0152 (0.0626)	0.00686 (0.0588)
Constant	2.300*** (0.535)	2.347*** (0.502)	2.300*** (0.710)
Observations	412	412	412
R-squared		0.192	
Number of code	38	38	38
Standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

The above Random Effect Model for NIM with dummy variable for Basel II Period given in Table 7.2.4.12 reveals that CAR and Cost per Loan Asset are significant at 0.01 level and showing positive association with the Performance NIM. CD is also significant but at 0.10 level of significance and negatively related to NIM. Size is negatively associated and significant at 0.05% level of significance.

The Radom Effect for NIM Model also show GNPA Ratio, LLP to LN, GL to TASS and Deposits are not significant and do not have influence on NIM but show negative association.

The Random Effect for NIM with dummy for Basel II period brings to light that LLP to GNPA and LLP to TASS are not significant indicators, but shows positive association with NIM.

The Dummy for Basel is also insignificant under Random Effect, as a result Basel II period doesn't have any influence on Performance, but shows positive association with NIM.

The above Fixed Effect Model for NIM with dummy variable for Basel II Period given in Table 7.2.4.12 reveals that CAR and Cost per Loan Asset are significant at 0.01% level and show positive association with NIM. Size is negatively related to NIM and shows significance level at 0.05%.

The Fixed Effect Model for NIM with dummy for Basel shows insignificant relationship between NIIM and GNPA Ratio, LLP to LN, CD, GL to TASS and Deposits. All these variables show inverse relationship with NIM.

The Fixed Effect Model for NIM with Basel dummy also reveals positive association of NIM with LLP to GNPA and LLP to TASS but both are insignificant.

The dummy Basel included under Fixed Effect is insignificant to influence NIM but shows positive association.

The Robust Random Effect Model NIM with dummy Basel shows that there are six factors which are having influence on Performance denoted by NIM. The CAR and Cost per Loan Assets are significant at 0.01% level of significance and there is positive association with NIM.

Deposits are also significant at 0.01% level but show negative association with NIM. LLP to LN influences negatively and LLP to TASS influences positively but both are significant at 0.05% level.

Size influences NIM negatively and significant at 0.10% level of significance.

The Robust Random Effect Model NIM with dummy Basel presents negative association of NIM with GNPA, CD and GL to TASS and is not significant in influencing NIM.

The Robust Random Effect Model NIM shows positive association with LLP to GNPA but insignificant in influencing Performance as indicated by NIM.

The Dummy used to indicate Basel effect is insignificant but is positively related to NIM. As dummy is insignificant the Basel II period doesn't influence NIM.

## 7.2.5 Discussion

**Table 7.2.5.1 Comparison of Expected Result with Actual Results of Effect of Credit Risk on Performance (ROA, ROE, and NIM) for a group of All Commercial Banks**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance		
		All ROA	All ROE	All NIM	All ROA	All ROE	All NIM
<b>GNPA Ratio</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>*</b>	<b>-</b>
<b>LLP to Loan</b>	<b>Neg.</b>	<b>N</b>	<b>P</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>C AR</b>	<b>Postv.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>*</b>	<b>*</b>	<b>***</b>
<b>C D</b>	<b>Postv. /Neg.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>LLP to GNPA</b>	<b>Neg.</b>	<b>P</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>*</b>	<b>-</b>
<b>LLP to TASS</b>	<b>Neg.</b>	<b>P</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Gross Loan to TASS</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>**</b>
<b>Oper. Exp. to Gr. Loans</b>	<b>Neg.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>***</b>	<b>***</b>	<b>***</b>
<b>Log to Assets</b>	<b>Postv.</b>	<b>P</b>	<b>P</b>	<b>N</b>	<b>-</b>	<b>***</b>	<b>***</b>
<b>T. Deposits</b>	<b>Postv.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>***</b>

**Source: Authors Compilation from Regression Tables 7.2.4.1 to 7.2.4.3**

The three variables which have been used to represent three model viz., ROA, ROE and NIM have been summarized to make comparison between expected and actual sign and the association with the independent variables for a group of All Banks.

The independent variable GNPA Ratio is insignificant and negatively associated with ROA and NIM and show negative association with ROE and

significant for a group of All Banks. The result is in conformity with earlier research and the expected signs where negative association of ROA, ROE and NIM with Credit Risks indicates that GNPA adversely negatively affect all 3 parameters of Performance of a group of All Banks as depicted by table 7.2.5.1 above.

The GNPA to GL is a financial indicator of a quality of loan assets held by the Commercial banks and their exposure to the risk of default or delayed payment. The core activity of commercial banks is to grant loans and make money from a series of activities of borrowing and deposit and once the loan becomes Non Performing it's a loss. Higher GNPA Ratio means high losses adversely affecting the banks' available capital for further borrowing. Hence, the efficiency of banks' investment is affected and thus the profitability. While lower GNPA Ratio indicates low risk and the lower deposit rate leading to positive impact on banks' performance. Thus higher the rate of GNPA ratio it will create negative impact on the commercial banks' performance..

The LLP to Gross Loan is insignificant and negatively associated with ROA and NIM and show positive association with ROE for a group of All Banks. The result is in conformity with the expected signs for ROA and NIM where negative association of ROA and NIM with Credit Risks indicates that LLP to Gross Loan adversely affect ROA and NIM, a Performance indicators of a group of All Banks. The results with ROE are not in conformity with the expected sign and positive association implies increase in Provision will improve performance as provision is a cushion against future losses.

The CAR is significantly and negatively associated with ROA and ROE and show positive association with NIM for a group of All Banks. The result is not in conformity with the expected signs for ROA and ROE where negative association of ROA and ROE with Credit Risks indicates that CAR adversely affect ROA and ROE, a Performance indicators of a group of All Banks as it holds back the financial institution from giving high rate of returns. The results with NIM is in conformity with the expected sign and positive association implies increase in CAR will improve performance as Banks with good Capital Adequacy Ratio not only have good profitability but are able to absorb loans that have gone bad.

The CD is negatively associated with ROA and ROE and show positive association with NIM for a group of All Banks. The result is in conformity with the expected signs for ROA, ROE and NIM where negative association of ROA and ROE with Credit Risks indicates that CD is adversely affecting ROA and ROE, a Performance indicators of a group of All Banks because rise in CD will add to NPA thereby affecting the performance. The results with NIM are also in conformity with the expected sign and positive association implies increase in CD will improve performance as increase in CD will contribute to NIM.

The LLP to GNPA is positively associated with ROA and show negative association with ROE and NIM for a group of All Banks. The result is in conformity with the expected signs for ROE and NIM where negative association of NIM and ROE with Credit Risks indicates that LLP to GNPA

is adversely affecting NIM and ROE, a Performance indicators of a group of All Banks because rise in LLP to GNPA will affect the performance. The results with ROA are not in conformity with the expected sign and positive association implies increase in LLP to GNPA will improve ROA.

The LLP to Total Asset is positively associated with ROA and NIM and show negative association with ROE for a group of All Banks. The result is in conformity with the expected signs for ROE where negative association of ROE with Credit Risks indicates that LLP to Total Assets is adversely affecting ROE, Performance indicators of a group of All Banks because rise in this ratio will affect the performance. The results with ROA and NIM are not in conformity with the expected sign and positive association implies increase in LLP to TASS will improve ROA.

The Gross Loan to Total Asset is negatively associated with ROA, ROE and NIM and significant for NIM, for a group of All Banks. The result is in conformity with the expected signs where negative association of Credit Risks indicates that Gross Loans to Total Assets is adversely affecting all the Performance indicators of a group of All Banks and increase in this ratio will affect the performance negatively.

The Operating Expenses to Gross Loans is significantly and positively associated with ROA, ROE and NIM for a group of All Banks. The result is not in conformity with the expected signs and positive association implies that Credit Risks indicator Operating Expenses to Gross Loans is positively adding to the performance represented by ROA, NIM and ROE for a group of All

Banks, if there are cases of high expenditures due to business diversification resulting in increase in the returns.

The Size represented by Log to Assets is significantly and positively associated with ROE and shows insignificant and positive association with ROA and significantly and negatively related to NIM for a group of All Banks. The result is not in conformity with the expected signs for a NIM and negative association implies that Credit Risks indicator size is inversely affecting NIM for a group of All Banks.

The Deposits is insignificant and negatively associated with ROA and ROE and shows insignificant and positive association with NIM for a group of All Banks. The result is not in conformity with the expected signs for ROA and ROE and negative association implies that Deposits is inversely affecting performance of a group of All Banks.

**Table 7.2.5.2 Comparison of Expected Result with Actual Results of Effect of Credit Risk on Performance (ROA, ROE, and NIM) of a group of Private Banks**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance		
		Pvt. ROA	Pvt. ROE	Pvt. NIM	Pvt. ROA	Pvt. ROE	Pvt. NIM
<b>GNPA Ratio</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>LLP to Loan</b>	<b>Neg.</b>	<b>P</b>	<b>P</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>*</b>
<b>C AR</b>	<b>Postv.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>***</b>	<b>**</b>	<b>***</b>
<b>C D</b>	<b>Postv. /Neg.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>LLP to GNPA</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>**</b>	<b>**</b>	<b>-</b>
<b>LLP to TASS</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Gross Loan to TASS</b>	<b>Neg.</b>	<b>P</b>	<b>N</b>	<b>P</b>	<b>***</b>	<b>-</b>	<b>*</b>
<b>Oper. Exp. to Gr. Loans</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>***</b>	<b>***</b>	<b>-</b>
<b>Log to Assets</b>	<b>Postv.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>**</b>	<b>-</b>	<b>-</b>
<b>T. Deposits</b>	<b>Postv.</b>	<b>P</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>***</b>

**Source: Authors Compilation from Regression Tables 7.2.4.4 to 7.2.4.6**

The three variables which have been used to represent three model viz., ROA, ROE and NIM have been summarized to make comparison between expected and actual sign and the association with the independent variables for a group of Private Banks as depicted by table 7.2.5.2 given above.

