PERFORMANCE OF BANKING SECTOR IN INDIA

Thesis submitted in fulfillment for the requirements of the degree of

DOCTOR OF PHILOSOPHY

by

MADHVI

Department of Humanities and Social Sciences

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

WAKNAGHAT - 173234, H.P.

INDIA

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TABLE OF CONTENTS

CHAPTER 3

RESEARCH METHODOLOGY

CHAPTER 4

PERFORMANCE AND EFFICIENCY OF DIFFERENT

BANKING SECTORS IN INDIA

CHAPTER 8

FINDINGS OF THE STUDY

DECLARATION BY THE SCHOLAR

I hereby declare that the work reported in the Ph.D thesis entitled **"Performance of Banking Sector in India"** submitted at **Jaypee University of Information Technology, Waknaghat, India,** is an authentic record of my work carried out under the supervision of **Dr. Amit Srivastava.** I have not submitted this work elsewhere for any other degree or diploma. I am fully responsible for the contents of my Ph.D. Thesis.

Madhvi

Department of Humanities and Social Sciences

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Date :

SUPERVISOR'S CERTIFICATE

This is to certify that the work reported in the Ph.D thesis entitled **"Performance of Banking Sector in India",** submitted by Madhvi at **Jaypee University of Information Technology, Waknaghat, India** is a bonafide record of her original work carried out under my supervision. This work has not been submitted elsewhere for any other degree or diploma.

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Date:

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ABSTRACT

Banking sector performance is always been a major contributor to overall countries growth and its development. Evaluation of banking sector's performance in India is a very authentic and reliable pointer to see the health and safety of the economy, which is not an easy task. Many factors need to be considered while evaluating bank's performance. To study bank's health, CAMEL which involved five important parameters named Capital Adequacy, Asset Quality, Management Efficiency, Earning Quality and liquidity has been used. DEA, further has been run to assess the bank's productive efficiency to measure bank's potential. An attempt has been made to validate bankruptcy model on RBI announcements on mergers and winding up. An effort has been made to minimize loss and maximize return for the shareholders and traders in the negative scenario of banking performance by developing a model named Swing Trading Model and by using NPA as a catalyst. 41 banks from different banking sector involved public banks, private banks and foreign banks for the year 2001-2016.

Keywords: CAMEL, DEA, Swing Trading, Banking Sector, Productive Efficiency

LIST OF ACRONYMS & ABBREVIATIONS

ALCO: Asset Liability Committee

BOB: Bank of Baroda

BSE: Bombay Stock Exchange

BIS: Bank of International Settlement

CAMEL: Capital Adequacy, Asset Quality, Management Efficiency, Earning

                     Efficiency, Liquidity Ratio

CAR: Capital Adequacy Ratio

DCB: Development Credit Bank

DEA: Data Envelopment Analysis

DMU: Decision Making Units

FEM: Fixed Effect Model

FI: Financial Institution

GDP: Gross Domestic Product

IC: Integrated Capital

MDA: Multivariate Discriminant Analysis

NPA: Non-Performing Assets

NSE: National Stock Exchange

RBI: Reserve Bank of India

PNB: Punjab National bank

PSBs: Public Sector banks

REM: Random Effect Model

SARFEAESI: Securitization and Reconstruction of Financial Assets and

                     Enforcement of Security Interest

SBI: State Bank of India

UK: United Kingdom

US: United States

LIST OF PICTURES

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION
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1.1. <u>Introduction</u>

Banking industry plays a vital role in Indian financial system which contributes approximately 7% to India's GDP according to report given by RBI, 2017 [1]. Banks are considered as backbone for growth and development of an Indian economy. Banks in India are striving to increase their efficiency as well as their productivity whilst facing stiff the competition from one another including foreign banks. In such a competitive scenario not only the number of banks are increasing in India, esp. due to an effort by government to increase more players in the industry and make possible a higher penetration of banking services across the nation, but also the horizon of the industry is also witnessing a tectonic shift with the entry of foreign and private banks thus increasing the rivalry to grab more market share in an ever-changing landscape of this industry.

Focal point in this study is the performance of banking sector in India by focussing on management of bad loans i.e. Non-Performing Assets (NPA) of these banks, which not only is detrimental to the balance sheet of the bank but also the ones who are able to manage it properly, find themselves holding a competitive edge which is so crucial to surviving in this cut-throat industry. Poor lending practices lead to the rise in Non-Performing Assets (NPA) of the bank due to which banks end up sacrificing their revenue margins. In the year 2017, RBI reported a net loss of Rs. 454600 crore due to rise in NPA, which directly impacts a bank's financial health due to the incremental requirement for the yearly provision to cover these bad loans, [2]. NPA of banks is contributing in bank's total losses and cutting their profit margin which may also, potentially, act as a causal factor for a bank's failure. According to RBI (March 2018), Non-Performing Assets in the banking system will touch 11.5 percent of total loans in the fiscal year 2019 which is definitely not a healthy sign for banks. In the year 2017 banks have written off their NPA and losses to the tune of Rs. 125 lakh crore, [3]. If this deteriorating condition of Indian banking industry is not controlled, it

could harm and affect India's economy negatively as the banking system is the backbone growth and development of any economy.

Beside the above crucial factors, higher losses and higher NPA also impact the bank's image negatively creating losses for the bank and ultimately eroding the shareholder's capital. Therefore, in the current study, an attempt has been made via reading the financials of the banks in India to identify the possibilities of a bank failure due to the impact of NPA.

1.2.   **An Overview of the Banking Industry**

A bank is a financial body which offers its financial and extra monetary services to its clients and users. A bank is usually considered as an organization which serves basic and essential banking services like accepting deposits and lending loans to its customers. Non-Banking Financial Companies (NBFCs) are also part of this industry wherein they provide many financial services but without fetching a legal meaning of bank. The financial sector has the number of components, the banking industry is one of those components which is very wide in itself. Indian banking system is explained as a system which provides liquidity services, cash management facilities to their users, account management services, portfolio management services according to Vithhal [4]. Indian banking system should not only be functioning without strained balance sheet but also should be strong enough to compete and adapt to the latest technological advancements. In a long period of business, the banking system in India has exceptional attainments to be reflected upon. Banks are very important and prominent contributor to the financial system in India according to Vivek [5]. Every bank protects money, deposits, and securities and provides credit options and other payment services including online payment services, cheque facility, money orders etc. other miscellaneous non-banking products like Investments, Portfolio Management has also become the part of the banking business lines to provide a gamut of financial services to their clients under one roof. But all these tertiary businesses are still secondary to the primary business of a bank i.e. borrowing and financing and thus even today, the management of Asset-Liability is one of the most crucial functions of the bank for which we also have a committee like ALCO (Asset Liability Committee) in the banks.

1.2.1. Need of the Banking System

Earlier, in the absence of financial institutions, the financial services and actions were controlled by individuals and money lenders who used to charge a very high rate of interest and were notorious for exploiting people. At that time uniform rules and regulations were not there for the security of public savings and control over loan disbursements or even the acceptable levels of interest to be levied on them. To overcome these limitations and issues, the organized banking industry was established so that uniformity and ethics could be brought to the financial system and which could be regulated and controlled by the countries government. The structured banking sector was performing well and abides by the rules and regulations prescribed by the concerned authority according to Shahooth [6]. The following functions of banks highlight the importance of the organized banking system in India.

- To control the credit and money supply in the markets.
- To protect the customer's savings and investments.
- To make financial system and it's working more secure and safe in the eye of the public to raise their confidence and to make working more smooth and efficient.
- To end the monopoly from few hands and organizations that were running the financial activities and exploiting people in India by charging a high rate of interest.
- To set some guidelines and a framework for the financial system.

1.2.2. History of Banking System in India

First bank in India named General Bank of India was set up in the year 1786, shadowed by the Bank of Bengal in the year 1809 established by The East India Company, Bank of Bombay in the year 1840 and Bank of Madras in the year 1843. After that Bank of Hindustan was set up in the year 1870 according to Kupiec [7]. Three entities (Bank of Madras, Bank of Bombay, and Bank of Calcutta) named as Presidency Banks. The first leading bank which was solely run by Indians was Allahabad Bank which was established in the year 1865 followed by Punjab National Bank in the year 1894, headquartered at Lahore. In the time between 1906 to 1913, Bank of India, Bank of Baroda, Indian Bank, Canara Bank and Bank of Mysore were also established. All Presidency banks were incorporated to form one bank, the Imperial Bank of India in the year 1921 which was run by European shareholders. Reserve Bank of India i.e. the central bank of the nation was set up in April 1935 to make

banking system stronger, transparent and regulated. But in the initial years of the banking industry, the growth was very slow and not as per the expectations.

From the year 1913 to 1948, approximately 1100 small banks came into existence. To give an organized structure to the banking sector and to formalize the financial activities of commercial banks, Banking Companies Act, 1949 was introduced by Government of India and later in 1966, it was named as Banking Regulation Act, 1949. As a Central authority, Reserve Bank of India was assigned immense powers to control and supervise banking activities according to Leightner [8]. Post-independence, RBI took some crucial steps with regards to banking sector reforms. Imperial Bank of India was nationalized in the year 1955 and given a new name i.e. State Bank of India, which acts as the key agent of the Central Bank and to manage financial activities in the whole country according to Inyiama [9]. State Bank of India Act, 1955 covers this aspect. Other seven associated subsidiary of SBI was nationalized in 1960.

In the year 1969 Indira Gandhi, the then Prime Minister of India, conveyed her intent for the Indian government to nationalize the banks. The message was conveyed in the annual conference meeting of All India Congress via the paper named "Stray Thoughts on Bank Nationalization". This move forced the Indian government to issue the regulations and nationalized fourteen biggest commercial banks on 19 July 1969 midnight according to Aryeetey [10]. A national leader Jayaprakash Narayana explained the action as a "Masterstroke of political sagacity" in 2 weeks of issuance of regulation and ordinance.

The foremost step of nationalization was taken in 1969. Approximately 85% of banks were under the ownership of government till 1980 and in the year 1980, another major step of nationalization was taken for 6 more commercial banks. The reason behind this nationalization was to give more authority and control to the government on money and financial institutions. After another step of nationalization, the Indian government controlled the major portion of the banking industry in India according to Sureshchandran [11].

In the year 1990, private banks came into existence which made the banking industry more competitive and advance. In the year 1993, Punjab National Bank was merged with New Bank of India by Government of India. It was single merger which reduced the total number of nationalized banks from 20 to 19 which resulted in nationalized banks pick the growth of

around 4 % till 1990 which was very much close to the average progress level of the Indian economy.

Following were foremost actions taken by the RBI to control banking industry in the country according to Sufian 2009 [12].

1949: Banking Regulation Act Enactment.

1955: SBI nationalization

1959: SBI subsidiaries nationalization

1961: Insurance cover was drawn up to deposits.

1969: Fourteen foremost banks nationalization.

1971: Setup of credit guarantee corporation.

1980: 7 Banks nationalization with deposits over Rs. 200 crore.

1990: Entry of private banks in banking industry.

1993: Merger of few major banks.

Foremost reasons why banks are heavily controlled are under:

•   To guard the public dealings.

•   To control the credit and money supply in the economy.

•   To create public confidence in the financial system of the country to make it more smooth and efficient.

•   To avoid monopoly of financial power from few hands and to make it more liberal.

•   To provide more credit to Government of India, revenues in form of taxes and other services.

Indian banking sector has become a crucial pillar for the growth and development of the country's economy. It has also come up as the largest employer by providing jobs to 15 % of the working population of the nation.

1.2.3.   Classification of Banking Sector

Indian banking industry has been categorized into 2 major sectors namely un-organized sector and organized sector. First sector named, organized sector includes Reserve Bank of

India (Central Bank of India) which is the banker's bank, Co-operative Banks, Commercial banks and specialized institutions like HDFC, ICICI, IDBI etc. whereas unorganized banking sector, heterogeneous in nature, mainly includes indigenous bankers and money lenders.

Structure of organised banking system in India is as under:

Picture 1.1 Structure of banking industry in India
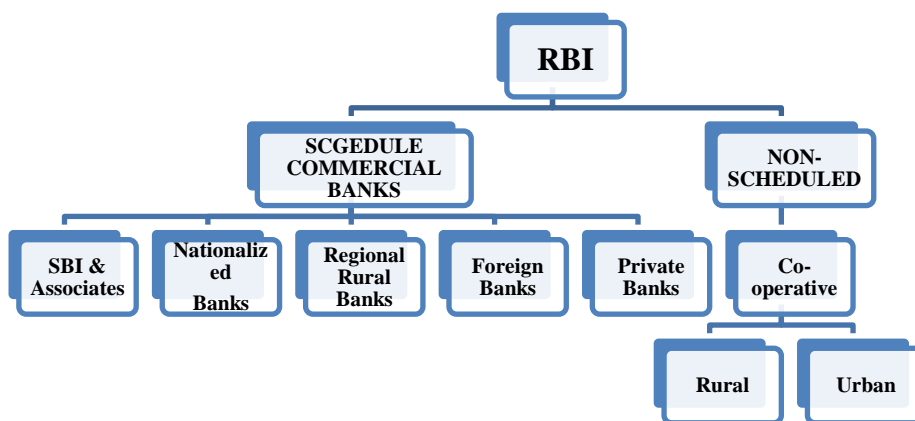
(Source: www. Ibef.org)

1. Reserve Bank of India.

2. Scheduled Commercial banks.

a) State Bank of India and its associates

b) Twenty Nationalized banks.

c) Regional rural banks.

d). Foreign banks.