The independent variable GNPA Ratio is insignificant and negatively associated with ROA and ROE and show positive association with NIM for a group of Private Banks. The result is in conformity with the expected signs where negative association with ROA and ROE implies that Credit Risks proxy GNPA adversely negatively affect all 2 parameters of Performance of a group of Private Banks. The results of positive association with NIM is different from expected sign.

The LLP to Gross Loan is significant and negatively associated with the NIM and thereby confirms with the expected results and show positive association with ROA and ROE for a group of Private Banks. The result is not in conformity with the expected signs for ROA and ROE, where positive association indicates that LLP to Gross Loan positively affect ROA and ROE a Performance indicators for a group of Private Banks and implies increase in Provision will improve performance as provision is a cushion against future losses.

The CAR is significantly and negatively associated with ROA and ROE and show significant and positive association with NIM for a group Private Banks. The result is not in conformity with the expected signs for ROA and ROE where negative association indicates that CAR adversely affect ROA and ROE, a Performance indicators of a group of Private Banks as it holds back the financial institution from giving high rate of returns. That is in order to keep CAR at higher rate banks will restrict their activities which could negatively affect their growth, expansion and development affecting the profitability adversely.

The results with NIM are in conformity with the expected sign and positive association implies increase in CAR will improve performance as Banks with good Capital Adequacy Ratio have good profitability and with good Capital Adequacy Ratio banks are able to absorb loans that have gone bad. Also the positive, CAR internalizes the risk for stakeholders and hence faces lower cost of funding and in return supports for higher ROE and ROA.

The CD is negatively associated with ROA and ROE and show positive association with NIM for a group of Private Banks. The result is in conformity with the expected signs for ROA, ROE and NIM where negative association with ROA and ROE indicates that CD is adversely affecting ROA and ROE, a Performance indicators of a group of Private Banks because rise in CD will add to NPA thereby affecting the performance. The results with NIM are also in conformity with the expected sign and positive association implies increase in CD will improve performance as increase in CD will contribute to NIM.

The LLP to GNPA is significantly and negatively associated with ROA and ROE, and show insignificant and negative association with NIM for a group of Private Banks. The result is in conformity with the expected signs for ROA, ROE and NIM where negative association indicates that LLP to GNPA is adversely affecting all 3 performance indicators. of a group of Private Banks

The LLP to Total Asset is positively associated with NIM and insignificant whereas show insignificant and negative association with ROA and ROE for a group of Private Banks. The result is in conformity with the expected signs for ROA and ROE where negative association is adversely

affecting ROE, Performance indicators of a group of Private Banks. The results of NIM are not in conformity with the expected sign and positive association implies increase in LLP to TASS will improve ROA.

The Gross Loan to Total Asset is significantly and positively associated with ROA and NIM and show insignificant and negative association with ROE for a group of Private Banks. The result with ROE is in conformity with the expected signs where negative association is adversely affecting the ROE of a group of Private Banks and increase in this ratio will affect the performance negatively. The significant positive relation with ROA and ROE is not in conformity with the Expected results.

The Operating Expenses to Gross Loans is significantly and negatively associated with ROA and ROE and results of association confirms with the expected sign whereas it is insignificantly and positively associated with NIM for a group of Private Banks and the result is not in conformity with the expected signs and positive association implies that it is positively adding to the performance represented by NIM for a group of Private Banks, if there are cases of high expenditures due to business diversification resulting in increase in the returns.

The Size represented by Log to Assets is significantly and positively associated with NIM and expected and actual results are in conformity and show significant and negative association with ROA and insignificantly negatively related to ROE for a group of Private Banks. The result with ROA and ROE are not in conformity with the expected signs for a Private Bank group, the reason could be the larger the size of the bank is, the more will be

the risk and inefficiencies at managerial level and inversely affecting the ROA.

The Deposits is insignificant and negatively associated with ROE and NIM but significant for NIM and the results are not in conformity with the expected association, while the association with ROA is insignificant and positive for a Private Banks and there is no difference in expected and actual association of a group of Private Banks.

**Table 7.2.5.3 Comparison of Expected Result with Actual Results of Effect of Credit Risk on Performance (ROA, ROE and NIM) of a group of Public Banks**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance		
		Pub. ROA	Pub. ROE	Pub. NIM	Pub. ROA	Pub. ROE	Pub. NIM
<b>GNPA Ratio</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>LLP to Loan</b>	<b>Neg.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>***</b>	<b>-</b>	<b>-</b>
<b>C AR</b>	<b>Neg.</b>	<b>N</b>	<b>P</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>C D</b>	<b>Post. /Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>LLP to GNPA</b>	<b>Neg.</b>	<b>P</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>*</b>	<b>-</b>
<b>LLP to TASS</b>	<b>Neg.</b>	<b>P</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Gross Loan to TASS</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>*</b>
<b>Oper. Exp. to Gr. Loans</b>	<b>Neg.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>***</b>	<b>***</b>	<b>***</b>
<b>Log to Assets</b>	<b>Post.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>**</b>	<b>***</b>	<b>-</b>
<b>T. Deposits</b>	<b>Post.</b>	<b>N</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>**</b>

**Source: Authors Compilation from Regression Tables 7.2.4.7 to 7.2.4.9**

The three variables which have been used to represent three model viz., ROA, ROE and NIM have been summarized to make comparison between expected and actual sign and the association with the independent variables for a group of Public Banks as depicted by table 7.2.5.3.

The independent variable GNPA Ratio is insignificant and negatively associated with ROA, ROE and NIM for a group of Public Banks. The result is in conformity with the expected signs where negative associations adversely negatively affect all 3 parameters of Performance of a Public Banks.

The LLP to Gross Loan is insignificant and positively associated with ROE and NIM and show significant and positive association with ROA for a Public Banks. The result is in conformity with the expected signs for all three representative of Performance and positive association implies increase in Provision will improve performance as provision is a cushion against future losses.

The CAR is insignificantly and negatively associated with ROA and show positive and insignificant association with ROE and NIM for Public Banks. The result is in conformity with the expected signs for ROE and NIM where the results with ROA are not in conformity showing negative association. The positive association with ROE and NIM implies increase in CAR will improve the performance.

The CD is insignificantly and negatively associated with ROA, ROE and NIM for a group of Public Banks. The result is in conformity with the expected signs and indicates that CD is adversely affecting ROA, ROE and NIM for Public Banks because rise in CD will add to NPA thereby affecting the performance.

The LLP to GNPA is positively associated with ROA and show negative and significant association with ROE and insignificantly and negatively related to NIM for Public Banks. The result is not in conformity with the expected signs for ROA where positive association implies increase in LLP to GNPA will improve ROA. Negative association with NIM and ROE is in conformity with the expected signs of association.

The LLP to Total Asset is positively associated with ROA and NIM and show negative association with ROE for Public Banks. The result is in conformity with the expected signs for ROE for a group Public Banks. The results with ROA and NIM are not in conformity with the expected negative sign.

The Gross Loan to Total Asset is negatively associated with ROA, ROE and NIM and significant for NIM, for a group of Public Banks. The result is in conformity with the expected signs where negative association of Credit Risks indicator Gross Loans to Total Assets is adversely affecting all the Performance indicators of a group of Public Banks and increase in this ratio will affect the performance negatively.

The Operating Expenses to Gross Loans is positively associated with ROA, ROE and NIM for Public Banks and the result is not in conformity with the expected signs and indicates that Operating Expenses to Gross Loans is positively adding to the performance represented by ROA, NIM and ROE for

Public Banks, if there are cases of high expenditures due to business diversification resulting in increase in the returns.

The Size represented by Log to Assets is significantly and positively associated with ROA and ROE and shows insignificant and positive association with NIM for Public Banks. The result is in conformity with the expected signs of relationship.

The Deposits is insignificant and negatively associated with ROA and ROE and shows significant and positive association with NIM for Public Banks. The result is not in conformity with the expected signs for ROA and ROE and negative association implies that Deposits is inversely affecting performance of Public Banks. The results for NIM are in conformity with the expected sign.

**Table 7.2.5.4 Comparison of Expected Result with Actual Results of Effect of Credit Risk on Performance (ROA, ROE and NIM) of a group of All Commercial Banks with Time Dummy for Basel II**

Independent Variable	Exp. Sign	Actual Sign			Level of Significance		
		All ROA	All ROE	All NIM	All ROA	All ROE	All NIM
<b>GNPA Ratio</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>***</b>	<b>-</b>
<b>LLP to Loan</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>**</b>	<b>**</b>
<b>C AR</b>	<b>Postv.</b>	<b>N</b>	<b>P</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>***</b>
<b>C D</b>	<b>Postv. /Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>LLP to GNPA</b>	<b>Neg.</b>	<b>P</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>LLP to TASS</b>	<b>Neg.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>-</b>	<b>**</b>	<b>**</b>
<b>Gross Loan to TASS</b>	<b>Neg.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Oper. Exp. to Gr. Loans</b>	<b>Neg.</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>***</b>	<b>**</b>	<b>***</b>
<b>Log to Assets</b>	<b>Postv.</b>	<b>P</b>	<b>P</b>	<b>N</b>	<b>-</b>	<b>-</b>	<b>*</b>
<b>T. Deposits</b>	<b>Postv.</b>	<b>N</b>	<b>N</b>	<b>N</b>	<b>-</b>	<b>***</b>	<b>***</b>
<b>Basel II</b>		<b>P</b>	<b>N</b>	<b>P</b>	<b>-</b>	<b>-</b>	<b>-</b>

**Source: Authors Compilation from Regression Tables 7.2.4.10 to 7.2.4.12**

The three variables which have been used to represent three model viz., ROA, ROE and NIM have been summarized to make comparison

between expected and actual sign and the association with the independent variables for a group of All Banks and by introducing Dummy Variable for Basel II period as depicted by table 7.2.5.4 above

The independent variable GNPA Ratio is insignificant and negatively associated with ROA and NIM and show significant and negative association with ROE for a group of All Banks, with an additional dummy variable. The result is in conformity with the expected signs where negative association of Credit Risks with ROA, ROE and NIM indicates that GNPA adversely negatively affect all 3 parameters of Performance for a group of All Banks.

The LLP to Gross Loan is insignificant and negatively associated with ROA and show significant and negative association with ROE and NIM for a group of All Banks. The result is in conformity with the expected signs for all three proxies of Performance where negative association adversely affect the performance indicators of a group of All Banks.

The CAR is insignificantly and negatively associated with ROA and show positive association with ROE and NIM for a group of all Banks, when an additional dummy variable is introduced. The result is in conformity with the expected signs for ROE and NIM which reveals direct positive relationship. The negative association with ROA is not in conformity with the expected results.

The CD is insignificantly and negatively associated with ROA and ROE and NIM for a group of All Banks, with an additional dummy variable for Basel II. The result is in conformity with the expected signs for all performance indicators where negative association for a group of All Banks indicates that every rise in CD will add to NPA thereby affecting the performance.

The LLP to GNPA is positively associated with ROA and NIM and show negative association with ROE for a group of All Banks with an additional dummy variable for Basel II Period. The result is in conformity with the expected signs for ROE where negative association indicates that LLP to GNPA is adversely affecting ROE for a group of all Banks. The results with ROA and NIM being positive are not in conformity with the expected sign

The LLP to Total Asset is positively associated with ROA and not significant, and significantly positively associated with ROE and NIM for a group of All Banks when an additional variable dummy for Basel II is included. The results of positive association are not in conformity with the expected signs of association for a group of All Banks.

The Gross Loan to Total Asset is negatively associated with ROA, ROE and NIM and insignificant for a group of All Banks when an additional variable dummy for Basel II. The results are in conformity with the expected signs of a group of All Banks and increase in this ratio will affect the performance negatively.

The Operating Expenses to Gross Loans is significantly and positively associated with ROA, ROE and NIM for a group of All Banks when an additional dummy variable for Basel II is included. The results are not in conformity with the expected signs of association.

The Size represented by Log to Assets is significantly and positively associated with NIM and show insignificant and positive association with ROA and ROE when an additional dummy variable is included for a group of All Banks. The result is not in conformity with the expected signs for NIM.

The Deposits is insignificant and negatively associated with ROA and shows significant and negative association with ROE and NIM for a group of All Banks when an additional dummy for Basel II period is included. The results are not in conformity with the expected signs.

The newly included dummy variable for Basel II is insignificant for all three models ROA, ROE and NIM indicating Basel II period was insignificant to determine the effect of Credit Risk on Performance. But for model 1 ROA and Model 3 NIM it shows positive association and for ROE it is negatively related.

### **7.3 Summary**

The chapter has basically dealt with the third objective which analyses the effect of credit risk on the Performance of the all banks, group of Public and a group of Private Banks and considers three Performance indicators viz.ROA, ROE and NIM as dependent variables leading to 3 Regression Models. It has included 10 independent variables and one dummy variable Basel II period to understand the effect on Performance indicators of the independent variable and accordingly analysed all 40 Commercial banks together.

## **CHAPTER VIII**

### **FINDINGS, CONCLUSION AND SUGGESTIONS**

#### **8.1 INTRODUCTION**

*Credit risk, has commonly been identified as a greatest risk on the banks performance (Boffey & Robson, 2007, p.66).*

Though one of the basic causes of banking crisis is ineffective management of credit risk, the primary business of every bank all over the world remains the same and they continue to perform their core business activity of credit financing.

There is a common consensus amongst the authors who contributed their findings on financial crisis that the magnitude of nonperforming loans is linked to the bank failure and crisis in both developing and developed countries of the world.

Saunders & Cornett (2006) suggest that the very nature of banking business is sensitive because more than 85% of the liability of banks is deposits and credit creation function is carried out by using the deposits made by their customers. Though Credit creation activity is a revenue generating

activity enabling bank to create revenue but also exposes banks to dangerously high risk leading to financial erosion and bankruptcy.

A healthy Financial System prevents bank failure and financial crisis and to control the inefficiencies in the management of Credit Risk and exposure to Financial Risks Banks in India have adopted Basel II Norms along with other nations of the world.

As such then the in depth study of the Credit Risk comes into picture and knowing the effect of Credit Risk on the Performance of Indian Public and Private Banks which would help in the improvement of the profitability adding to healthy financial system and has employed regression analysis to establish relationship between Credit Risk and Performance.

As the study Credit Risk and its impact on the Performance of Select Public and Private Banks in India was an attempt to understand the impact of Credit Risks on the performance of Indian Public and Private Banks it was required to deal with the root cause and different aspects of Credit Risk of the banks under study and accordingly the most important area to be touched upon was to assess and analyse quality of Loan Assets held by the Banks under study.

The need to analyse the quality of asset was felt in order to assess and evaluate assets at Credit Risks as indicated by the magnitude of NPAs. Mere focusing on the quality of Loan assets was not enough, there was need to know the underlying causes and factors influencing Credit Risk. And further

to that impact of Credit Risk on Performance of Indian Public and Private Banks was studied.

To suffice the need to cover different areas mentioned above the study has purely used Secondary data for all the objectives. The secondary data was availed from the annual reports of the banks under study and Money Control.com. Beside this data on macroeconomic indicators were collected from RBI Website and also World Bank. The study included 40 Banks listed on Bombay Stock Exchange then, up to 31-2-2016. The study is based on Panel data, Unbalanced, covering 40 banks over a period of 16 years and uses software SPSS 22 and STATA 12.

While dealing with the individual objectives of the study in total three in number an attempt has been made to consider together all Banks under study, separately a group of Public Banks and a group of Private Banks and a comparison between Private and Public is also made.

In addition to this the study considers the Basel II period implementation in India to evaluate quality, factors and effect prior to and post implementation of Basel II norms in India. The purpose was to analyse quality prior to and post implementation of Basel II Norms, and to understand whether the determinants influencing the credit risks in period prior to and post implementation were same, whether post period was influencing factor and so on. There was also need to see the influence of post Basel II period on the performance.

To analyse the quality of assets Trend analysis was presented on important asset quality ratios comprising of Gross NPAs to Gross Loans and

Advances Ratio, Net NPAs to Net Advances Ratio, Provision to Total Loans Ratio, Ratio of GNPA's to Total Assets, Ratio of NNPA's to Total Assets, Total Investments to Total Assets Ratio and Slippage Ratio to observe the trend over a period of study of 16 years from 2001-2016.

Besides, the summary statistics of variables used were presented to give idea of data and Test of Normality Histogram was performed, the data being found to be not normal the non parametric Mann Whitney U Test was run to analyse the asset quality using six different asset quality ratios.

After analyzing the quality in terms of asset quality ratios and the trend of these ratios the study deals with the different determinants and the factors influencing the Credit Risks and considers Bank Specific Factors and Macroeconomic Factors influencing Credit Risk as the independent variables and Credit Risks the NPAs as the dependent variable and runs a regression model. Hausman Test was run to decide between Random and Fixed Effect Model besides this Heteroscedasticity and autocorrelation test were carried out and robust standard error was also corrected. The Macroeconomic factors included in the study include the GDP Growth Rate, Exchange Rate, Interest Rate, Inflation Rate and Unemployment Rate. Various Banks specific financial ratios also have been used and include Credit Growth, Operating Efficiency, CAR, Ownership Structure, Loan Loss Provision and Size represented by Total Assets. Using these factors number of hypothesis using Regression Models have been tested to derive the determinants of Credit Risk in the Public and Private Indian Banks separately for a group of Public, Private and All Banks. The Bank Specific and Macroeconomic factors together is considered as one

model, beside only Bank Specific factors as another Model and Macroeconomic Factors as 3<sup>rd</sup> Model and Model 4 Macroeconomic and Bank Specific Determinants with Time Dummy for Basel Period. The trend of various ratios used in the regression is also presented.

After studying different factors influencing the Credit Risks, the effect of Credit Risk on Performance has been studied using different financial ratios and Regression analysis was done to test different hypothesis. Here Banks Performance measured by ROA, ROE and NIM has been used as dependent variables and accordingly there are three Models. Besides this 10 independent variables have been used viz., Loan Loss Provision to Gross Loans, Loan Loss Provision to Gross Non Performing Assets, Loan Loss Provision to Total Assets, Gross Loans to Total Assets, Operating Expenses to Gross Loans, Gross Non- Performing Assets to Gross Loans, Capital Adequacy Ratio, Credit Deposit Ratio, Deposits, Log of Total Assets and one Dummy Variable representing Basel II period. The Size represented by log of Total Assets and Deposits have been used as Control variables.