3. Non-Schedule banks

a). Co-operative banks.

i). Rural banks.

ii). Urban banks.

1.2.4.   Reserve Bank of India

The Reserve Bank of India (Central Bank), headquartered in Mumbai, was set up on 1st April 1935 in agreement with the provisions of RBI act 1934. It holds apex power in India for monetary activities and conditions. Initially, RBI has privately owned with the share capital

of Rs. 5 crores which were divided into Rs. 100 shares each paid-up fully. But after nationalization in 1949, it was completely controlled and owned by the Government of India.

Reserve bank of India Act 1934 was initiated on 1st April 1935 which provides core basic framework for working in the banking industry. Bank was set up for the need:

•   To control the issue of currency
•   To keep reserve with the view to protect money stability
•   To organize and manage the credit system in the country on the advantageous node.

1.2.5. <u>Developmental Phases on Indian Banking System</u>

The financial crunch in the year 1997 and 2008 made the world realize the criticality of having a healthy and controlled banking system in order to sustain a strong economic growth and development. Liberalization on banking system came into existence through reforms in Indian banking sector in 1991. The banking system in India has been developed in three distinct phases since 1786, Lu [13].

1.   Early Phase (1786- 1969)

1100 small banks were there in India at that time. Banking Companies Act 1949 was established to have a smooth functioning of commercial banks. The central bank of India (RBI) became a central banking authority and authorized to control and supervises the banking sector in India, Thagunna [14].

2.   Post Nationalized Period (1969-1991)

SBI was established to act as a key agent of the central bank (RBI) and manage all financial activities in the country. During the early phase of the banking system, to create public confidence for banking sector, 14 big banks were nationalized, which gave surety and assurance of protection and sustainability towards the banking sector.

3.   Post Liberalization Period (1991-Till now)

In this era; mobile banking, ATM, online banking came into existence in order to bring liberalization in the banking industry which made the banking system more efficient, convenient and transparent

Development of the banking industry is still going on at a very fast speed. Public sector bank constitutes 75% of the whole banking sector in India, whereas private banks have promoted online banking and enriched the experience of people with the latest technology and they are likely to expand by the time.

1.3.   <u>Research Problem</u>

Commercial banks in India have major parts like private banks, public banks, and foreign banks. Public banks especially SBI and its associates have major role in the banking industry, working as an agent of RBI and having a separate act to govern it, SBI act 1955. These banks are well supported by the government through capital infusion but their lacklustre performance is not hidden from anyone. There are apparent problems and issues with public bank's financials as compared to other banks in the industry. Therefore, there is a need to highlight the performance of public banks with their competitors in the industry and to find out the key issues which differentiate the performance of PSBs with other categories. Few researchers have worked on these lines in the past analyzing the bank's performance but none of them have provided a concrete solution to tackle these performance issues.

Bank's performance management is an integral part of growing and developed economy. Poor lending practices lead to the rise in Non-Performing Assets of the bank which sacrifice revenue margin. A negative relationship is there between Non-Performing Assets and profitability of any banks; and provision creation procedure is a supplement to this, In the country like India Non-Performing Assets still needs to be controlled through proper and cautious lending to the customers to make banking performance more strong and competitive. Business organizations across industries are complaining about lack of credit in the market whereas, banks are suffering from huge losses on NPA, Richard [15]. To minimize loan losses, it is very much crucial to managing NPA, lending process and provision creation in the system which is directly connected to the bank's profitability. Banks simply do not like

lending to small borrowers, arguing that they do not present bankable and feasible projects, Aftab [16].

The crisis of 2008 created need of a higher attention that should have been given at the time of previous crisis also. Failure to adopt the banking laws and regulations was among the primary reasons for bank failures that also came out as a result of the financial crisis. Even the larger banks were affected by the crisis and got failed by not implementing the banking regulations properly, Ayyoup [17]. According to Mester [18] "The impact of charter type state vs. national), holding company structure, and the measures of bank's brittleness on the likelihood of their default after 1990 financial crisis were adverse to the nation's development. Established, old and well known banks were more likely to default, dependent upon whether a bank acknowledged bailout capital or not, if they were comparatively large, had comparatively low capital ratios, had rather low liquidity, apprehended relatively big portfolio of real estate credits, had a fairly big proportion of Non-Performing Loans, and smaller amount income diversity". So, there was the need to keep a check on the bank's financials which can give direction to the owners regarding the financial health of the banks.

The role of banks in promoting the economic and social welfare for the betterment and advancement of the life of the community is well recognized. Banks were facing higher losses because of higher NPA, Girardone [19]. NPA provision creation reduces the efficiency and productivity of banks, weakening the business strength of the bank and harming its liquidity. The higher ratio of NPA to total advances was found the unfavourable variable that not only affects the profitability and productivity of the banks but also affects their liquidity position, Hart [20]. A lot of research has been done to measure the efficiency of banks on different parameters including NPA, Profits, Capital Adequacy Ratio, Equity Return and some work has also been done to predict the bank's working capability and utilization of resources but in present times, banks are facing the issues of failures and defaults at an accelerating rate due to their bad financial health, Gordo [21]. Therefore, there was the need to create a system or a solution that can help banks in forecasting defaults and failure by using their financials.

High degree of Non-Performing Assets pushes the banks to pursue high yields to keep the returns intact which leads into bank entering with high-risk clients leading in to further deteriorating their Loan Book quality and thus increasing their Non-Performing Assets in

future. These high-risk borrowers sometimes are the major clients of the banks leading to huge bank exposure, on aggregate, towards high-risk loans and when these borrowers default this leads to major financial crunch on the banking book. Higher losses and higher NPA leads to deteriorating and sometimes even negative returns to the shareholder's and thus it becomes imperative for the shareholders to protect their interest even in the negative trend of banking performance. We found the lack of research and work done in this area where an impact of the bank's bad performance effect can be minimized and shareholder's an investor's return can be maximized.

An enormous frame of literature on the bank's performance and its efficiency covering half an era has focussed on the Indian Banking System involving its financial performance which helps in identifying health of the banks, Duca [22]. Considering the structural variations in the banking industry in India, existing relative literature was found on banks efficiency but many studies have used CAMEL and DEA as validating tool for each other which is not relevant because both have different objective as CAMEL focus on analysing financial health and DEA is used to study productive efficiency of the banks, Inyiama [9].

These research problems have been summarized below.

1.   Which are better performer public banks or private banks or foreign banks?
2.   How NPA and its provision creation related to bank's profitability?
3.   Can banks predict their failure in advance through financial tools?
4.   How can a trader use financial information in the equity market as a trading opportunity and protect the interest of shareholders by avoiding price coming down from the particular range?

Therefore, the purpose here is to offer a solution which will help banker, owners, and stockholders to use the financials of the bank from the different perspective like predicting bank failure, connecting it to the capital market, and creating provision creation consciousness against NPA after knowing its impact on bank' profitability.

1.4.   <u>Rationale of the Study</u>

Promoting the social and economic welfare of the society is the foremost basis driving the institution of collection and disbursement of money. Banks, as we call them today, were constituted for this specific purpose initially and what we see now is a whole gamut of financial services and products on offering to the general public, corporate and governments. Performance of a bank, to a greater extent, depends on the quantum of deposits it receives and how meticulously it utilizes their deposits in order to generate profits. For our understanding, we can mainly consider this venial structure as the input-output ratio of the bank. We witnessed consolidation among competitions across all sectors is on the cusp of this development but we believe that mere consolidation is not the panacea for the issue at hand and bank enjoys the liberty of generating enough profits either through on its own or through merger with another bank whilst keeping a blind eye to the demon at its door - The Non-Performing Asset (NPA).

What drives this study is not focusing on the contributions made by banks in expanding their business and opening new branches but understanding the financial implications of these banks. In this study, an attempt has been made to quantify the losses because of NPA and its provision. What we understand from the previous studies conducted in this field and from the recent developments in the banking is that management of credit and following the proper lending procedure has become the major challenge for the financial system. Few researches were there in the past which worked on analysing the bank's performance but the solution of the problem was missing and no study focussed on avoiding effects of NPA or bank's negative performance.

The banking industry is in the midst of a few tough challenges. Increasing NPAs are adversely impacting the profitability and liquidity stance of the banks besides posing the threat of survival as well. At the same time, stringent norms from regulators, to guard the concern of the accountholders, are also putting the dent on the liquidity and profitability of the banks. Besides the above two critical factors, competition within the industry is forcing banks to provide innovative services at reduced costs, thus, eroding the profitability. In such a situation, it is imperative for the banks to manage their NPAs just to remain competitive.

It is a fact that the profitability of the bank is the cornerstone for its survival but you can't generate enough profits unless you control your NPA. Over the last ten years, several issues have arisen which motivates the proposed evaluation. Civil society, sponsors, and stakeholders continue to raise concerns about the interpretation, application, and effectiveness of safeguard policies of the banks. On the other hand, management demands greater flexibility to suit local conditions and capacity. Previous studies have focused on measuring banking sector performance by inculcating different methods like calculating profits, CAR, and other variables over years. On account of NPA measurement, previous studies only involve NPA, Advances or Gross NPA Growth for concluding bank's productivity, which seems not thorough from the point of view to proposing any solution. Previous studies focused on NPA but no study has discussed the consequences of NPA on a broader level i.e. bank failure. Consistency in huge losses and higher NPA can bring banks to bankruptcy stage and no research has worked on the same area which could give any remedial measures in this situation.

Therefore, the current research made an effort to reduce the consequence of NPA on the survival of the banks by validating few of the RBI merger and wind-up decisions on bankruptcy model which will help bankers and owners in predicting their failure stage in advance that will help them in taking timely corrective actions. Hence, the current study is not a complete solution of NPA but as an indicator of the bank's survival.

Indian Banking system is the backbone of its economy and a critical factor in its growth and development. But increasing NPAs is becoming a huge threat to the industry, which if not kept under check, could be an impediment to the growth story of the nation. Banks have already written off NPAs to the tune of Rs. 125 lakh crore putting the reputation of the industry under the microscope and the stocks of many banks are getting clobbered across the stock exchanges in India.

The banking sector is not untouched by the capital market as all financial pillars are associated with each other and capital markets also get affected by banking financial decision and its results which makes stock market more volatile. No research till now worked in the area of minimizing losses and preventing bad impact of bank's poor performance So, in the current research an attempt has been shaped to prevent the negative impact of NPA (Bank

Failure) and study has developed a trading model called Swing Trading Model which will help shareholders, traders and investors in minimizing their losses in equity market when banks are performing negatively. Taking into consideration, the significance of the financial system in achieving the overall performance in the economy with modifications in the governing environment and the globalization of financial markets, a great deal of effort has been made to examine the relation between share price movement and NPA movement along with its application for the short-term trading opportunity in equity market.

This study is not a historical biopsy of the incorporation of the financial system rather a post-mortem of what has been achieved by these institutions while still keeping the public welfare in perspective. As part of the study and to reach our objectives we can't just rely on sampling to a selected few and extrapolating the results from thereon, hence, we must examine the performance of the banks across sectors – Public, Private and Foreign – and delve deeper in their financials to grasp all the ingredients required for the study i.e. Loans, advances, Investments, Number of Offices/Branches, during the period under study and changes thereof. We understand this challenge and few others as well an effort is made under this study to incorporate all these before we can reach any conclusion and suggest recommendations. With the above issues and lack of research in the past, the proposed evaluation will carry out an in-depth and forward-looking analysis of the effectiveness of banks and its policies frameworks and more importantly this study will focus on performance review of these banks while accommodating the conflicting interests mentioned above.

Previous studies also lack in inadequate provisioning for NPAs which ideally should negatively impact the profits of the bank but since those studies had not given the due weight to NPA structuring, they have failed to quantify the actual profits. This study will attempt to bring NPA as the part of overall profit structure of the bank and gross/net profits of the banks.

RBI is taking very active steps in balancing and correcting banking structure in India, for which it is taking very crucial and big steps for banks survival like merger and closing down the business. So the question is raised as to what if banks could get the sign of failure in advance and can protect its survival. In the current year, RBI has taken few steps like shut down few banks and merger of few banks for their survival.

Above rationale points are summarized below:

- All banks are analysed together on performance and efficiency basis.

- It is important to know the reason for the Bank's ill health before any solution can be proposed further. So, an attempt has been made to analyse the performance of all banking sector using CAMEL and Data Envelopment Analysis, where CAMEL has given the result of financial strength and DEA for productive efficiency. Implementation of both tools together will prove that having good financial health does not mean that bank is productive efficient also and vice-versa.