Hausman Test was run to find the preferred model. Diagnostic analysis for autocorrelation and Heteroscedasticity was also carried out and it was found that Heteroscedasticity was present and to remove the same robust standard error was used and results are presented accordingly. The trend of all these ratios is also presented.

## **8.2 Major Findings of the Study**

The major findings of the study objective wise are presented.

### **8.2.1. Analysis of Quality of Assets of the Banks under study**

The Quality of Assets of the banks under study is analysed with the help of Trend Analysis by considering the Trend of important Asset Quality ratios based on three bifurcations

A) All Banks

B) A group of Public Banks

C) A group of Private Banks

#### **A) All Banks**

1. The study uses the ratio of GNPA to GL as the main parameter to evaluate the Asset Quality and the Credit Risks and confirms based on the summary statistics that the average mean of GNPA for all sampled 40 banks during the study period from 2001-2016 was 4.45%, which means on an average out of loans granted 4.45% was irrecoverable and not performing in Indian Commercial Banks. To add further the maximum highest GNPA was found at 24.11%. When this average is compared with the baseline given by Basel Norms the average of 4.45 is within the limits. Also as given in Economic

Survey 2017 the acceptable GNPA limit is 10%. The average NNPA to Net Advances for all the sampled banks was found at 3.24% and the maximum NNPA Ratio stood at 9.09%. The mean of LLP to LN stood at 0.044 and maximum LLP was found at 3.04. The average mean is less than the required rate of Provision which should be between 2% and 2.5%. The average of Slippage Ratio expressed as additions to NPA during the year to Closing NPA was found at 0.9% and maximum slippage was 8.32%. The mean of Total Investment to Total Assets ratio which talks of defensive mechanism adopted by banks as an alternative to core function of granting loans stood at 0.9% and the maximum over a period of 16 years was @ of 8.32%. The ratio of GNPA's to Total Assets on average was found at 0.05% and maximum was 2.5%. The ratio of NNPA's to Total Asset showed an average of 0.02% and maximum was found at 0, 9%.

2. The GNPA's in Rupees Crores of all banks under study have been increased from Rs. 3076.984 crores in 2001 to Rs. 14201.21 crores in 2016, thereby showing an increase of 21% though there is fluctuation in the rate over the study period but showing a declining trend from 2002 to 2004. The year 2012 show a rise to Rs.10637.51 crores and after that showing a decline till 2015 and a height of Rs. 14 201.21 crores. The trend of GNPA ratio of all banks on an average stood at 10.24 in 2001 showing a decline and in 2016 the ratio stood at 7.07%. The trend of the ratio of NNPA's of all banks was 0.62, showing an increase to 1.01 in 2002 and thereafter a decline till 2012 and slowly showing a rise after that to 0.86 which is more than the rate of GNPA in the year 2001. The trend in the ratio of LLP to Loans show a fluctuation for 40 banks, where highest provision was made in 2009 but which stood at less

than 0.1% , and then decline is recorded till 2014 and increased to approximately 0.05% in 2015, and after that reduced in 2016 to 0.05%. The trend of Slippage Ratio is showing a rise from 2009 where the slippage rate for all banks stood at 1.20 % and increased to 1.39% in 2016. The trend of the ratio of GNPA to Total Assets shows fluctuations and there is decline from 2008 till 2013 and after that slightly rising. The year 2001 shows that the ratio was approaching a level of 0.15 and gone down to approximately 0.7%. The trend of the ratio of NNPA's to Total Assets of all banks also shows fluctuating trend but showing a rise of 0.55 in 2004 and declined to 0.15 approximately in 2012, showing rising trend after that. The trend of the ratio of Total Investment to Total Assets for all banks show rising trend till 2004 approximately reaching a scale of 0.5 and then there is a decline reaching the level of 0.33 approximately in 2012 and the year 2004 shows a rise of 0.4.

3. The results of the Wilcoxon Sign Rank Test finds that there is difference in the asset quality across all banks in pre and post Basel II period as shown by the results of the ratio of LLP to Loan, GNPA's to Gross Loans, NNPA's to Net Advances, GNPA's to Total Assets, and Total Investment to Total Assets. The asset quality ratio NNPA's to Total Assets for all banks was not found to be statistically significant thus this ratio of asset quality was not different during pre and post Basel II period.

## **B) A group of Private Banks**

4. The average of GNPA's to Gross Loans of a group of Private Banks was confirmed at 3.76% and the maximum rate stood @ 19% during the period from 2001 to 2016. The average of NNPA's to Net Advances stood at 0.08% approximately and the maximum NNPA's rate was found to be 3.04%. The average of LLP to GL for a group of Private Bank stood at 0.27% and the maximum provision was made @ 7.13%. The mean of GNPA to Total Assets for a Private Bank group stood at 0.06 % and the maximum rate was 2.07%. The mean of the ratio of NNPA's to Total Assets stood @ 0.018 and the maximum rate was 0.34%. The mean of the ratio of Total Investments to Total Assets was found at 0.27% and the maximum was 2.27%. The average of NPA Slippage ratio was found at 1.03% and the maximum Slippage for a group of Private Banks stood at 8.32%.

5. The GNPA's in Rupees Crores for a group of Private Banks showing declining trend till 2005 and from 2008 to 2012 there is a major increase to Rs. 20099.78 Crores and decreased to Rs. 3257.743 Crores. The trend of GNPA's to Gross Loans for a group of Private Banks stood @ 8.97% in 2001, increased to 9.25% in 2002, 10.61% in 2003 and declined to 3.75% in 2016, thereby showing decline from 5.7% in 2004. There is fluctuation in the ratio of NNPA's to Net Advances of a group of Private Banks till 2004 and in 2005 the ratio is declined to 0.27%, showing declining trend there after till 2015 and in 2016 increased to 0.36%. The trend of LLP to Gross Loans increased to 0.21 in 2009 from 0.11 in 2001 and thereafter shows downward movement to 0.01 in 2013 and slight increase in 2016 to 0.02. The trend of Slippage for Private

Banks shows fluctuations but slippage has been increasing from 2013 and was @ 1.43% and increased to 1.48% in 2016. The trend in the ratio of GNPA's to Total Assets shows fluctuation but overall a declining trend from 0.25 in 2001 to 0.05 approximately in 2016. The trend of the ratio of NNPA's to Total Assets stood at 0.032 in 2001, though there is fluctuation in the ratio; it has declined to 0.01 in 2016. The trend in the ratio of Total Investments to Total Assets shows a rise to 0.38% in 2016 from 0.32 in 2001. Overall the ratio is not very high.

6. As revealed by Wilcoxon Sign Rank Test the difference in the asset quality ratio of Gross Non Performing Assets to Gross Loans, the ratio of Net Non Performing Assets to Net Advances, the ratio of Gross Non Performing Assets to Total Assets and the ratio of Net Non Performing Assets to Total Assets for Private were found to be statistically significant at 5% significance level in the period prior to post implementation of Basel II norms and the ratio of Loan Loss Provision to Total Loans was insignificant.

### **A Group of Public Banks**

7. The average of GNPA ratio for a group of Public Banks was found at 4.83% during the period from 2001 to 2016 and the maximum was 24.11%. The average mean of NNPA of a group of Public Banks stood at 0.02% and the maximum ratio was found at 1.37%. The average of LLP to Gross Loans of Public Banks was confirmed @ 0.43% and maximum provision made stood at 9.09%. The mean of the ratio of GNPA to Total Assets stood at 0.05% and the maximum was 2.50%. The mean of the ratio of NNPA to Total Assets was

found at 0.02% and maximum ratio stood at 0.9%. The average mean of the ratio of Total Investments to Total Assets for a Public Bank Group was 0.44% and the maximum was 4.49%. The mean of the Slippage ratio was 0.55% and the maximum was found at 2.86%.

8. The trend of GNPA's in Rupees Crores for a group of Public Banks show rising trend in 1<sup>st</sup> six years, there is a declining trend thereafter and a rise in 2010 to Rs. 2407.472 Crores reaching a height of Rs.21814.05 crores in 2016. The trend of GNPA's to Gross Loans recorded a decline from 10.49% in 2001 to 1.94% in 2010 and 2016 showing a rise up to 8.90%. The trend of NNPA's to Net Advances shows a fluctuation in the rate, on an average there is a decline and shows increase in 2016 to 1.22 from 0.69 in 2001. The trend of LLP to GL shows fluctuation but overall there is a decline, but the provision rate in 2004 shows an increase to 0.07% declining approximately to 0.01% in 2007 and increased to 0.07 in 2015 and declined to 0.02% in 2016. The trend in Slippage ratio for a group of Public Bank is showing a rise from 1.047 in 2010 1.33 in 2016. Trend in the ratio of GNPA's to Total Assets for a group of Public showing an increase up to the year 2005 and approximately increased to 0.15% , showing decreasing trend till 2013 and rising upward in 2016 to 0.1% approximately. The overall trend in the ratio of NNPA's to Total Assets show declining and rising trend. In 2003 the rate of NNPA's stood at 0.07%, declined to approximately less than 0.01% in 2012 and increased to 0.05 % in 2016.

9. The results of Wilcoxon Sign Rank Test shows that the difference in the asset quality ratios of Total Investment to Total Asset and the ratio of GNPA's

to Gross Loans for a group of Public Banks were statistically significant in the pre and post Basel II period and as a result the asset quality in the pre and post Basel II of a group of Public Banks were not the same. The difference in the asset quality ratios of Net Non Performing Assets to Net Advances, the ratio of Loan Loss Provision to Total Loans, the ratio of Gross Non Performing Assets to Total Assets and the ratio of Net Non Performing Assets to Total Assets of Public Banks was not significant in the pre and post Basel II period to decide about the asset quality.