- NPA and provision were found to be the major reason for bank failure. So, we intend to propose a model for bankruptcy and validate it on few RBI decisions that will help banks to trace early signs of failure and take timely corrective measures.

- The study delves into investigating the impact of NPA performance on the performance of the bank's stock price along with its use for the trading opportunity in the capital market to protect the interest of shareholders. As banks start committing higher losses; shareholders and investors lose their capital. Hence, the study has developed a strategy called swing trading model which will help traders and shareholders to minimize their losses even in the scenario of negative performance. Higher losses and NPA usually lead to a fall in share price and continuous fall in share price can culminate into huge losses for the shareholders besides damaging the bank's reputation. Therefore, a swing trading model to cover such a scenario can go a long way in controlling the eroding wealth of shareholders.

1.5.   Thesis Structure

The thesis comprises of 9 chapters. The first chapter is "Introduction" which explains the scenario of the Indian banking system and its structure. The topic of research has been explained in this section which was further extended to the research problem that is the basis of this research.

The second chapter is "Literature Review" which discusses a developmental scenario in the context of Indian banking. A discussion has been done on evolutionary stages, its

developmental and advancement phases since its inception. This chapter discusses the related studies and researches already been done in this field which will further highlight the research gap for future study. Furthermore, this chapter will also cover the objectives and limitations of the current study.

Chapter third "Research Methodology" discusses the tools and techniques along with sample selection used in the current study. The study has tried to use all current and updated study material to substantiate the research results.

Chapter four "Performance and Efficiency of Different Banking Sectors in India" is the empirical part of the study. The focus of this study is to bring into highlight the financial health and productive efficiency of Indian banking sector using three models - CAMEL, DEA and Neural Network. CAMEL is used to measure the financial health of banks, DEA for productive efficiency and Neural Network for Prediction for bank's profits and NPA to compare with the actual result with predictions in order to analyse the efficient utilization of bank's resources. The motive of this part of the study is to identify the issues in banking performance related to their financials.

Chapter five "NPA and Provisioning Effect on Performance of Different Banks in India" is an attempt to measure the profit part of the banks which they forgone from their revenue at the cost of provision creation. It is crucial to understand here that this same portion of forgone profits could have, otherwise, been used for generating further profits and thus increasing shareholder's wealth.

Chapter six "Bank Failure Prediction Using Financial Ratios / CAMEL" is an attempt to explore whether bank's failure can be predicted in advance using its financials or can any sign from bank financials be picked up to see its failure stage. This study could prove to be quite helpful for banks to take corrective actions in advance and to stabilize its performance at right time.

Chapter seven "Non-Performing Assets and Swing Trading in Capital Market" answer the question that when banks declare their results how crucial that information can be for equity market players as a trading opportunity. Considering the significance of the financial system in attaining the overall performance in the economy along with the changes in the

supervisory environment and the globalization of financial markets, a great deal of effort has been made to examine the relation between share price movement and NPA movement along with its application for the short-term trading opportunity in the equity market.

Chapter Eight "Findings and Conclusion" elaborate the results of the research followed by chapter 9 "References".

CHAPTER 2

LITERATURE REVIEW

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2.1. <u>Introduction</u>

Current chapter summarizes the key inferences and conclusions of previous researches done on banking performance. The literature review has vital relevance for any research work as it deals with a justification for the requirement of the current research initiatives. After going through the literature review, the possibility of the replication of study can be removed and another dimension could be picked for the research. The literature review assists scholar to eliminate constraints of present work or may help to widen prevailing research. Some studies have been carried out to investigate the many aspects of performance of commercial banks in India. Bank's performance and productivity are debated in many academic researches overseas. Literature in India mainly focused on analysis of NPA, different ratios, and profitability among different banking group since the post-liberalization phase.

The current chapter comprises of six sections, the first section discusses the important work done on banking performance and efficiency which highlights NPA, bank failure, and data envelopment analysis. In the next section, studies have been discussed on NPA Provisioning to know the impact of provision creation on banks profitability and bank failure model has been proposed to help banks to identify the early sign of bankruptcy in order to take corrective actions in advance. Whereas the next section, followed by discussing studies on bank's NPA performance and capital market, which highlights the impact of NPA movement on the equity market. Further sections involved research gaps, objectives and limitations and scope of research.

The available literature and research is divided into three major parts according to the area of research:

2.2. Performance and efficiency of banks.

2.3. NPA provisioning and bank failure.

2.4. Impact of NPA on share price movements

2.2. **Performance and Efficiency of Banks**

Many studies have been done worldwide which have discussed the banking performance and its efficiency. Literature of this section (2.2) has been divided into 2 parts, in the first part literature related with the financial health of the banks have been discussed whereas in second part literature related to bank's productive efficiency has been discussed.

Aryeetey [10] analysed the bank's asset of 49 branches in Ghana and highlighted how banks in Ghana give credits to its customers across different groups. The author also explained that credit to small and medium industries are not available easily. This study advocates the systematic differentiation in the credit allocation that is not constructed on a broad analysis of creditworthiness. The further study assessed both formal and informal relationship between portfolio and financial market. Banks in Ghana do not like to lend to small borrowers, arguing that they do not present bankable projects.

Mukherjee, Nath, and Pal [23] studied performance benchmarking and strategic homogeneity of 68 Indian banks from the time period of 1996-1999 and found that updated methods and techniques of increasing performance were proved satisfactory in Indian banks. The study found that public banks performed well when compared to private and foreign banks in the liberalization phase, with few exceptions. Due to the methodological limitation of the DEA model variable were not directly included in the study. The study has analyzed overall business performance which cannot define the performance of individual input/output.

Darrat [24] assessed technical and cost efficiency of banks in Kuwait and sample of 8 banks were selected for the period of 1994-1997 and found that smallest bank in Kuwait "Industrial Bank of Kuwait" was the most efficient bank in the country whereas nationalized bank of

Kuwait was the largest bank on the basis of cost efficiency. Cost efficiency was found 67% in 1994 -1995 and 68% in 1996-97 and showed average input waste of 49% which clearly shows that resources in Kuwait were not fully utilized.

Sureshchandar, Rajendran, and Chandrasekharan [11] analysed opinions of customers for service quality in the banking sector in India for the period of 1998-2002 and found that foreign banks in India have earned good perception of people as compared to other banks in all cases except social responsibility. Public banks were ranked low in terms of infrastructure, quality service. In this study critical factors like core service or service product, the human element of service delivery, the non-human element like process, procedure, system, technology were analysed.

Petkovski, Mihail [25] examined the influence of the banking sector on countries' economic growth. The study focused on 16 European countries for the period of 1991-2011. The study revealed the negative relationship between lending to the private sector and economic growth whereas positive relation was found between the ratio of quasi-money and economic growth.

Jiang, Chunxia [26] examined the bank's efficiency in China for the period of 1995-2008. The study revealed that foreign participation has the negative impact on bank's profits where their IPO helps in improving their profits. Noticeable improvement was found in banks in China for the time period of 1995-2008.

Liutto, Uiboupin [27] discussed foreign banks performance of 10 European countries which involved 319 banks and found that entry of foreign banks adversely affects the revenues of domestic banks from point of view of both non-interest income and interest income from assets and profitability. Overhead cost and the competition with domestic banks also gets increased with their entry in the short run.

Vaithilingam, Nair and Samudra [28] examined key drivers for soundness of the banking sectors of 120 countries (underdeveloped, developed and developing) and found that infrastructure, intellectual capital (IC) has a positive but insignificant effect on the soundness of the bank. Institution and integrity have a +ve impact on the soundness of the bank. In the paper infrastructure, IC, countries policies were studied whereas financial parameters have been ignored fully.

Karunkar, Vasuki, and Saravanan [29] studied bank's NPA from the time period of 1996-2008 which explains that due to NPA, Interest income, profitability, cost of capital gets affected which definitely impacts profitability and efficiency of the bank. The study suggested that it is important to control and avoid NPA in market stage and by following strict and formal lending process. The study focussed more on descriptive approach and analytical part was missing in the study.

Boudriga, Boulila and Jellouli [30] analysed bank's supervision and NPA in 59 countries from the time period of 2002-06 and found that countries like Egypt, Nigeria, Philippines, Morocco suffered from more from bad loans as compared to other countries. While others like Finland, Australia, and Spain were having less number of bad loans. In the supervisory role, surveillance does not directly affect NPA and also help create the good working environment. High level of capitalization, cautious provisioning strategy, attentiveness of the banking sector and foreign capital became a reason for the lower non-performing loan.

Oberholzer, Westhuizen [31] assessed technical/ scale proficiency of commercial banks in South Africa for the period of 2005-09. Four banks were selected as the sample and Data Envelopment Analysis was used to analyse the efficiency along with linear programming, non-parametric, and intermediation approach. A significant falling trend was noticed after the 2008 crisis which affected the liquidity, solvency, and profitability of banks.

Maletic, Kreca, and Predrag [32] analysed the use of DEA model for assessing efficacy in the banking sector. Two models with different input/output indicators with the sample size of 33 banks of Serbia for the time period of 2007-2011 were used. The first model defines interest and non-interest expense model B observes employment and deposits.

Kwambai, Wandera [33] studied the effects of credit information sharing on NPA of banks in Kenya and found that Total NPA increased in 2007-2012 from 6.26 to 10.5 billion rupees. The study showed that sharing of credit information and size of non-performing assets are related to each other. Sharing of credit information enhance the transparency level among banks that helps banks to lend carefully to their customers and prevent default rates.

Chhikara, Kodan [34] analysed the NPA of 24 banks in India and found that NPA of the foreign banks were having a decreasing trend but when comes to claim settlement process SARFEAESI Act 2002 (Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest) worked moderately well in terms of the recovery amount but still it could not meet the expectations. The need was felt to improve the claim settlement process for recovery of the lost amount.

Mitra [35] studied NPA management of 8 Urban Co-operative Banks in Hooghly district in India and found that RBI could not directly control NPA due to inefficient management of the banks but the interference of RBI in banking rules, regulations can improve their efficiency. According to the Banking Regulation Act 1949, RBI cannot interfere in bank's decision except regulatory decision.

Thus it could be said that the Indian banking sector started giving emphasis on understanding the customer according to their needs and requirement and changing their schemes and products accordingly. But there is always a question on bank's efficiency and productivity. Every sector of banks is performing differently as they are different in nature, size, management style and hence, it is very important to analyse these sectors separately.

Above literature discussed bank's efficiency in the form of its financial health and it was revealed that after taking few remedial measures by RBI and government, bank's performance was improving for e.g. the implementation of SARFASAI Act, 2002 brought bank's attention towards NPA issue and its management.

2.2.1. <u>Data Envelopment Analysis</u> (DEA)

In the literature above, we discussed how important it is to measure a bank's efficiency as it is one of the crucial factor on which the performance of a bank is judged. Hence, it becomes imperative to analyse the productivity of the bank to measure its efficiency.

For productivity, data envelopment analysis (DEA) has been employed which is a programming technique that gives the productivity score by comparing inputs and output of the organizations; we call it decision-making units in technical words. This technique is based on linear programming and has been accepted in larger industrial areas. Model of DEA was

introduced by Charnes (1978) in which he presented "fractional programming" using ratios which play a major role.

Golany, Storbeck [36] discussed multi-period data envelopment analysis (DEA) study of the efficiencies of selected 200 branches of large US Banks over six consecutive quarters (1992-1993). From the framework of performance evaluation, the study has developed the strength to classify the potential group of different branches who have more scope for improvement.

Phelps, Figueira, and Nellis [37] measured the bank's efficiency in the US for 4 banks and evaluates the efficiency of the banks and also discussed problems of data availability and problems related to the methodology. The author raised some doubts about the reality of efficiency measures. The study also discussed that to facilitate managerial application and strategy it is required to analyse two very important dimensions namely risk and their drivers.

Shahooth, Battall [38] discussed and analysed the relative cost efficiency of 24 Islamic banks for the period of 1999-2001. This study highlighted that many of the Islamic banks were found very efficient whereas others were struggling to enhance their performance. The study advised making use of data envelopment analysis to focus on inefficient units by making certain modifications in input-output combination to enhance their performance.

Bader, Mohamad, Ariff [39] assessed the average and overtime efficacy of and 37 Conventional Banks and 43 Islamic banks of 21 countries founded on their age, size, and region using dynamic and static panels for the time period of 1990-2005. The conclusions advocate that no substantial link was found between overall efficiency outcomes of Islamic vs Conventional banks.

Hays, Lurgio [40] argued to distinguish among community banks in the US (having total assets less than $1 billion) having low and high-efficiency low efficiency built on the efficiency ratio, universally used measures for performance (financial) that narrates non-interest expenses to total operating income. The study worked on the data from the year 2006-08. This included the time periods of the industry with good performance along with bad industrial conditions affected by financial crunch. The model's classification accuracy ranges from approximately 88% to 96% for both original and cross-validation datasets.