### **Across Categories of Ownership**

**10.** The results of comparison across the categories of Ownership shows that the difference in the asset quality ratio of GNPA's, the ratio of NNPA's, the ratio of GNPA's to Total Asset, the ratio of NNPA's to Total Asset and the ratio of Total investment to Total Asset have been found to be statistically significant as revealed by the Independent Samples Mann Whitney U test. Thus these five asset quality ratios were different across the category of ownership for public and private banks over a period of 16 years and the ratio of Loan Loss Provision to Total Loans was not found to be significant,.

### **8.2.2 Determinants of Credit Risk in the banks under study.**

The study considers two types of determinants of Credit Risks in Banks, Bank Specific and Macroeconomic and findings are presented under the following headings.

- A) Macro and Bank Specific Factors influencing Credit Risks for a group of All Commercial, Private and Public Banks
- B) Bank Specific Factors influencing Credit Risks for a group of All Commercial Private and Public Banks
- C) Macro Economic Factors influencing Credit Risks for a group of All Commercial, Private and Public Banks
- D) Macroeconomic and Bank Specific Factors influencing Credit Risks with Time Dummy for Basel Period for a group of All Commercial Banks

**A) A group of All Commercial Banks**

1. The Robust Fixed Effect Model for Macroeconomic and Bank Specific Factors for a group of Commercial Banks shows that LLP to Loans, Credit growth, Unemployment Rate and Inflation Rate are significant and established negative association of Inflation Rate with the GNPA Ratio. Whereas LLP to Loans, Credit Growth and Unemployment Rate show positive association with GNPA and are significant. The CAR, Ownership, Operating Inefficiency, Size GDP, Exchange Rate and Lending Rate were found to be insignificant.
2. The results of Robust Fixed Effect Model for Bank Specific Factors for a group of All Commercial Banks found positive association between independent variables Credit Growth and LLP to Loans and the GNPA Ratio. The CAR, Size, Operating Inefficiency and Ownership are insignificant.

3. Robust Fixed Effect Model for Macroeconomic Factors for a group of All Commercial Banks found that Inflation Rate is significant at 0.01% level and negatively associated with Credit Risks while Unemployment Rate, the Lending and Exchange Rate and GDP are insignificant.
4. The Robust Random Effect Model for macroeconomic and bank specific determinants with Dummy Variable for Basel II for a group of All Commercial Banks finds that Bank Specific Factors LLP to Loans and Credit Growth are significant and show positive association with GNPA's and Macroeconomic indicator Lending Rate and Inflation Rate show significant and negative association, while Exchange Rate show positive association with GNPA's and Dummy for Basel II period is significant and show negative association with GNPA Ratio, a proxy for Credit Risk. Thus the Basel II period was the significant determinant of the Credit Risk. The CAR, Size, Operating Efficiency, Ownership and GDP Growth Rate and Unemployment Rate are insignificant.
5. The Robust Fixed Effect Model for Bank Specific Factors for a group of All Commercial Banks found that the Credit Growth was significant and positively related with the GNPA Ratio. CAR, LLP to Loans and Operating Inefficiency are insignificant. The Dummy Variable for Basel II is significant showing negative association with GNPA Ratio.
6. The Robust Fixed Effect for Macroeconomic indicators with Dummy for Basel II period for a group of All Commercial Banks found two factors significant viz., Exchange Rate and Inflation Rate. The Exchange Rate show positive association and Inflation negative association. The Dummy for Basel II is significant at 1% level of significance and showing negative association

with GNPA Ratio, indicating that Basel II period had significant effect on Credit Risk. The Unemployment Rate, Lending Rate and GDP were found insignificant.

## **B) A group of Private Banks**

1. The results of Robust Fixed Effect for Bank Specific and Macroeconomic determinants found Credit Growth and LLP to Loan significantly and positively contributes to Credit Risks. The contribution of CAR, Operating Efficiency, Size, GDP Growth Rate, Exchange Rate and Unemployment was insignificant. Inflation Rate was found significant having negative association with GNPA's.
2. The Robust Fixed Effect for Bank Specific Factors for a group of Private Banks found that Operating Inefficiency and Credit Growth are significant and show positive contribution to GNPA's. The LLP to Loans, CAR and Size are insignificant.
3. The Robust Fixed Effect Model for Macroeconomic indicators for a group of Private Banks found that GDP Growth Rate, Lending Rate, Unemployment Rate and Exchange Rate were insignificant, while Inflation Rate showed significant and negative association with a Credit Risk for a group of a Private Banks.

### **C) A group of Public Banks**

1. The Robust Fixed Effect Model for Bank Specific and Macroeconomic Factors for a group of Public Banks found only Inflation Rate to be the significant determinant of credit risk having negative influence
2. The Robust Fixed Effect for Bank Specific Factors for a group of Public Banks found CAR and Credit Growth as significant determinants of Credit Risk but CAR discloses negative association with GNPA Ratio and Credit Growth positive association.
3. The Robust Fixed Effect for Macroeconomic Factors for a group of Public Banks found two macro factors viz., Inflation Rate significant at 0.01% level of significance and negatively associated with Credit Risks, while Exchange Rate is significant and positively associated.

### **8.2.3 Credit Risk and its Effect on the Performance of the banks**

The Credit Risk impacts the Performance and the Performance in the study is represented by ROA, ROE and NIM and the findings of these Models are presented under following categories.

#### **A) All Banks**

1. The trend of ROA for a group of all Banks has been showing fluctuation in the ratio but shows a rise to 0.65% in 2011 from 0.10 in 2001 and decline to -0.014. Overall there is a declining trend. The trend of ROE for a group of all

Banks though present a fluctuating trend but there is increase in the rate from 1.12% in 2001 to .37% in 2010, then showing a declining trend and the rate was found to be – 2.08. The trend of NIM of a group all Banks show increasing trend and increased from 0.17% in 2001 to 1.39% in 2010 and 1.32% in 2016. The study uses independent variables as a proxy for Credit Risk and the ratio of LLP to GNPA has increased to 0.39% in 2010 from 0.14 % in 2001 and the rate of Provision in 2016 shows increase to 0.50 % The trend of LLP to Total Assets shows increasing trend till 2010 and increased from 0.018% in 2001 to 0.036% in 2010 and thereafter has been declining and in 2016 stood at 0.019%. The ratio of Gross Loans to Total Assets for a group of all banks has been showing rise right from 2001 and increased from 0.41% to 0.94% in 2016. The trend of Cost per Loan for a group of all Banks show fluctuating trend and the highest rate of 0.09 was observed in 2009, decline to 0.03% in 2010 and further to 0.02 in 2016. The trend of Deposits shows a change in the scene from 2003 showing an increase to Rs. 1809996 Crores to Rs.13372928 in 2016. The log of asset representing size a dummy variable show an increasing trend and has increased from 9.76% in 2001 to 12.13% in 2016.

2. The average mean of ROA of all banks is 0.19% and maximum stood at 19.55% over a period of 16 years. The mean of ROE for a group of all Banks stood at 3.37% and maximum ROE was found to be 55.82%. The average of NIM was 1.24%, the maximum NIM was recorded at 7.16%. The mean of CAR stood at 12.96% and maximum CAR was recorded at 59.42%. The mean of CD ratio was found at 69.65% and maximum was recorded at 202.84%.

The mean of LLP to GNPA was 0.31% and maximum was and maximum was recorded at 202.84%. The mean of LLP to GNPA was 0.31% and maximum was.91%. The mean of LLP to TASS stood at 0.022% and maximum was 1.64%. The mean of GL to TASS was 0.70% and maximum stood at 6.83%. The Cost per Loan averaged at 0.55% and maximum was 308%. The mean of log of Assets stood at 11.07% and maximum was 21.24%. The mean of Deposits was Rs. 5077221 Crores.

3. The results of Robust Random Effect ROA Model for a group of all Banks found that CAR was significant and negatively related with ROA and the Cost per Loan was significant and positively associated with ROA. There is negative association between ROA and the GNPA to GL, LLP to Loan, CD Ratio, and GL to TASS and Deposits and are insignificant. LLP to TASS and LLP to GNPA and Size are insignificant but show positive association with ROA
4. Robust Random Effect ROE Model for a group of all banks found that Size and Cost per Loan are significant at 0.01% level and are positively related to Performance indicator ROE. The LLP to GNPA, CAR and GNPA Ratio are significant at 0.05% but negatively associated with ROE. The LLP to Loan is positively associated with ROE and the CD Ratio, LLP to TASS, GL to TASS and Deposit show negative association with ROE and are insignificant.
5. Robust Random Effect Model for NIM for a group of all Banks found that CAR, Cost per Loan and Deposits are positively associated and significant at 0.01% level. Size negatively associated with NIM and significant at 0.01%. GL to TASS show negative relationship and significant at 0.05%. The GNPA to GL, LLP to LN and LLP to GNPA are insignificant and have negative

association with NIM and the CD and LLP to TASS are positively related but insignificant.

6. The Robust Random Effect ROA Model with dummy variable for Basel II Period for a group of All Banks under study found that only Cost per Loan Asset is significant at 0.01% level and is positively associated with the ROA. The GNPA Ratio, LLP to LN, CAR, CD and Deposits are negatively associated and LLP to GNPA, LLP to TASS and size are positively associated but. Insignificant. And the dummy variable for Basel II is insignificant.
7. The Robust Random Effect ROE Model with dummy variable for Basel II Period for a group of All Banks found that GNPA Ratio is significant at 0.01% level but show negative association. Deposits show positive association and significant at 0.01%. The LLP to LN is significant at 0.05% levels and negatively associated. The LLP to TASS and Cost per Loan Assets are positively associated and significant at 0.05%. The CD, LLP to GNPA and GL to TASS are insignificant and there is negative association and CAR and Size show positive association with ROE. Dummy for Basel II is insignificant thereby showing no difference in effect on ROE in Post Basel II period.
8. The Robust Random Effect NIM Model with dummy Basel for All Banks found that the CAR and Cost per Loan Assets are significant at 0.01% level and there is positive association. Deposits are significant at 0.01% level and show negative association. The LLP to LN is negatively associated and LLP to TASS is positively associated but significant at 0.05% level. Size share negative association and significant at 0.10% level. The study finds positive association with LLP to GNPA but insignificant. The dummy for Basel II

effect is insignificant but is positively related. GNPA, CD and GL to TASS are insignificant and are negatively associated with NIM.

## **B) A group of Private Banks**

1. The trend of ROA shows fluctuation but overall the ratio is showing a decline and stood at 0.014% in 2001 and 0.1% in 2016. The trend of ROE is showing a rising trend till 2004 and increased to 2.54% in 2004. There is decline from 2005 to 2011, and a showing rise of 2.52 in 2012 and again declining trend in 2016 to 1.63%. The trend of NIM for a Private group shows rising trend from 2005 with a rate of 1.56% and in 2016 increased to 1.72% The trend of the ratio of LLP to GNPA's shows a rising trend and in the year 2001 the NIM stood at 0.15% and increased to 0.48% in 2016. The ratio of LLP to TASS showed a rise of 0.11% in 2008 and after that the ratio is showing a decline to 0.01% in 2016. The trend of GL to TASS shows a fluctuation from 2001 to 2007 and rising trend from 0.52% in 2008 to 0.98% in 2016. The trend of Cost per Loan shows a fluctuation till 2006 and from 2007 the trend is closer to 0.039% in 2007 and reaching 0.034% in 2016. The size represented by log of Total Assets is showing rising trend and recorded a rise of 9.99% in 2005, reaching to 11.39% in 2016. The trend of Deposits in Rupees Crores is showing rising trend and increased from Rs.8.749779 crores in 2001 to 10.41864 in 2010 and Rs. 11.39485 Crores in 2016.
2. The mean of ROA for a group of Private Banks was found at 0.14% and minimum was -0.033% and maximum was 4.25%. The mean of ROE stood at 1.84% and maximum ROE was 22.73% and minimum was -0.7134. The NIM

averaged at 1.50% and maximum was found at 5.61%. The mean of CAR was found to be 14.19% and the minimum was 0.34% and maximum was 59.42%. The mean of Credit Deposit was found at 71.75% and the minimum was 36.14% and maximum was recorded 114.77%. The mean of the ratio of LLP to GNPA's stood at 0.40% and the maximum was 3.91%. The mean of LLP to TASS stood at .039% and maximum was 1.64%. The mean of GL to TASS stood at 0.53% and maximum was 6.83%. The mean of the Cost per Loan was 0.04%, and the minimum and maximum ranged from 0.002% to 0.490%. The mean of log of Total Assets was found at 10.23% and the maximum was recorded at 21.24%. The maximum Deposits were recorded at Rs. 546424.2 Crores and the mean stood at Rs.49232.68 Crores.

3. Robust Random Effect ROA Model for a group of Private Banks shows negative relationship between ROA and CAR and significant at 0.01% level. GL to Total Assets is significant at 0.01% and is positively related to ROA. Size is significant and negatively associated with ROA and significant at 0.05%. LLP to GNPA negatively related to ROA and is significant at 0.05%. GNPA Ratio, CD Ratio and LLP to TASS, recorded negative relationship and LLP to LN and Deposits are positively associated with ROA.
4. The Robust Random Effect ROE Model for a group of Private Banks found CAR and LLP to GNPA are significant at 5% and Cost per Loan at 1% and are negatively related. The GNPA Ratio, CD, LLP to TASS, GL to TASS, Size and Deposits are insignificant and show negative association while the LLP to LN is insignificant but positively related with ROE.
5. The Robust Random Effect NIM Model for a group of Private Banks found positive and significant relation between CAR and NIM and significant and

negative association with the Deposits at 0.01% significance level. The LLP to LN and GL to TASS were found to be significant at 10% having negative and positive association respectively. The GNPA Ratio, CD, LLP to TASS, Cost per Loan and Size are positively related and LLP to GNPA are negatively related but insignificant

### **C) A group of Public Banks**

1. The trend of ROA for a group of Public Banks shows a fluctuation, the highest rate was 0.26 % in 2009 and declined to -0.09% in 2016, from 0.07% in 2001. The trend of ROE is showing a rising trend, the year 2009 found to have highest ROE at 8.26%, showing declining trend and in 2016 it has declined to - 4.37%. The trend of NIM for a Public Bank group showing rising trend from 2001 and the year had NIM at 0.03% approximately and 1.18% in 2009 and the year 2016 shows a decline to 1.02% The trend of LLP to GNPA shows rising trend and in year 2001 the ratio was 0.14%, in 2011 it stood at 0.4% and showing decline to 0.27% in 2016 after 2011. The trend of LLP to TASS showing a rising trend till 2005, and was recorded at 0.027% , after that shows a decline till 2013 and the year 2016 showing a rise to 0.22%. The trend of GL to Total Assets showing increasing trend and the year 2011 found to have highest rate at 1.19% and slightly declined to 0.9% in 2016. The Cost per Loan shows a declining trend till 2013 and stood at 0.002% and showing rising trend for next two years and recorded a decline at 0.023%. The trend of log of Total Assets is showing an increasing trend and increased from 10.57% in 2001 and increased to 11.91% in 2010 and reaching a height of 12.64% in

2016. The trend of Deposits is showing rising trend and increased from Rs. 2754382 Crores in 2001 to Rs. 9706047 Crores in 2010 and rose to Rs. 22585520 Crores in 2016.

2. The mean of ROA for a Public group stood at 0.22% and the maximum was 19.55%. The ROE averaged at 4.20%, the minimum was found at -33.11 and maximum was 55.82%. The mean of NIM was found to be 1.06% and the maximum was recorded at 7.16%. The CAR over a period of 16 years averaged at 12.17%, minimum as 7.33 % and maximum was 20.1%. The Credit Deposit mean was found to be 68.28%, minimum was recorded at 8.87% and maximum was 202.84%. The mean of LLP to GNPA stood at 0.25% and the maximum provision made was 1.34%. The mean of LLP to TASS was 0.011%, minimum was -0.003% and maximum was 0.47%. The mean of GL to TASS was found at 0.8% and maximum stood at 6.74%.
3. The Robust Random Effect ROA Model for a group of Public Banks found positive association of ROA and LLP to LN, and Cost per Loan Asset and significant at 0.01% level of significance and Size is significant at 0.05% level and positively related to ROA. The ratio of GNPA, CAR, CD, LLP to TASS and Deposits are insignificant but negatively associated. The ratio of LLP to GNPA is also insignificant but there is positive association.
4. The study based on Robust Random Effect ROE Model for a group of Public Banks found significant and negative association between ROE and GNPA Ratio and LLP to GNPA. The Cost per Loan Asset and Size are significant at 0.01% and share positive association. The LLP to LN show positive association with ROE along with CAR. While CD, Deposits, LLP to TASS, and GL to TASS show negative association with ROE.

5. The Robust Random Effect NIM Model for a group of Public Banks found negative association of GL to TASS and the positive association of Cost per Loan Asset with the NIM and are significant. The Deposits are significant at 0.05% and positively associated with NIM. There is negative association of GNPA Ratio, CD, and LLP to GNPA with NIM and LLP to LN, CAR, LLP to TASS and Size are also insignificant but share positive associations with NIM.

### **8.3 Conclusions and Implications of the Study**

The main objective of this research was to study the impact of Credit Risk on the Performance of the Indian Public and Private Banks and to deal with this very comprehensively an asset quality was assessed to analyse the Credit Risks and empirically examined the determinants of Credit Risks and the conclusion for these three aspects is presented as follows.

#### **Quality of Assets**

The six assets quality ratios have been used by the researcher to assess the quality of assets of the groups of banks under study and the researcher arrives at the following conclusion:

The 1<sup>st</sup> ratio used in the study to evaluate the quality of assets in the pre and post Basel II period and across ownership was the ratio of GNPA to GL and the ratio was found to be significant for all groups in pre and post Basel II period and also across ownership over a period of 16 years indicating difference in quality of assets across groups and ownership.

The 2<sup>nd</sup> ratio used in the study to evaluate the quality of assets in the pre and post Basel II period and across ownership was the ratio of NNPA to NA and the ratio was found to be significant for a group of all Commercial Banks and a Private groups in pre and post Basel II period and also across ownership over a period of 16 years indicating difference in quality of assets across a group of Commercial and Private Banks and ownership. The ratio is insignificant for a group of Public Banks indicating that the quality in pre and post period of a group of Public Banks was not different.

The 3<sup>rd</sup> ratio used in the study to evaluate the quality of assets in the pre and post Basel II period and across ownership was the ratio of LLP to TL and the ratio was found to be significant for only one group the group of all Commercial Banks studied together in pre and post Basel II period indicating that there was difference in asset quality of 40 Commercial Banks grouped together. For a group of Private Banks, Public Banks in pre post Basel II period and across ownership over a period of 16 years, the study confirms difference in quality of assets across ownership and a group of Public and Private Banks was the same and there was no difference in the asset quality.