Tahir, Bakar [41] studied the performance of foreign and domestic banks in Malaysia for the time period of 2000-2006. Banks were chosen from the similar sector by carrying out a chain of non-parametric and parametric tests (DEA). The findings from the non-parametric and parametric tests mention that for the years 2000-2004, both foreign and domestic banks have the same expertise whereas outcomes for 2005 and 2006 showed that banks after the period of 2004 have more latest, advance and competent technology.

Oberholzer, Westhuizen [42] explained the relation between the performance of banks evaluated by data envelopment and the bank's financial ratios of 5 banks in South Africa for the time period of 1998-2007. The study showed that ups and downs in the efficiency evaluations lead to variations in the bank's performance. The research found a regression model significant statistically for only one bank out of five.

Qayyum, Riaz [43] observed the problem and smeared bootstrapping practice offered to build confidence through data of 28 commercial banks which involved 6 Islamic Banks for the period of 2003-2010. Public conventional banking institutions were found more efficient institutions which were followed by private Islamic and private conventional banks with an average bias of ten percent. The result further advises that as compared to Islamic banks, conventional banks were found more efficient.

Maletic, Kreca, and Predeag [29] analysed the use of DEA model for assessing efficacy in the banking sector. Two models with different input/output indicators with the sample size of 33 banks of Serbia for the time period of 2007-2011 were used. The first model defines interest and non-interest expense model B observes employment and deposits.

Gordo [21] evaluated the frontier of the best performance to calculate relative efficiency of the many group of banks of the Philippines for the time period 1999-2009. The study discussed that even after going through major technical progress, total productivity of Philippine Banks did not increase due to the reduction in technical efficiency that clearly shows that implementing the technology is not enough but the effective and optimum use of technology is more important.

Above studies discussed the productive efficiency of the banks and it was found in many of the researches that even after implementing the latest technologies in the banks, bank's

productivity did not increase too much so, it can be said that productivity of banks is related to how bank are using their resources, if they are not utilized optimally, every effort is waste.

2.3. <u>NPA Provisioning and Bank Failure</u>

In the current scenario every bank wants to compete in the market, and in this competitive environment sometimes banks become negligent in their lending process that contributes in higher NPA in their balance sheet which further results in the increase in NPA provisioning in the next year. Therefore, it becomes critical to study these issues which have a major contribution in the bank's losses and bank failure. Below is the literature of NPA provisioning of the banks and of bank failure.

Das [44] explained the post-liberalization work of banks in India and also focussed on evaluating and measuring cost efficiency of Indian banking for the post-reform period. It was analysed in the study that competition has increased after deregulation. After deregulation, the share of all banking sectors have increased but the profitability of foreign banks has increased multi-fold after deregulation.

Pradhan [45] discussed the NPA issues of 6 banks in Odisha. Primary data was used from 50 managers and found that mismanagement or diversion of the fund is also one of the main causes of NPA. Higher range of Non-Performing Assets pushes the banks to charge high prime lending rates and prime lending-related interest rates. This leads to banks chasing up the higher yields creating the possibility of exposure to high risk ultimately leading to increasing levels of Non-Performing Assets in the future.

Rajangam [46] made an effort to evaluate the operational performance of the selected PSBs, Private bank and foreign banks in India for the period of 1997-2011. The study discussed that prudential norms of banks and other policies have forced banks to enhance their performance and efficiency which has resulted in lowering the NPA and making the bank's financial structure strong.

Debdas [21] touched the issue of NPA and discussed the performance of selective Cooperative Banks in India for the period of 2005-10. A higher range of Non-Performing

Assets indicates the high probability of credit defaults at a large number that affect the revenue and total assets of co-operative banks which reduce the worth of the asset. The growth of NPA implicates the need of provisions that erodes the overall profits and fails the cooperative framework. The concern of Non-Performing Assets of Cooperative Banks has been discussed further at extent, under the Indian financial system.

Bamoriya [47] analysed the impact of key financial heads on NPA of 4 Scheduled Commercial Banks of India for the period of 2002-2013 and suggested some measures on bank's effective management of NPAs. Out of key input variables, total deposits and total assets had the major influence on Non-Performing Assets. The banking industry is a necessary and very important financial service sector which is facing one of the biggest threat in terms of rising NPA levels and its effects on banks financials. Therefore, current research made vital suggestions towards the banks NPA management with effectiveness. The study has suggested that total deposits have 3.5 times more impact on bank's NPA as compared to other variables, hence, managers should keep a proper watch on total deposit and total assets of the bank.

Sathye [48] analysed the comparative performance of selected private and public sector Indian banks for the period 2001-2012 on the base of their indirect and direct offerings to the social order for social and economic growth and its influence on banks NPA. The study revealed that from the performance point of view, private sector banks were found more efficient where public banks lacked but from the social angle, public banks have fared better than private banks.

Manjule [49] studied the efficiency of NPA management of public sector for the year 2001-09 and also discussed the challenges faced by PSBs in controlling NPA whilst having enough capital in hand to deal with future contingencies. The efficiency of public banks can be seen declining in gross NPA and net NPA. PSB should be more selective in giving loans to the borrowers to avoid defaults rates in the future.

Above literature reveals how critical is NPA management for the survival and growth of a bank. According to previous researches NPA was rising continuously and it is very important

for banks to control it if they want to improve their financials. Banks and Government are making genuine efforts to help control rising NPAs in banks but are not quite succeeding.

2.3.1. <u>Bank Failure</u>

It becomes imperative to analyse and find the problem of bank's performance especially when the banking industry is going through big losses and higher NPA. In previous section 2.3., the literature on NPA provisioning has been discussed in detail and it becomes critical to study the repercussions (Bank Failure) of NPA provisioning in order to bring research to a fruitful level, therefore, literature for bank failure has been discussed below.

West [31] explored a warning system for bank failure for commercial banks in the US using the data of 8 years. Results showed that use of factor analysis and logit estimation gives the favorable result for analysing bank failure condition.

Estrella [50] developed and tests logit and discriminant models in detecting the possible failures in the banking institutions of Serbia for the time period of 1984-1990. This research also measures the comparative capabilities of logit and discriminant analyses in differentiating failed from non-failed banks and found that financials for the failed bank were very weak consistently for 6 years.

Mester [51] has examined the data of 214 banks in third Federal Reserve District from the period of 1991-92. The study discussed that banks were working at the level of cost-efficient output and focussing on product mix but the problem was found with the efficiency of inputs. Third district banks had to face competition from those banks who were efficient producers compared to the banks that are producing at a constant level.

Wheelock [52] analysed mergers and bank failure occurred in the US for the period of 1984-1993. The study observed the role of quality of management as an alternate measure and strong connection between inefficiency and bank failure risk. The study also highlighted that banks who were merged with some other banks were having the low asset quality.

Kupiec, Ramirez [7] analysed the bank failures of New York for the period of 1900-1930 and evaluated the effect of bank failure on economic growth. The study revealed that bank failure

in New York had an extremely negative effect on economic growth and increased their cost at the time of failure. Systematic risk is also associated with bank failure. In such situations, government policies can lower the risk of losses and damage at the time of bank failure

Lu, Whidbee [13] studied the financial crisis of the late 2000s in the US and found that the bankruptcy of a banking institution may have a wide range of effects. Individuals, Depositors, and banks can lose their money deposited that is in surplus of the sum insured by the Federal Deposit Insurance Corporation. Bank failure affects the nation's health and erodes its wealth also and is not a healthy sign for any countries' growth. High regulations have been imposed to reduce its negative impact. It is very crucial to identify leading factors contributing in bankruptcy level so that corrective actions can be taken to cure that in advance.

Li, Qingyu [53] analysed the effect of the financial crisis on bank failure of US banks for the time period of 2007-2012. Capital ratios have also been employed while assessing the reasons and factors that cause bank failure. Some ratios that are employed in the recent researches are capital ratios leverage ratios, and capital to gross revenue ratio used total equity divided by total assets and found that banks which are less capitalized have greater risk of failure.

Kandrac, John [54] analysed the effect of bank failure on local economies focussing on 48 contiguous U.S. states for the time duration of 2007-09. The result revealed that more banks failure in any country lead to poverty, compensation growth, and lower income. It was also found that markets having higher interbank competition are adversely affected by bank failures.

Looking into literature, it was found that lots of researches worked to measure the efficiency of banks on different parameters including NPA, Profits, CAR, and Equity Return. Some work has also been done to predict the bank's failure and its impact on the economy, however, there appears to be not much research been done on predicting factors that can help in forecasting bank defaults and failure rate.

2.4. <u>Impact of NPA on Share Price and Swing Trading of Bank's share.</u>

The reputation of a bank is formed after too much effort and period of time and consistent losses generated by a bank not only negatively impact its image but erodes the wealth of its shareholders. Thus, it is critical to measure the impact of the increasing NPAs on the wealth of the shareholders. We have considered this phenomenon by looking at the stock prices of the banks under study and how these stock prices get impacted by the variation in NPAs of these banks.

Huang [55] discussed the performance of post-acquisition of the large banks in the US including merger events from 1982 to 1987. A significant correlation was found between stock returns and performance measures associated with bank acquisition. The better performance was expected with the mergers and its impact on stock price performance as merger leads to combining the capital and all resources of banks which helps the weak bank to overcome their shortcomings.

Leightner, Lovell [56] analysed the index of Thai banks for the year 1989-1994. The study revealed that when objectives of the banks were used properly in Thai country, rapid growth was found for the banks with good productivity.

Grigorian, Manole [57] studied a large number of banks in transition countries from the time period of 1995-1998. The study confirmed the usage of DEA effectively in transition countries. Positive effects were found in the study on market capitalization. The study also discussed that by transferring ownership of private banks to foreign banks does not affect profitability and productivity.

Cooper [58] investigated the relationship between the efficiency of banks and the stock price of US banks using data from 1986-1999. The study discussed that the existing studies on share price and its accounting generally discounts banking industry because of their high leverage and many other dynamics of the industry. To reduce the gap, an attempt has been made to investigate the connection between share price and efficiency of the banks.

Altunbas [59] analysed the connection between risk and efficiency of European Banks from the data of 1992-2000. The study revealed that NPA may indicate that the banks should use

less resource than usual in their credit appraisal and the process of loan monitoring. In short, Non-Performing assets brings inefficiency in the banks. The study also revealed no relation between bank risk-taking capability and its inefficiency.

Duca [60] analysed the relationship between share price and NPA of 5 foreign countries using the data from 1954-2004 and discussed the significance of the financial institutions in achieving the overall performance in the economy with modifications in the regulatory and governing environment and the globalization of financial markets. A great effort has been put to examine the relation between share price movement and NPA movement along with its usage for the trading opportunity in short-term.

Athanasoglou [61] discussed the impact of the bank's specific component on the bank's performance like the size of the bank, the profitability of the bank. To stabilize financial system performance it is essential to examine the efficiency of developing banks. Impact of stages of the business cycle was also found in the bank's profitability to a greater extent.

Aftab [16] analysed the data of 7 banks listed on the Karachi Stock Exchange for 5 years (2003-2007). Considering the structural changes in Indian banking system into consideration, there is relatively a growing researches on banking efficiency in India. The study revealed the significant and positive connection between stock performance and bank's efficiency.

Above literature discussed bank's efficiency, the impact of NPA and provision and impact of negative performance of banks on shareholder's return. After discussing the existing literature we found few gaps in previous studies which we tried to discuss in section 2.5.

2.5. <u>Research Gaps</u>

Since the competition and developments strive to improve existing scenario, in the current study all the banks have been categorized into four categories named SBI and its associates, public sector banks, private sector banks, and foreign banks have been studied and analysed on the parameter of performance efficiency. After studying present literature on banking, it is clear that huge work has already been done since the inception of the banking sector on banking performance. Many studies have explored the untouched area while

relating it to banking performance while some of them have done a comparative study, some of them worked on efficiency parameters whereas others have analysed the bank's productivity. In the above literature, it was found that researchers were using CAMEL and DEA together as a validating tool for each other which is not right as both as different objective as we have discussed the same in the first chapter. As per our understanding, previous studies missed in analysing, quantifying and reflecting the efficiency of the banks via some robust models. In our study, we tried to evaluate the efficiency of the banks using the CAMEL rating method and Data Envelopment Analysis.

Many researches have used CAMEL and DEA together as a validating tool for each other but in reality, both have a different purpose. CAMEL method is used to analyse the financial health of any organization whereas DEA is used to know the productive efficiency. We have used both tools together in this study to clarify that having good financial health does not necessarily mean that bank will be productive efficient also. On the other hand, having good productive efficiency does not mean that the bank will have strong financial health.

Many researchers have worked on the bank's survival, credit default risk and NPA issues of the banks. Furthermore, it was felt by studying existing literature that there is hardly any study that has touched bank failure and validated these with the decision of Reserve Bank of India. Therefore there was a need to study on testing bank failure model on RBI decisions. So current study has picked some decision taken by RBI on merger and winding up of the bank and has tested the financials of these bank on failure model and has discussed that can banks predict their bankruptcy stage themselves timely using their financials so that advance action can be taken by managers to avoid bank failure.