The 4<sup>th</sup> ratio used in the study to evaluate the quality of assets in the pre and post Basel II period and across ownership was the ratio of GNPA to TA and the ratio was found to be significant for a group of all Commercial Banks and a Private groups in pre and post Basel II period and also across ownership over a period of 16 years indicating difference in quality of assets across a group of Commercial and Private Banks and ownership. The ratio is

insignificant for a group of Public Banks indicating that the quality in pre and post period of a group of Public Banks was not different.

The 5<sup>th</sup> ratio used in the study to evaluate the quality of assets in the pre and post Basel II period and across ownership was the ratio of NNPA to TA and the ratio was found to be significant for a group of Private Banks in pre and post Basel II period and also across ownership over a period of 16 years indicating difference in quality of assets across a group Private Banks and ownership. The ratio is insignificant for a group of Public Banks and Commercial Banks indicating that the asset quality in pre and post period of a group of Public Banks and Commercial Bank as a group was not different

The 6<sup>th</sup> ratio used in the study to evaluate the quality of assets in the pre and post Basel II period and across ownership was the ratio of TI to TA and the ratio was found to be significant for all groups in pre and post Basel II period and also across ownership over a period of 16 years indicating difference in quality of assets across groups and ownership based on the difference in the ratio.

To conclude the Gross Non Performing Assets to Gross Loans and the Total Investment to Total Assets were found to be significant for all groups analysed under the four headings viz., a group Commercial Banks, Public and Private group in Pre and Post Basel II and across ownership of Private and Public Banks and accordingly confirms difference in asset quality. Similarly the Net Non Performing Asset to Net Assets and Goss Non Performing Assets to Total Assets confirm same results and are significant for three groups viz., all Commercial Banks, Private Banks and across ownership, confirming

difference in asset quality. While for a group of Public Banks it is insignificant indicating same asset quality.

### **Determinants of Credit Risks**

The study has used Bank Specific and Macroeconomic variables to examine the determinants of Credit Risk and summarizes that there are both categories of factors which influence the Credit Risks in Commercial Public and Private Banks in India.

The negative and insignificant association is confirmed between CAR and Credit Risk for a group of 40 Indian Commercial Banks when Bank Specific and Macro economic factors were grouped together and also when only Bank Specific factors are studied .When Time dummy with Bank Specific and Macro economic factors are studied the association between CAR and Credit Risk is negative and insignificant for a group of 40 Indian Commercial Banks and also when only Bank Specific Factors were studied with Time dummy for Basel II. That shows CAR is negatively and insignificantly associated with the Credit Risks of a group of all Commercial Banks in India during the study period.

For a group of Public Banks the association between CAR and Credit Risk is negative and significant when only bank specific variables are analysed and negative and insignificant when bank specific and macroeconomic factors were clubbed. Negative and insignificant association with the Credit Risk of Private Banks was confirmed.

The association of LLP to GL with Credit Risk of a group of Commercial Banks was confirmed to be positive and significant when both Bank specific and Macro Factors are included with and without Time Dummy for Basel II and also when Bank Specific without Time Dummy indicating that this Bank specific factor is a determinant of Credit Risk. Also the ratio confirms the same positive and significant association with a group of Private Banks when two categories of factors were grouped. The negative and insignificant association was confirmed with a group of Public Banks when Bank Specific and Macro factors were grouped together but show positive association for a group of Public Banks when only Bank Specific factors are considered.

The study confirms positive and significant association between Credit Growth and Credit Risk for a group of 40 Commercial Banks when Bank specific and Macro Factors are grouped together with and without Time Dummy for Basel II. The positive and significant association also holds good for a group of Private Banks. For a group of Public Banks the association is also positive and significant but only when Bank Specific Factors are analysed. The association of the said ratio with a group of Public Bank is positive but insignificant when Bank Specific and Macro factors are included together.

The positive association of Credit Growth implies and confirms that growth in the rate of credit granted increases the Credit Risks.

The study confirms positive and insignificant association of Operating Inefficiency with Credit Risk for a group of Public Banks, when Bank Specific and Macro factors are studied together and also when only Bank Specific

determinants are included. The association of this ratio with a Credit Risk of a group of Commercial Banks is negative and insignificant when Bank specific and Macro factors are analysed together with and without Time Dummy for Basel II. Positive and Insignificant association was confirmed for a group of Commercial Banks when only Bank Specific factors with and without Time Dummy was studied and also for a group of Private Banks.

Insignificant and negative association was confirmed between GDP growth rate and the Credit Risk for the group of 40 Commercial Banks and a group of Public Sector Banks. Negative insignificant association was also found for a group of Private Banks when Macro economic factors were included and when Bank specific and Macro economic factors were studied positive association was confirmed. Thus GDP was insignificant to decide Credit Risks.

The study confirms negative and significant association of Inflation Rate with Credit Risk for all three groups of banks under study. For a group of Commercial Banks with and without Time Dummy for Basel II when Bank Specific and Macroeconomic factors and only Bank Specific factors are studied the association between Inflation Rate is found to be negative and significant, indicating that rise in inflation rate reduces Commercial Banks Credit Risk. For a group of Public and Private Banks also the association is negative and significant. There is negative and significant association between Inflation Rate and the Credit Risk in Indian Commercial, Private and Public Banks under study.

The association between Unemployment Rate and Credit Risk is significant and positive for a group of Commercial Banks when Bank Specific and macroeconomic indicators are analysed. Insignificant but positive association is confirmed for a group of Private and Public Banks. For a group of Commercial Banks the association revealed is negative and insignificant when both Bank Specific and Macro Factors are analysed and also when only macroeconomic indicators are studied with Time dummy for Basel II.

The association between the Exchange Rate and Credit Risks is positive and significant for a group of Indian Commercial Banks when Bank Specific and Macro factors and only macroeconomic factors are studied together with Time Dummy for Basel II. The insignificant and positive association is seen for the group of Commercial Banks when Macroeconomic factors and Bank Specific and Macro factors are studied without time dummy. The association of Exchange Rate and Credit Risks for a group of Private Banks is confirmed to be negative and insignificant. The association of Exchange Rate and Credit Risk for a group Public Banks is positive and insignificant.

The association between Lending Rate and Credit Risk for a group of Commercial Bank is negative and significant when Bank Specific and Macroeconomic indicators with Time Dummy for Basel II were studied. The negative and insignificant association was observed for a group of Public Banks. For a group of Private Banks when Bank Specific and Macro factors were considered together, the association was negative and insignificant and positive and insignificant when macroeconomic factors were analysed. The insignificant and negative association was found for a group of Commercial

Banks when Bank Specific and Macro factors were considered without Time Dummy and when Macro factors were considered with time dummy.

The Time Dummy for Basel II is significant and negatively associated with the Credit Risk for a group of Commercial Banks when both Bank Specific and Macroeconomic factors and also when only Macroeconomic and Bank Specific factors are included, thereby showing inverse and significant association.

### **3) Effect of Credit Risk on the Performance of the Banks**

In order to study the effect of Credit Risk on Performance of the Banks three models, three proxies representing Performance were put forth viz. ROA, ROE and NIM. The summary of all three Models based on Discussion and comparison as per expected and actual signs of association is presented below.

#### **Model: 1 ROA**

There is an insignificant and negative association between GNPA and ROA for a group of All Banks , Private or Public with and without any Time Dummy for Basel II and the insignificant negative association is as per the expected results and also the results are in conformity with the earlier studies.

The association of LLP to GL Ratio is negative and insignificantly related to ROA for a group of All Banks under study and the results are in

conformity with the expected sign and the previous research. There is positive association between LLP to GL and ROA but significant for a group of Public and insignificant for a group of Private Banks and the results are not as per anticipated signs of association but in conformity with some of earlier studies.

The association of CAR is negative with ROA for a group of Commercial Banks, Public and Private Banks and the results though not in conformity with the expected sign but there is previous research which shows negative association.

There is an insignificant and negative association between CD and ROA for a group of All Banks, Private or Public and is as per the expected results and also the results are in conformity with the earlier studies.

There is an insignificant and positive association between LLP to GNPA and ROA for a group of All Commercial Banks and a group of Public Banks. The association of LLP to GNPA with Private Bank is negative and significant and this negative association is as per the expected results and also the results are in conformity with the earlier studies. The positive association is not in conformity with the earlier research

There is an insignificant and positive association between LLP to TASS and ROA for a group of All Commercial Banks and Public Banks not in conformity with earlier studies. The association of LLP to TASS with ROA of a group of Private Bank is negative and insignificant and the negative association is as per the expected results and also the results are in conformity with the earlier studies. The positive association is not in conformity with the earlier research

There is an insignificant and negative association between GL to TASS and ROA for a group of Commercial Banks and Public Banks and the result is in conformity with earlier studies. The association of GL to TASS with ROA of a group of Private Bank is positive and insignificant and the result is not in conformity with the earlier research.

The insignificant and positive association between Operating Expenses to GL and ROA is not in conformity with earlier studies and significant and the negative association is as per the expected results and also the results are in conformity with the earlier studies.

There is an insignificant and positive association between Size and ROA for a group of All Commercial Banks is in conformity with earlier studies. Positive and significant association is as per the expected results the results are in conformity with some of the earlier studies.

The insignificant and negative association between Deposits and ROA is not in conformity with earlier studies. Positive association is as per the expected results and the results are in conformity with some of the earlier studies.

### **Model: 2 ROE**

There is negative association between ROE and GNPA to GL Ratio and the expected results are in conformity with the earlier studies. The association of LLP to GL Ratio is negative and significantly related to ROE for a group of all Commercial Banks and the results are in conformity with the expected sign and the previous research. The positive but insignificant

association is not as per anticipated signs of association but in conformity with some of earlier studies.