Many studies have related the bank's performance and its impact on share price. No study has proposed any solution or strategy that can reduce or avoid the impact of the negative performance of banks or advise shareholders and investors as to how to protect their interests in this failing establishment. Therefore, the current study has developed a model called swing trading model which will help an investor, shareholder in minimizing the loss in equity market using data of the change in NPA. By using the model, prediction on the direction of the share price is feasible and thus can help in recouping or hedging positions in the capital market. The current study has successfully developed a Back Testing Model/Swing Trading Model for a trading opportunity in the capital market which will support and help

shareholders, traders to minimize their loss and get a minimum return even in case of negative performance of banking sectors.

2.6. <u>Objectives of the Study</u>

The present study analysed the performance of Indian banks within the context of its efficiency, profitability, trading opportunity and bank failure. Therefore, the following objective has been finalized:

1. To study the performance and efficiency of different sector of banks in India with reference to the different input/ output.
2. To study the NPA provision creation effect on banking performance and how by using financials of the bank, its failure can be predicted in advance.
3. To study the impact of NPA on the short-term performance of the Equity Share Price of the Bank and determining its efficacy for the Trading Opportunities in the Capital Market

2.7. <u>Limitations of the Study and Future Scope</u>

The study has few limitations like its sole focus is on banks existing in India. The study has focussed on public, private and foreign banks whereas other categories like Cooperative Banks, Regional Rural Banks have not been considered in the study. Another limitation of the study is related to data because some data has been taken from the bank's individual websites. The accuracy of the result depends on the accuracy of the data available. Some methodology that has been used in this study on banks in India like swing trading model for the trading opportunity and bank failure model raises a question that will these models work in other countries the same way they have worked for banks in India. Therefore, further research can be done using the same models and approaches for banks in foreign countries.

CHAPTER 3

RESEARCH METHODOLOGY
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3.1. <u>Introduction</u>

The current chapter is divided into few parts which discuss tools and techniques, sample size, methodology and sources used for data collection in the current study. To comprehend the mentioned objective in chapter 1, we have used the combination of two approaches named descriptive and analytical as a research design. Purpose of descriptive design is the description of affairs and facts that already exists and cannot control by the researcher whereas, in analytical design, the researcher has to use existing facts and has to critically evaluate the data available. 20 leading Indian banks from the public sector, 14 banks from the private sector and 7 foreign banks have been selected for this study. SBI and its associates, in spite of being a public bank, have been categorized as a different category because SBI group played important role in the Indian banking history. It is the oldest bank who holds 13% out of 75 % of the public sector in the banking industry. SBI also works as an agent of Central Bank of India and it acts as a banker's bank. SBI comes under the separate act SBI Act 1955, and all other banks come under the Banking Regulation Act 1949. These are the strong reasons to commit SBI as a separate group for our study.

The selected relevant parameters like mobilization of deposits, loans and advances, investment, return on assets, earnings and expenses, capital assets, risk-weighted assets ratio, output-input analysis, business per employee, credit-deposit ratio, percentage growth in net profit, interest income to total income and non-performing assets of the selected public sector, private sector and foreign banks will be considered to study the performance and efficiency whereas average, percentage, rank, tables, charts, graphs have been used for the analysis of the data for the period of 2001-2016. The practice of ratio analysis, simple mathematical and statistical techniques like CAMEL model, DEA, discriminant analysis, back-testing model, correlation analysis, regression analysis, and panel data regression has been used at appropriate places.

Table 3.1 shows the banks used in the study. Banks have been categorized in four major parts named SBI group, Public Banks, Private Banks and Foreign Banks. From SBI group 6 SBI associates is chosen, 14 major banks from public sector, 14 major banks from private sector and 6 banks from foreign banks.

Table 3.1: List of Banks Used In Study

SBI and its Associates (6)	Public Sector Banks (14)	Private Sector Banks (14)	Foreign Banks (6)
• State Bank of Hyderabad • SBI • State Bank of Patiala • State Bank of B&J • State Bank of Travancore • State Bank of Mysore	• Corporation Bank • Union Bank of India • IDBI • Bank of Baroda • Canara Bank • Andhra Bank • PNB • Vijaya Bank • Oriental Bank of Commerce • Allahabad Bank • Punjab And Sind Bank • Bank of India • UCO Bank • Central Bank of India	• Ratnakar Bank • Yes Bank • Kotak Mahindra Bank • ICICI Bank • J&K Bank • Nainital Bank • HDFC Bank • IndusInd Bank • City Union Bank • Axis Bank • South Indian Bank • Development Credit Bank • ING Vyasya Bank • Dhan Laxmi Bank	• Bank of Ceylon • Barclays Bank • Bank of America • Deutsche Bank • Citibank • Royal bank of Scotland • Standard Chartered Bank

(Source: Author's Compilation)

3.2. <u>Sources of Data</u>

The study is based on secondary data. The data of the selected banks for the period of 2001 to 2016 have been collected from the secondary sources, i.e. Reserve Bank of India publications, issues of Economic Review, Statistical Tables Relating to Banks in India, BSE, NSE, Websites of Selected Public, Private and Foreign Banks, Website of Money Control, Indian Banker's Association Bulletins, Corporate Database. For collecting relevant data for the purpose of conducting the research work internet surfing has also been used for obtaining the requisite and latest information.

3.3. Statistical Tools/Techniques Used For Study

Below is the tools and techniques discussed which have been used in the study.

3.3.1. CAMEL (Capital Adequacy, Asset Quality, Management Efficiency, Earning Efficiency, Liquidity Ratio)

CAMEL is considered one of the best rating methods based on ratios to know the financial health of any bank. It works on 5 parameters named Capital Adequacy Ratio, Asset Quality, Management Quality, Earnings Efficiency, and Liquidity Ratio. The present study is based more on analytical research design and descriptive research has been used to support and validate the facts. To measure the capital adequacy, banks currently use the Capital-Risk Asset Ratio. Adequacy of the capital is basically evaluated on two components of the total capital of a bank i.e. the capital of the bank for the CAR purposes has been categorized into two tiers Tier I and Tier II capital – and, the second component of this ratio is Risk Weighted Assets. Tier I is the core capital of the bank which shows the strength of the bank. Tier I capital includes common stock and disclosed reserves. Tier II capital is the secondary capital which includes undisclosed reserve, revaluation reserve, subordinated debt and hybrid instrument. The capital adequacy is based on the following key financial ratio.

Table 3.2: Capital Ratio Analysis

Ratios	Formula	Criteria
CAR	$CAR = \dfrac{\text{Tier one Capital} + \text{Tier Two Capital}}{\text{Risk Weighted Assets}}$	$\geq 8\%$

(Source: Credit Analysis of Financial Institution)

Capital Adequacy Ratio (CAR): "This ratio is the bank's capital to its risk which tells us about the bank's safety level". As shown in table 3.2, a bank's CAR is necessary to be minimum of 8% set by the Bank for International Settlement (BIS) and 9% by Reserve Bank of India on the basis of BASEL norm II. BASEL guidelines are basically being prescribed by the group of central bank named BASEL committee. Set of rules and agreement given by committee are called BASEL norms. BASEL norm I prescribed CAR of 8%, II 8 % and III

focus on CAR of 9-12%. CAR has been measured on the basis of BASEL norm II. Different countries may have different norms for CAR depending on regulators.

Table 3.3: Capital Adequacy Ratio Scale

Assigned Scale	Scale 1 (Well Capitalized)	Scale 2 (Adequately Capitalized)	Scale 3 (Significantly Capitalized)	Scale 4 (Under Capitalized)	Scale 5 (Critically undercapitalized)
Range	Between CAR 12% +	Between CAR 12%-9%	Between CAR 9%-6%	Between CAR 6%-3%	Less Than CAR 3%

(Source: Credit Analysis of Financial Institution)

As shown in table 3.3, the capital adequacy ratio is rated from 1 to 5. Ratings 1 in capital adequacy ratio indicates a bank has a strong level of capital in relation to the financial institution risk. The rating of 5 indicates a critical deficient level of capital.

Table 3.4: Asset Quality Ratio Scale

Ratios	Formula	Criteria
Net NPA Ratio	$\dfrac{\text{Net NPA}}{\text{Total Advance}}$	$\leq 1\%$

(Source: Credit Analysis of Financial Institution)

Asset Quality: "Asset quality shows the bank's loan quality which shows the earnings of the bank". As shown in table 3.4, poor quality of assets is the key root of most bank failures. Inadequate management lending policies are major reason behind this- both past and present. Market knowledge of poor asset quality often leads to pressure on the bank's short-term funding rating, causing liquidity crisis or outright 'run on the bank'. It is true that non-performing loans are proxy for asset quality for any bank - the lower the better.

Table 3.5: Non-Performing Asset Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
Avg Net NPA	$\leq 1\%$	$\geq 1\% \leq 4\%$	$\geq 4\% \leq 7\%$	$\geq 7\% \leq 10\%$	$\geq 10\%$

(Source: Credit Analysis of Financial Institution)

As discussed in table 3.5 asset quality is rated from 1 to 5. Ratings 1 indicate a strong asset quality and minimal portfolio risks whereas rating 5 reflects poor and deficient asset quality for any bank which foretells the coming threat to bank performance.

Table 3.6: Business per Employee Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
Business per Employee	≥ 4 Crore	≤ 4 Crore ≥ 3 Crore	≤ 3 Crore ≥ 2 Crore	≤ 2 Crore ≥ 1 Crore	≤ 1 Crore

(Source: Credit Analysis of Financial Institution)

Management Efficiency: "Management Efficiency tells about the ability of the banks to react to financial stress". As shown in table 3.6 in CAMEL rating system, which is considered by management as the most crucial element to keep an eye on as it is playing a importing role in inferring the bank's victory or failure; however, it is focus to measures such as the asset quality examination. Management's decisions have an impact either directly or indirectly on: asset quality, asset growth, earnings levels and funding strategies. In the CAMEL rating system, each of the components is scored from 1 to 5. In the context of management, the rating of 5 is applicable to critically deficient management but a rating of 1 is assigned to note that the board of directors and management are fully effective.

Table 3.7: Earning Ratio

Ratio	Formula	Criteria
Return on Asset	$\dfrac{\text{Net Interest Income}}{\text{Assets Growth Rate}}$	≥ 1%

(Source: Credit Analysis of Financial Institution)

Earnings Ratio: "This ratio tells about the ability of the bank to generate earnings, returns and expansion capabilities". As shown in table 3.7, stability in profit not only forms the public confidence in the bank, also offers adequate provisions and absorbs loan losses. It is also essential for a well-adjusted financial structure and help in arranging rewards to the shareholders and investors. Thus consistent healthy revenue and earnings are essential to the sustainability of banking institutions. Profitability ratio shows the capacity of a company to produce profits from assets and revenue.

Table 3.8: Return on Asset Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
ROA	≥ 1.5 %	≤ 1.5 % ≥ 1.0 %	≤ 1.0 % ≥ 0.5 %	≤ 0.5 % ≥ 0.25 %	≤ 0.25%

(Source: Credit Analysis of Financial Institution)

Table 3.8 shows that a rating of 1 reflects good revenue that is adequate to retain loan allowance with sufficient capital and support operations. On the flip side, a rating of 5 depicts a scenario of incurring regular losses and represents a risk to the firm's solvency through the loss of capital.

Table 3.9: Liquidity Ratio

Ratio	Formula	Criteria
Credit Deposit Ratio	$\dfrac{\text{Total Credit}}{\text{Total Deposits}}$	$\leq 80\%$

(Source: Credit Analysis of Financial Institution)

Liquidity Ratio: "This ratio tells about the ability of the bank to meet present and future cash flow for the short term". As discussed in table 3.9 the study has used CAMELS rating to examine bank's performance in liquidity. An adequate liquidity in bank is required for two motives, first, to fulfil a demand for fresh loans without recalling existing loan or realizing term investments such as bond holdings, and second to fulfil both routein and seasonal variations in bank's deposits so that withdrawals demands can be fulfil in a timely and orderly way. Banks make money by advancing or investing these resources in long-term at higher rates but mobilizing short-term deposits at a lower interest rate which creates the liquidity risk for banks as it generates Asset-Liability mismatch.

Table 3.10: Credit Deposit Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
Credit Deposit Ratio	$\leq 50\%$	$\geq 50\% \leq 55\%$	$\geq 55\% \leq 60\%$	$\geq 60\% \leq 65\%$	$\geq 65\%$

(Source: Credit Analysis of Financial Institution)

Table 3.10 reflects a rating 1 represents adequate liquidity levels as the bank has access to enough sources of funds to meet present and estimated liquidity needs. On the flip side, the rating of 5 indicates critical liquidity-issues, and to meet liquidity needs, the institution demands immediate external assistance.

Table 3.11: The CAMEL's Composite Rating

Rating Scale	Rating Range	Rating Analysis	Exposure Limits	Rating Interpretation
1	1.0-1.4	Outstanding	1st Limit	The bank performs in good and efficient manner in every way.
2	1.6-2.4	Superior	2nd Limit	Evidently healthier than the average bank performance, but not fairly outstanding in every respects
3	2.6-3.4	Average	3rd Limit	A well-run, banking institute that only fulfil all of the important criteria.
4	3.6-4.4	Under-perform	NR	The bank reveals a foremost issues that if not corrected, could lead to as very severe or disappointing condition that will hover its survival. This would also involve key financial and or supervisory disclosures
5	4.6-5.0	Doubtful	NR	The bank's financial condition is poor alongwith asset quality ruining over half of the bank's prime resources. If not improved further worsening will lead to supervisory control and a high possibility of failure.