The association of CAR is negative with ROE without Dummy and positive with Dummy for a group of Commercial Banks under study and the results though not in conformity with the expected sign but there are previous research with negative association and positive. Thus CAR is negatively and positively associated with ROE whether significant or not.

There is an insignificant and negative association between CD and ROE for a group of All Banks, Private and Public and the results are not in coordination with the expected signs.

The insignificant and negative association for a group of Commercial and Public Banks and negative and significant for a group of Private Banks between the ratios of LLP to GNPA and ROE is as per the expected results and also the results are in conformity with the earlier studies.

The negative and insignificant association between LLP to TASS and ROE for a group of Commercial Banks, Private Banks and Public Banks is as per the expected signs and also the results are in conformity with the earlier studies. The positive significant association for a group of Commercial Banks with Time Dummy for Basel II is the value added to the study.

There is an insignificant and negative association between GL to TASS and ROE for a group of All Commercial Banks, Private Banks, and Public Banks and the result is in conformity with earlier studies.

The significant and the negative association of Operating Expenses to Gross Loan with ROE for a group of Public and Private Banks is as per the

expected results and also the results are in conformity with the earlier studies. The positive association for a group of Commercial Banks is not in conformity with the earlier research.

The significant and positive association of control variable Size and ROA for a group of Public and Commercial Banks is in conformity with earlier studies. The negative and insignificant association for a group of Private Banks is confirmed.

There is an insignificant and negative association between Size and ROE for a group of Commercial Banks, Private and Public Banks and there is difference in expected and actual sign of association and the result is not in conformity with earlier studies. Study also confirms negative and significant association for a group of Commercial Banks with an additional Time Dummy for Basel II period.

### **Model: 3NIM**

There is insignificant and negative association between GNPA and NIM for a group of Commercial Banks and Public Banks showing conformity with earlier research. Study also confirms positive and insignificant association of GNPA Ratio for a group of Private Banks.

The association of LLP to GL Ratio is significantly and insignificantly shows negative association with NIM for a group of Commercial and Private Banks and the results are in conformity with the expected sign and the previous research. The positive and insignificant association between LLP to

GL and NIM, for a group of Public Banks is not in accordance with the anticipated signs of association not in accordance with some of earlier studies.

There exist significant and insignificant positive association between CAR and NIM for a group of Commercial, Public Banks and Private Banks and the results are in conformity with anticipated signs of association and some of earlier studies..

There is an insignificant and positive association between CD and NIM for a group of Commercial and Private Banks and study also confirms negative and insignificant association for the group of Public Banks and Commercial Banks when additional Time Dummy for Basel II period is included and the results are in coordination with the expected signs and some of the earlier research showing both positive and negative association.

There is insignificant and negative association between LLP to GNPA and NIM for a group of Commercial and Private Banks is in conformity with the results of the previous research. The positive association for a group of Public Banks is not in conformity with the expected results and the earlier studies. Thus the association of the ratio of LLP to GNPA with NIM is negative and positive but insignificant.

There is significant and insignificant but positive association is confirmed between LLP to TASS and NIM for all three groups and the results not in conformity with earlier studies.

There is an insignificant or significant but negative association between GL to TASS and NIM for a group of Commercial and Public Banks and the results show conformity with earlier studies. positive and significant

association of Gross Loans to TASS for a group of Private Banks is not in conformity with the previous research.

There is positive and significant or insignificant association between Operating Expenses to Gross Loans and the NIM for a group of Public and Commercial Banks and Private Banks respectively but results not in conformity with the earlier studies.

The Size is positively significantly and insignificantly associated with NIM. To conclude the significant and negative association between Size represented by logarithm of Assets is not in conformity with earlier studies. While the association of Size with NIM for a group of Private and Public Bank is positive is in conformity with some of the earlier studies.

The study result for the Deposits and NIM confirms both positive and negative significant and insignificant association. The result is not in conformity with earlier studies when it shows negative association for a group of Public and Private Banks. Commercial Banks with Time Dummy also show negative association, but without Time Dummy show positive and significant association.

The association of Time Dummy for Basel II with ROA and NIM is positive and insignificant for a group all Banks and with ROE it is negative and insignificant.

## 8.4 Contribution of study

The contribution made in the earlier studies is not comprehensive in nature. We summarize the main contributions of our study as follows.

1. The current research work by the researcher using Panel data, has mainly dealt with the Impact of Credit Risk on the Profitability Performance of select Public and Private Banks in the context of country India for a period of 16 years from 1-4-2000 -31-3-2001 to 1-4-2015- 31-3- 2016, thereby covering a latest period up to 31-3-2016, before merging of SBI Associates into giant SBI.
2. The previous research work and contribution of different authors on Credit Risk is available more in the form of research papers not extensively covering the subjects. Hardly any PhD thesis are available on the cited subjects beside this previous research is more available on the other countries of the world and hardly any studies on Public and Private Banks in India.
3. The study is first of its kind covering all the Banks listed on the Bombay Stock Exchange thereby including a large number of 40 Commercial Banks in the country India. Previous research papers show a selected sample covering few banks.
4. The study is first of its kind which deals with Credit Risk in its entirety covering three aspects which involves assessing of quality of loan assets to analyse the credit risk, factors influencing the Credit Risks and the impact and effect of credit risk on the Profitability Performance of the Public and Private Banks in India.

5. Earlier studies do not show any implications of introduction of Basel II norms in the Commercial Banks either in India or any other country of the world.
6. First study of its kind which has included six asset quality ratios together to assess the quality of Loan Assets of the 40 Commercial Indian Banks and tested the hypothesis related to these asset quality ratios group wise for all banks, private banks and Public Banks in period prior to and the post implementation of Basel II norms in Indian Banks.
7. The study is first of its kind again when it comes to assessment of factors influencing the Credit Risks. The study considers Macroeconomic and Bank specific determinants of Credit Risk, assessing the determinants by categorizing into Bank Specific and Macro as Model I, only Bank Specific as Model II and again separately only Macroeconomic as Model III. All these Models are analysed by running a regression for a group of all 40 banks, a group of 24 Public Banks and a group of 16 Private Banks. Besides this a dummy Time for Basel II period was incorporated in the model to see if there is any change in the results after the implementation Basel II norms in Indian Banks and the regression was run for a group of 40 Banks together.
8. The study is first of its kind again when it comes to the analysis of effect of Credit Risks on the Performance of the banks. The study considers three dependent variables as a proxy for Performance viz. ROA, ROE and NIM thereby including regression with three models for a group of All Banks, Private Banks and Public Banks. Further to this for a group of All Banks Dummy variable representing Basel II time period is included to see the change of effect on the performance.

## **8.5 Suggestions**

Following suggestions are made based on the basis of findings and conclusion.

### **General Suggestions to a group of Commercial Banks**

1. To improve the quality of the Loan Assets held by the Commercial banks by bringing improvement in the ratio GNPA to Gross Loans.
2. To make Loan Loss Provision as per the requirement and also by taking into consideration the Non Performing Loans.
3. Care should be taken to see that Credit Growth beyond certain level doesn't contribute to Credit Risks.
4. During high Inflation the approach of the Indian Commercial, Public and Private Banks should be in favour of granting of more credit.
5. When the exchange rate is high banks should control granting of liberal credit to the exporters.
6. Banks should strive hard to maintain high rate of ROA and ROE by venturing into profitable avenues.
7. Banks should look into their Credit Policy and strictly adhering to the same.

### **Suggestions to a Group of Private Banks**

8. When there is rise in lending rate care should be taken to limit sanctioning of huge amount of new loans.
9. Loans should not be just granted without proper evaluation of the loan takers as unnecessary credit growth results in addition to the Credit risks exposure.
10. Loan Loss Provision should be made adequately to reduce the Credit Risk and simultaneously should see that it negatively affect the ROE enjoyed by the shareholders.
11. Inflationary conditions in the country should be used as a positive indication to bring control on Non Performing Loans.
12. When the unemployment rate is high a very vigilant role has to be played by the bankers while granting new loans which may add up to NPA menace.
13. Care should be taken to minimize Cost per loan as it negatively affects the Performance ROE.
14. To raise operating efficiency by bringing improvement in Operating Inefficiency.

### **Suggestions to a Group of Public Banks**

15. Inflationary conditions in the country should be used as a positive indication to bring control on Non Performing Loans.
16. High and well accepted Capital Adequacy Ratio should be maintained.
17. Unnecessary growth in Credit should be curtailed.
18. To bring improvement in Operating Inefficiency Ratio and to maintain high efficiency.
19. During economic downturn in the nation credit to be sanctioned very carefully.
20. When the rate of exchange is high there is need to keep track of granted loans and new loans to be offered after careful scrutiny.

### **8.6 Scope for Future Research**

Though the study has dealt with different aspect of Credit Risk and its Impact on the Performance of Banks in India, still there is a scope for further research on the areas of the topic Credit Risk and different areas of credit Risks.

Credit Risk and its Impact on the performance in Commercial Banks can be studied by including primary survey with the Bank Officers and the Borrowers along with Secondary Data.

## **8.7 Limitations of the Study**

The current study is subject to the following limitations:

1. The study is limited to the availability of secondary data. The secondary data was inadequately available for some years for some variables of some of the banks.
2. The study covers all the limitations inherent with the secondary data and information.
3. The scope of the study is restricted to the secondary data only. Collection of primary source of information from those directly concerned with the management of Credit Risk and loan approving authorities is out of the scope of the study.



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