(Source: Credit Analysis of Financial Institution)

As shown in table 3.11 after computing the rating for each of elements, the composite rating is the weighted average of the sum of five elements. The composite rating is defined in CAMEL approach to bank analysis and to identify the better banks among potential banks. Depending on the composite rating of an individual bank, the proposed exposure limit is used to compare the level of the bank as shown in 3.13. Table 3.12 shows the weightage of the CAMEL variable in the bank's financial health that revealed that capital adequacy ratio plays important role in bank's financial condition.

Table 3.12: CAMEL Variable

Variable name	Computation	Weightage
C-Capital Adequacy	Total Equity/ Total Assets	35%
A- Asset quality	Non-performing loans/ Total loans	20%
M-Management Efficiency	Business Per Employee	25%
E- Earning	Return on Assets	10%
L- Liquidity	Advances / Deposits	10%

(Source: Author's Compilation)

Table 3.13: CAMEL Rating Parameters

Variables	Scale 1	Scale 2	Scale 3	Scale 4	Scale 5	Composite CAMEL Rating	Composite Rating Range	Rating Analysis
CAR	>12 %	9%-12%	6%-9%	3%-6%	<3%	1	1 -1. 5	Outstanding
AQ	<1%	1%-4%	4%-7%	7%-10%	>10%	2	1. 6 – 2. 4	Superior
ME	>4 Cr.	3-4 Cr.	2-3Cr.	1-2Cr.	<1 Cr.	3	2. 5 – 3. 4	Average
EE	>15 %	10-15%	5-10%	5-0.25%	<0.25	4	3. 5 – 4. 4	Under Performer
LR	<50%	50-55%	55-60%	60-65%	>65%	5	4. 5 - 5	Doubtful

(Source: Author's Compilation)

3.3.2. <u>Data Envelopment Analysis (DEA)</u>

In today's era of advanced technology, the role of the banking industry has become utmost important for everyone for managing their monetary transactions. Due to the new technological inventions, there has been an enhancement in the working quality of the banks and this has headed to rise in the competition among the banks. The more proficiently a bank is able to turn its resources into revenue, the more efficient it is. To survive in the market, banks have to work on increasing their efficiency on a continuous basis. Therefore, the productive efficiency analysis in the banking industry is attracting more and more attention.

CAMEL rating was used to measure the financial health of any bank which tells us how efficient a bank is in terms of its financial position. But on the other hand, it is also very important to know the bank's potential by using their inputs and output for higher productivity and data envelopment analysis is widely accepted by the researchers for measuring productive efficiency of the banks.

Productive efficiency is always calculated in terms of the combination of the inputs and outputs. Many researchers have proposed various methods to calculate bank's productive efficiency. However, we use a popular linear programming technique, Data Envelopment Analysis (DEA). DEA can deal with multiple inputs and multiple outputs in a single structure, illustrating the change in efficiency score with respect to the changes in input/output variable. In order to identify the most efficient commercial banks operating in India, DEAOS software has been used.

DEA can deal with multiple outputs vs. multiple inputs relations in a single framework. It has become an excellent method for productive efficiency evaluation. DEA modelling allows the analyst to select outputs and inputs considering management need. Advantage of using DEA is it unlocks the access to what-if analysis. Additionally, the approach works with parameters of diverse units without the requirements for calibration (e.g. Rupees, Number of Staff or Number of Transactions).

Current study measures the productive efficiencies of 41 commercial banks operating in India, and the period of study is 2002 to 2014. Here, the productive efficiency of Decision Making Units (DMUs) is compared using the deterministic or stochastic input-output data. For the analysis, DEA model with two inputs and two outputs is used. The selection of inputs/outputs in the real world in itself is a complicated task since every bank treats their resources as input/output. So, taking into consideration the ownership as well as the functioning of the banks, we have chosen the number of employees and deposits as the inputs whereas advances and interest income have been chosen as the outputs.

Further analysis has been done by calculating the efficiency of different banks operating in India and a pertinent model has been specified below.

a). <u>**Variables Used in DEA**</u>

The following variables are specified:

Outputs: Y1 = Advances

Y2 = Interest Income

 Inputs: X1 = Number of employees

X2 = Deposits

Propositions are based on the comparison of banks' efficiency with respect to multiple inputs (Number of employee, Deposits) and multiple outputs (Advances, Interest income) and DEA model is applied to validate these propositions.

Three main orientations are offered by DEA techniques for efficiency analysis. (Charnes et al., 1994):

(a) Input oriented models, in which DMUs are valued to create a set quantity of productivity with the minimum possible amount of input.

(b) Output oriented models are models in which DMUs are supposed to produce the maximum possible amount of productivity with the particular amount of input.

(c) Base-oriented models are models in which DMUs are supposed to produce the ideal mix of Input and Output.

Study has used output oriented approach.

Efficiency =1 considered efficient

Efficiency score nearest to 1 considered efficient

The efficiency score is generally conveyed as either a number between zero and one or 0 and 100 percent. A unit scoring less than one is considered inefficient relative to other units.

3.3.3. <u>Reasons of Using Both Tools Together</u>

As discussed in differentiation, CAMEL and DEA both have two different motives. CAMEL focuses on financial health whereas DEA gives productive efficiency. So we have used both tools together in one study to prove that having fairly strong financial health does not mean that the bank is productive efficient also and vice versa. Differentiating points that makes both tools different from each other are discussed below in table 3.14.

Table 3.14: Difference in CAMEL and DEA tools

	CAMEL	DEA
1.	It is used to measure financial health of any bank.	It is used to measure productive efficiency.
2.	Base on five important ratios name Capital Adequacy, Asset Quality, Management Efficiency, earning Efficiency, Liquidity Ratio.	Based on input-output analysis.

3.	It helps in finding weak point in the financials of a bank.	It helps in identifying bank's potential.

(Source: Author's Compilation)

3.3.4. <u>Discriminant Analysis</u>

Discriminant analysis (also known as discriminant function analysis) is a descriptive technique developed by R. A. Fisher in 1936 to (a) describe characteristics that are specific to distinct groups (called descriptive discriminant analysis); and (b) classify cases (i.e., individuals, subjects, participants) into pre-existing groups based on similarities between that case and the other cases belonging to the groups (sometimes called predictive discriminant analysis). It has been used to predict bank failure which is based on Altman Z score to define range and stage of bankruptcy for the banks.

Reason for using the Altman Z score in the study is using all 5 important CAMEL ratios which are universally accepted as evaluating the financial health of the bank. While other methods like Springate model and Zmijewski model use maximum 3 parameters which cannot give reliable results compared to the Altman Z score which uses 5 CAMEL parameters.

Discriminant Analysis involves the determination of a linear equation, like the regression, to predict that to which group the case belongs. The form of the equation or function is:

$$D = v_1 X_1 + v_2 X_2 + v_3 X_3 + \cdots \ldots \ldots \ldots \ldots \ldots \ldots + v_i X_i + a$$

Where
 D = discriminate function
 v = discriminant coefficient or weight for that variable
 X = independent variable score
 a = constant
 i = number of predictor variable

CHAPTER 4

PERFORMANCE AND EFFICIENCY OF DIFFERENT BANKING SECTORS IN INDIA

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4.1. Introduction

The banking sector is considered one of the most important components for the growth and development of any economy. An effective banking system promotes the utilization of funds by smoothing its flow from the surplus sector to the sector where it is in deficit. Since the initiation of the reform process, which started in 1991, the number of banks and bank branches started increasing not only because of increase in the domestic players but also because of penetration in the industry by foreign players. These not-so-tough entry barriers led to intensity the competition among banks for maintaining and improving their profitability as well as performance.

Many studies have been done to measure the bank's performance and researchers have delved into various ways of analysis. Traditionally banking performance was being measured by using the traditional system which includes Return on Investments (ROI) and Return on Assets (ROA) evaluation. However, in the current scenario experts have found the traditional approach which just focused on financial view which cannot give a transparent and overall picture of the performance of bank. Basically, there are two aspects to measure bank's overall performance which includes financial aspects and human aspects.

Existing literature has divided the performance indicator into two important parts which include Non-Financial Statement indicators and Financial Statement indicators. Where financial statement indicators include those factors that have an impact on bank's profit and loss account, its balance sheet and its efficiency; Non-Financial Statement indicators are the factors those that may not have a direct impact on the balance sheet but for sure have an indirect impact on the performance of the bank. Much literature has worked out on measuring

bank's performance but very less of which was found on comparing all major banks of different sectors together. So this study has made an attempt to club all banking sectors involving all major banks and tried to measure productive efficiency and performance irrespective of whether it is a public bank, a private bank or a foreign bank.

The current study has focussed to measure bank's performance and its productive efficiency of the different banking sectors like the public, private and foreign banks using CAMEL method and DEA. The study is based on 41 banks of all the three sectors and the data ranges from 2001–2014. The result of this study shows that public banks are suffering from the problem of NPA (Poor Asset Quality) which tells us about the quality of loans given by the bank and poor liquidity, which defines an arrangement of future and present cash flow of the banks. Also, interest income and advances are found to be highly correlated while advances and NPA ratio are negatively correlated.

The present study is supposed to provide better results as compared to earlier studies because it captures all major banks of India together from major sectors (Public, Private and Foreign) in one study tested on CAMEL and DEA parameters together. Studies have used CAMEL and DEA as a validating tool for each other but in reality, both have a different purpose. CAMEL is used to measure the financial health of the banks where DEA is used to know the productive efficiency of the banks. Reason for using both tools together is to make it clear that having financial soundness does not mean that bank is productive efficient also and on the other hand productive efficient does not always means that bank will be financially strong too. So, in our study, we have used both for a relevant purpose which will discuss that having good financial health does not mean that the bank will be productive efficient also.

4.2. <u>Methodology</u>

The study has focused on the different categories of the banking sector including all major sectors SBI and Associates, Public Banks, Private Banks, Foreign Banks. CAMEL method along with RANK method supports the current study by giving criteria for sound eligibility after considering + ve variables like Advances, Deposits, Net Profit, NPA ratio, Capital Adequacy, and Business per Employee. At last, Correlation has been employed to find out relation among used variables. After that data envelopment analysis has been used to measure

the productive efficiency of banks. This should help in clarifying the point that 'strong financial health does not mean good productive efficiency and vice versa'. At last neural network has been used to see banks management of their profits and their NPA.

4.2.1. Sample

20 leading banks in India from the public sector, 14 banks from the private sector and 7 banks foreign banks have been selected for this study as shown in table 4.1. SBI and its Associates in spite of being a public bank have been categorized as a different category because SBI group has its own history as discussed in the previous chapters.

Table 4.1: Sectors for the Study

SBI and its Associates (6)	Public Sector Banks (14)	Private Sector Banks (14)	Foreign Banks (7)
• SBI • State Bank of Hyderabad • State Bank of Patiala • State Bank of B&J • State Bank of Travancore • State Bank of Mysore	• Corporation Bank • Union Bank of India • IDBI • Bank of Baroda • Canara Bank • Andhra Bank • PNB • Vijaya Bank • Oriental Bank of Commerce • Allahabad Bank • Punjab And Sind Bank • Bank of India • UCO Bank • Central Bank of India	• Ratnakar Bank • Yes Bank • Kotak Mahindra Bank • ICICI Bank • J&K Bank • Nainital Bank • HDFC Bank • IndusInd Bank • City Union Bank • Axis Bank • South Indian Bank • Development Credit Bank • ING Vyasya Bank • Dhan Laxmi Bank	• Bank of Ceylon • Barclays Bank • Bank of America • Deutsche Bank • CitiBank • Royal Bank of Scotland • Standard Chartered Bank

4.2.2. Model used

Three models have been used in the current study which has been discussed below in detail.

a). CAMEL

As discussed in chapter 3, CAMEL is a ratio-based model used to assess the financial performance of banking institutions with the help of different criteria, viz. Capital Adequacy, Asset Quality, Management Quality, Earnings, and Liquidity. The current study is a

descriptive research study based on analytical research design. To measure the capital adequacy, bank supervisors currently use the Capital-Risk Asset Ratio. Variable used for CAMEL rating is below an explanation of this variable having been discussed in previous chapter methodology. After calculating an individual rating for separate CAMEL variables weighted average has been taken to allocate composite CAMEL rating.

The study has already discussed CAMEL variables in detail in chapter 3 (Methodology) but it has mentioned here again to refresh and remind for the current chapter.

Table 4.2: CAMEL Variables with Their Weightage

Variable name	Computation	Weightage
C-Capital Adequacy	Total Equity/ Total Assets	35%
A- Asset quality	Non-performing loans/ Total loans	20%
M-Management Efficiency	Business Per Employee	25%
E- Earnings Ratio	Return on Assets	10%
L- Liquidity Ratio	Advances / Deposits	10%

(Source: RBI website)

Table 4.3: Rating Parameters of CAMEL

CAMEL Variables	Scale 1	Scale 2	Scale 3	Scale 4	Scale 5	Composite CAMEL Rating	Composite Rating Range	Rating Analysis
CAR	>12 %	9%-12%	6%-9%	3%-6%	<3%	1	1 -1. 5	Outstanding
AQ	<1%	1%-4%	4%-7%	7%-10%	>10%	2	1. 6 – 2. 4	Superior
ME	>4 Cr.	3-4 Cr.	2-3Cr.	1-2Cr.	<1 Cr.	3	2. 5 – 3. 4	Average
EE	>15 %	10-15%	5-10%	5-0.25%	<0.25	4	3. 5 – 4. 4	Under Performer
LR	<50%	50-55%	55-60%	60-65%	>65%	5	4. 5 – 5	Doubtful

(Source: Author's Compilation)

b). <u>Data Envelopment Analysis</u>

Further to measure bank's productive efficiency DEA (Data Envelopment Analysis) has been used which helps in analysing the potential of any bank to get to the answer whether that particular bank is using its input and output properly or not. DEA can deal with multiple inputs vs. multiple output relations in a single framework; it is becoming a method of choice for efficiency evaluation in recent days. DEA modelling allows the analyst to select inputs and outputs in line with the focus area of the management. This is an advantage of DEA since it opens the door to what-if analysis. Additionally, the technique works with variables of different units without the need for standardization (e.g. Rupees, number of staff or number of transactions). DEAOS software has been used for the same. For DEA, years from 2002-2014 has been taken in this study.

While compiling the data it was found that some of the banks started their business in late years. Variable data for those was not available for the selected period, hence, their performance was measured from their initiating years.

Further analysis has been done by calculating the efficiency of different banks operating in India and the model used in the study has been specified below.

Following are the variables used in DEA model:

The following model was specified:

Outputs: Y1 = Advances

Y2 = Interest Income

Inputs: X1 = Number of employees

X2 = Deposits

The number of employees is considered as an input because without human resource all efforts made in the form of acquiring land, loans, fixed assets are worthless. Human resource is having the capability to converge maximum output from minimum input. Total deposits (a Liability item on balance sheet) are considered as an input from a pure economics point of view because banks are supposed to perform an intermediary function to transform loans out

of the deposits. Interest income is considered as one of the output because that is mostly taken as a parameter to evaluate the banking performance in the context of contribution to banks current earnings. A loan is being accepted as an output having the same reason deposits are accepted as input.

Efficiency =1 considered efficient

Efficiency score close to 1 considered efficient

The efficiency score is generally conveyed as either a number between zero and one or 0 and 100 per cent. A unit scoring less than one is considered inefficient relative to other units.

c. <u>Neural Network of NPA and Net Profit Prediction</u>

At last Neural Tools software, 7.5 has been using to predict and compare Non-Performing Assets and Net Profits. The software gives the prediction on the basis of previous data and results are considered as good or bad with an adjustment range of 10-20% movement. This logic has helped to understand whether banks are able to use their resources fully, manage their NPA and are able to reach the expected level of profits. Reason for using this software in the current study is to know the bank's NPA and profit management by comparing the predictions made by software using 10 years data and the actual results given by the banks.

4.3. <u>Data Analysis and Results</u>

Table 4.4 discuss the composite rating calculated by the CAMEL ratio. It was found through CAMEL rating that the financial health of private and foreign banks was good as compared to public ones. As in the scoring of public banks, most of these banks scored a rating of 3 which shows performance level below average, which is an alarming sign for public sector banks.

Table 4.4: CAMEL Composite Rating

48

SBI Group	Rating	Public Sector Banks	Rating	Private Sector Banks	Rating	Foreign Banks	Rating
State Bank of Hyderabad	2	Corporation Bank	2	Ratnakar Bank	3	Bank of Ceylon	3
SBI	3	Union Bank of India	2	Yes Bank	2	Barclays Bank	2
State Bank of Patiala	2	IDBI	2	Kotak Mahindra Bank	2	Bank of America	2
State Bank of B&J	2	Bank of Baroda	2	ICICI Bank	2	Deutsche Bank	2
State Bank of Travancore	3	Canara Bank	2	J&K Bank	2	Citi Bank	2
State Bank of Mysore	3	Andhra Bank	2	Nainital Bank	2	Royal Bank of Scotland	3
		PNB	2	HDFC Bank	2	Standard Chartered Bank	3
		Vijaya Bank	2	IndusInd Bank	2		
		Oriental Bank of Commerce	2	City Union Bank	2		
		Allahabad Bank	2	Axis Bank	2		
		Punjab And Sind Bank	3	South Indian Bank	2		
		Bank of India	3	Development Credit Bank	2		
		UCO Bank	3	ING Vyasya Bank	3		
		Central Bank of India	3	DhanLaxmi Bank	3		

(Source: Author's calculation)

Whereas when productive efficiency was measured for all sectors through DEA in table 4.5 it was found that SBI and public banks have good productive efficiency as compared to other sectors which clearly shows that public banks are using their potential better when compared to other sectors.

Table 4.5: Data Envelopment Analysis Score

SBI Group	DEA	Public Sector Banks	DEA	Private Sector Banks	DEA	Foreign Banks	DEA
State Bank of Hyderabad	85%	Corporation Bank	78%	Ratnakar Bank	90%	Bank of Ceylon	63%
SBI	87%	Union Bank of India	90%	Yes Bank	66%	Barclays Bank	100%
State Bank of Patiala	87%	IDBI	100%	Kotak Mahindra Bank	70%	Bank of America	99%
State Bank of B&J	86%	Bank of Baroda	79%	ICICI Bank	75%	Deutsche Bank	80%
State Bank of Travancore	87%	Canara Bank	82%	J&K Bank	83%	Citibank	80%
State Bank of Mysore	100%	Andhra Bank	81%	Nainital Bank	84%	Royal bank of Scotland	67%
		PNB	89%	HDFC Bank	93%	Standard Chartered Bank	68%
		Vijaya Bank	87%	IndusInd Bank	59%		
		Oriental Bank of Commerce	86%	City Union Bank	91%		
		Allahabad Bank	81%	Axis Bank	100%		

		Punjab And Sind Bank	84%	South Indian Bank	86%		
		Bank of India	83%	Development Credit Bank	89%		
		UCO Bank	85%	ING Vyasya Bank	92%		
		Central Bank of India	79%	DhanLaxmi Bank	86%		

(Source: Author's calculation)

Table 4.6 reveals the descriptive statistics of different banks for the year 2001-14 which involves 6 banks from SBI group, 14 banks from Public sector, 14 Private sector and 7 Foreign sector. The Study shows that among SBI group minimum average efficiency was found 0.85-0.88 whereas among nationalized banks the average efficiency was ranging from 0.59-0.99. Private Banks reflected the average efficiency range from 0.50-0.96 and foreign banks echoed the range of 0.30-0.98.

Table 4.6: Descriptive Statistics for efficiency of different banking sectors operating in India

Sectors	SBI Group	Nationalized Banks	Private Banks	Foreign Banks
Mean	0.87	0.84	0.80	0.70
Standard Error	0.00	0.02	0.04	0.09
Median	0.87	0.85	0.86	0.74
Range	0.03	0.40	0.46	0.68
Minimum	0.85	0.60	0.51	0.67
Maximum	0.88	1.00	0.96	0.99
Count	6.00	14.00	14.00	7.00
Confidence Level (95.0%)	0.01	0.05	0.09	0.24

(Source: Authors calculation)

Figure 4.1 defines the variation in the average efficiency score of SBI Group. It is apparent that there was not a huge difference between the efficiency scores among the banks in this group with the exception of State bank of Mysore, which scored highest productive efficiency score as compared to peer groups. Other banks in the same group were not found that much efficient on the basis of productivity.

Avg.	SBI	State Bank of B&J	State Bank of Hyderabad	State Bank of Mysore	State Bank of Patiala	State Bank of Travancore
	87%	86%	85%	100%	87%	87%
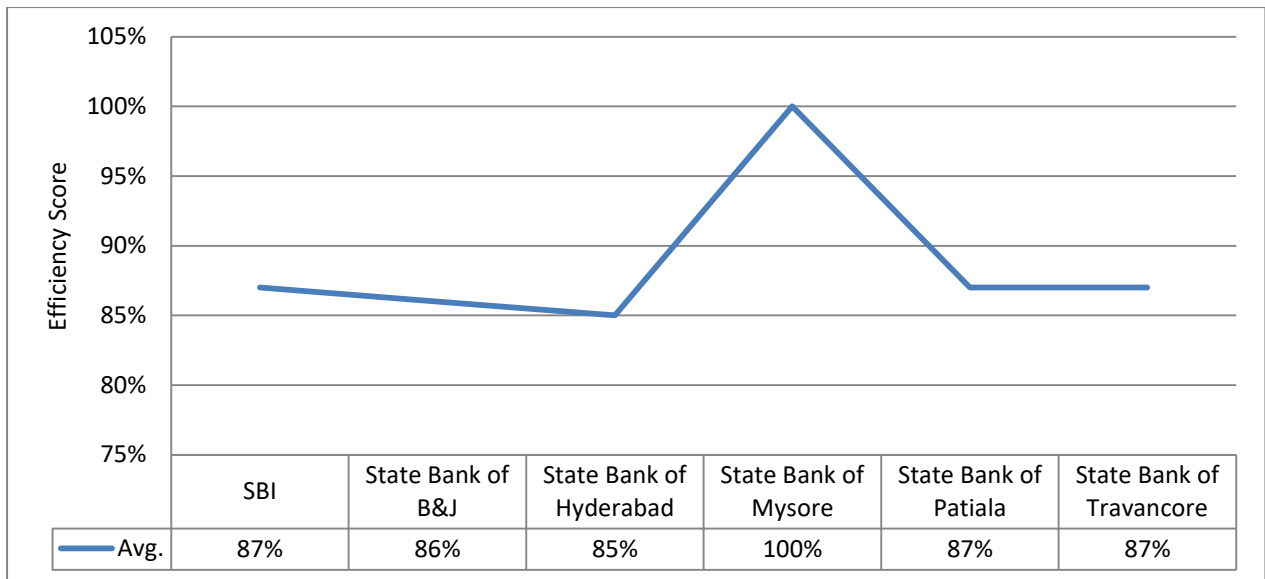
(Source: Author's Calculation)

Figure 4.1: Efficiency Score of SBI Group

Figure 4.2 reveals IDBI as productive efficient in its peer group suggesting that IDBI was using their input out correctively as DEA in this based on output oriented which clearly shows IDBI was able to maximize its output with given amount of input while others are not able to do this efficiently.

Series1	Allahabad Bank	Andhra Bank	Bank of Baroda	Bank of India	Canara Bank	Central Bank of India	Corporation Bank	IDBI	Oriental Bank of Commerce	Punjab And Sind Bank	PNB	UCO bank	Vijaya Bank	Union Bank of India
	81%	86%	79%	83%	82%	79%	78%	100%	86%	84%	89%	85%	87%	90%
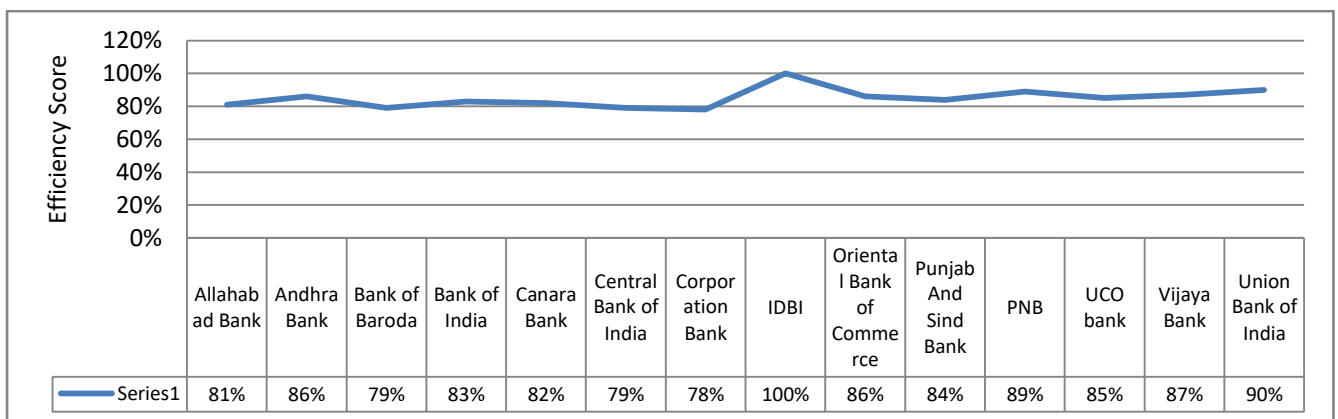
(Source: Author's Calculation)

Figure 4.2: Efficiency Score of Public banks

Figure 4.3 reveals Axis Bank as productive efficient in its peer group that means Axis Bank was using their input output efficiently as DEA in this study based on output oriented approach which clearly shows Axis Bank was able to maximize its output with given amount of input while others are not able to do this efficiently.

Series1	City Union Bank	Dhan Laxmi Bank	ING Vyasya Bank	J&K Bank	Nainital Bank	Ratnakar Bank	South Indian Bank	Axis Bank	Development credit Bank	HDFC Bank	Kotak Mahindra Bank	ICICI Bank	IndusInd Bank	Yes Bank
	91%	86%	92%	83%	84%	90%	86%	100%	89%	93%	70%	75%	59%	66%
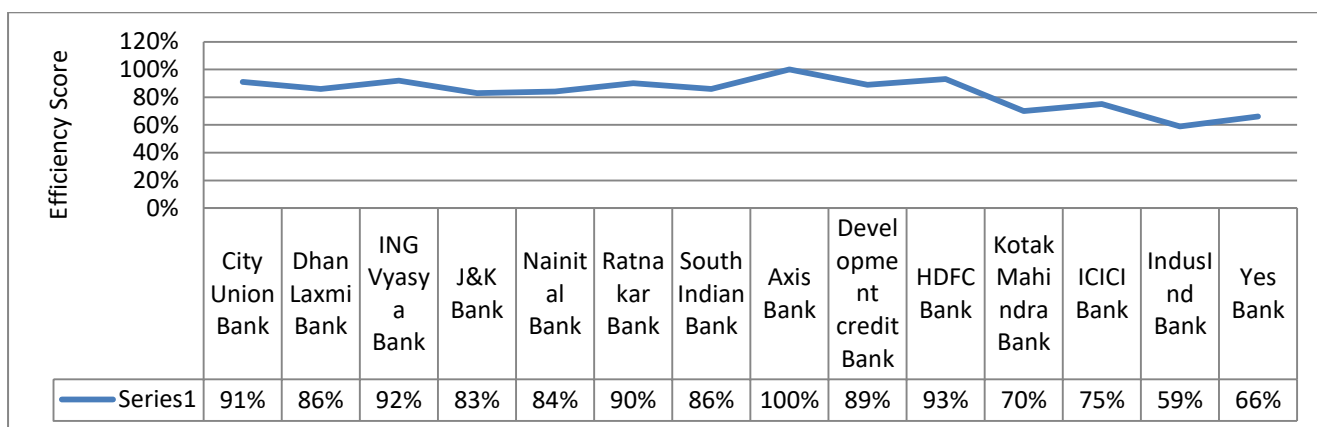
(Source: Author's Calculation)

Figure 4.3: Efficiency Score of Private Banks

Figure 4.4 reveals Barclays Bank as productive efficient compared peer group that means Barclays Bank was using their input out correctively as DEA in this based on output oriented which clearly shows Barclays was able to maximize its output with given amount of input while others are not able to do this efficiently.

Series1	Bank of America	Bank of Ceylon	Barclays Bank	Citi Bank	Deutsche Bank	Royal Bank of Scotland	Standard Chartered Bank
	99%	63%	100%	80%	80%	67%	68%
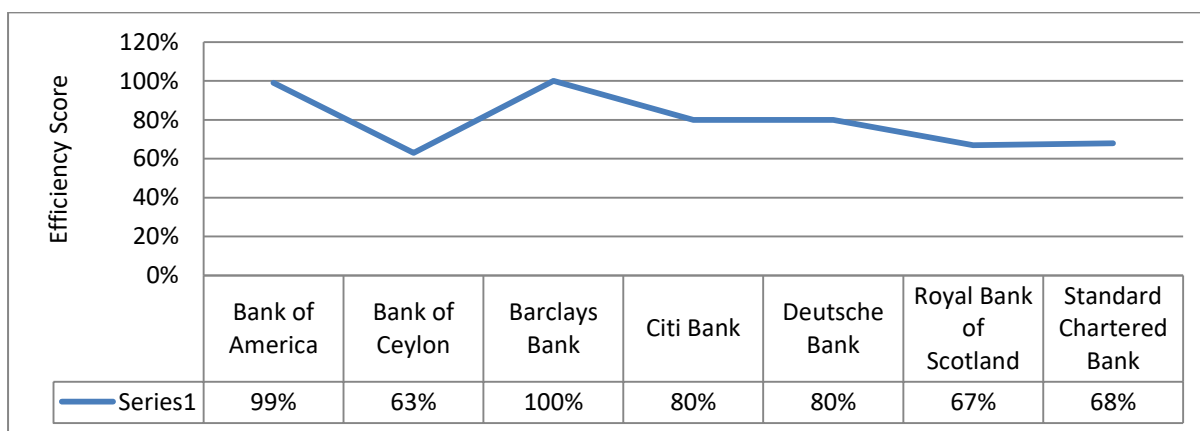
(Source: Author's Calculation)

Figure 4.4: Efficiency Score of Foreign Banks

The results of all banks for efficiency score seem interesting and it revealed that it's not necessary all the time that bank generating the highest profits is also efficient. An efficiency is a tool that helps in measuring how banks are using and converting their inputs for producing maximum output. A bank that is able to generate maximum output with minimum input will be most efficient. In the current study banks efficiency was measured on some parameters that involve key input and key output. In the present study State Bank of Mysore

52

was found very efficient in SBI group whereas in case of public banks IDBI ltd was found more productive efficient. In the case, private banks Axis bank were more efficient.

Table 4.7 shows the composite rating for CAMEL along with DEA score where CAMEL is giving an overview of the financial health of the banks and DEA is discussing productive efficiency. It was found from the table 4.7 that the financial health of the private and foreign banks was much stronger as compared to SBI group and public bank but DEA model shows opposite results compared to CAMEL result. DEA model revealed that productive efficiency of public banks was much better than the private and foreign banks. It was clear from the table 4.7 that it is not necessary that if the bank is financial healthy will be the productive efficient also and vice-versa. Table 4.6 and 4.7 were not able to give the clear picture of bank financials so, It was very important to compare CAMEL and DEA together to see, the banks who are financially healthy, are they productive efficient also. Because in many of the existing literature both tools have been considered as a validating tool for each other but in actual they have a different concept. So below is the table revealing the bank who has strong financial health does not mean that will be productive efficient too. So it was found in the composite rating that private and foreign banks were much healthier as compared to public banks but the productive efficiency of public banks was better as compared to the other two categories. Still having to look at the table results were not clear and up to expectations so, to go into depth and analyse it further we divided analysis into 5 parts to get a clear picture.

Table 4.7: CAMEL Composite Rating with DEA Score

SBI Group	Rating	DEA	Public Sector Banks	Rating	DEA	Private Sector Banks	Rating	DEA	Foreign Banks	Rating	DEA
State Bank of Hyderabad	2	85%	Corporation Bank	2	78%	Ratnakar Bank	3	90%	Bank of Ceylon	3	63%
SBI	3	87%	Union Bank of India	2	90%	Yes Bank	2	66%	Barclays Bank	2	100%
State Bank of Patiala	2	87%	IDBI	2	100%	Kotak Mahindra Bank	2	70%	Bank of America	2	99%
State Bank of B&J	2	86%	Bank of Baroda	2	79%	ICICI Bank	2	75%	Deutsche Bank	2	80%
State Bank of Travancore	3	87%	Canara Bank	2	82%	J&K Bank	2	83%	Citibank	2	80%
State Bank of Mysore	3	100%	Andhra Bank	2	81%	Nainital Bank	2	84%	Royal bank of Scotland	2	67%
			PNB	2	89%	HDFC Bank	2	93%	Standard Chartered Bank	2	68%
			Vijaya Bank	2	87%	IndusInd Bank	2	59%			
			Oriental Bank of Commerce	2	86%	City Union Bank	2	91%			

Allahabad Bank	2	81%	Axis Bank	2	100%	
Punjab And Sind Bank	3	84%	South Indian Bank	2	86%	
Bank of India	3	83%	Development Credit Bank	2	89%	
UCO Bank	3	85%	ING Vyasya Bank	3	92%	
Central Bank of India	3	79%	DhanLaxmi Bank	3	86%	

(Source: Author's Calculation)

Table 4.8 shows Capital Adequacy of all sectors and it was found that all banks were having good financial health in case of capital adequacy that shows all were able to maintain good capital reserve and possess a good capability to protect the interest of the depositors. The study also reveals that banks are ready to fulfill the CAR norm of maintaining 9-12% of the capital which is to be fulfilled by the year March 2019 which is the requirement of BASEL norm III. In the analysis ranking has been given to the CAMEL rating to reduce the effect of range prescribed by it and it was found that lower rank banks of public banks were having high-efficiency score as compared to high-rank bank of private banks that shows the good productivity of public banks and higher financial soundness does not mean that the bank will be higher productive efficiency and vice-versa.

Table 4.8: Capital Adequacy Rating in CAMEL with DEA Score

SBI Group	CAMEL Rating	DEA Score	Public Banks	CAMEL Rating	DEA Score	Private Banks	CAMEL Rating	DEA Score	Foreign Banks	CAMEL Rating	DEA Score
State Bank of Hyderabad	1	85%	Corporation Bank	1	78%	Ratnakar Bank	1	90%	Bank of Ceylon	1	63%
SBI	1	87%	Union Bank of India	1	90%	Yes Bank	1	66%	Barclays Bank	1	100%
State Bank of Patiala	1	87%	IDBI	1	100%	Kotak Mahindra Bank	1	70%	Bank of America	1	99%
State Bank of B&J	1	86%	Bank of Baroda	1	79%	ICICI Bank	1	75%	Deutsche Bank	1	80%
State Bank of Travancore	1	87%	Canara Bank	1	82%	J&K Bank	1	83%	Citi Bank	1	80%
State Bank of Mysore	1	100%	Andhra Bank	1	81%	Nainital Bank	1	84%	Royal Bank of Scotland	1	67%
			PNB	1	89%	HDFC Bank	1	93%	Standard Chartered Bank	2	68%
			Vijaya Bank	1	87%	IndusInd Bank	1	59%			
			Oriental Bank of Commerce	1	86%	City Union Bank	1	91%			
			Allahabad Bank	1	81%	Axis Bank	1	100%			
			Punjab And Sind Bank	1	84%	South Indian Bank	1	86%			

54

			Bank of India	2	83%	Development Credit Bank	1	89%			
UCO Bank	2	85%	ING Vyasya Bank	2	92%			
Central Bank of India	2	79%	DhanLaxmi Bank	2	86%			

(Source: Author's Calculation)

Table 4.9 shows the asset quality which tells us about the quality of loans and that has 20% weighting in the overall financial health of the bank. In case of Asset, Quality PSB were poor higher ratings as compared to other sectors that mean public sector banks are suffering from higher NPA issues, as asset quality in CAMEL disclose the quality of the loans given by banks. Current study discusses that quality of loans is poor in case of public banks as compared to others. It might have several reasons like political pressure, priority sector lending or employees inefficiency in lending procedure. But again after having higher NPA, productive efficiency of PSB was found good.

Table 4.9: Asset Quality Rating in CAMEL with DEA Score

SBI Group	CAMEL Rating	DEA Score	Public Banks	CAMEL Rating	DEA Score	Private Banks	CAMEL Rating	DEA Score	Foreign Banks	CAMEL Rating	DEA Score
State Bank of Patiala	2	87%	Andhra Bank	1	86%	Nainital Bank	1	84%	Bank of America	1	99%
State Bank of Hyderabad	2	85%	Corporation Bank	1	78%	Yes Bank	1	66%	Deutsche Bank	1	80%
State Bank of Travancore	2	87%	Oriental Bank of Commerce	2	86%	HDFC Bank	1	93%	Standard Chartered Bank	1	68%
State Bank of B&J	2	86%	IDBI	2	100%	J&K Bank	1	83%	Citibank	2	80%
State Bank of Mysore	2	100%	PNB	2	89%	Axis Bank	2	100%	Royal bank of Scotland	2	67%
SBI	2	87%	Bank of Baroda	2	79%	Kotak Mahindra Bank	2	70%	Barclays Bank	3	100%
			Vijaya Bank	2	87%	ING Vyasya Bank	2	92%	Bank of Ceylon	5	63%
			Canara Bank	2	82%	ICICI Bank	2	75%			
			Union Bank of India	2	90%	IndusInd Bank	2	59%			
			Bank of India	2	83%	South Indian Bank	2	86%			
			Allahabad Bank	2	81%	City Union Bank	2	91%			
			UCO Bank	2	85%	Ratnakar Bank	2	90%			
			Central Bank of India	2	79%	Development Credit Bank	2	89%			
			Punjab And Sind Bank	3	84%	DhanLaxmi Bank	2	86%			

(Source: Author's Calculation).

Table 4.10 shows the management efficiency which involves employees performance with average business per employee and in case of Management Efficiency PSBs were having poor rating that shows that employees of public banks are not that much contributing in business as compared to other sectors that may reason of job security in public sector and more pressure in private and foreign sector. Inefficiency in employee's performance somehow impacts on the bank's asset quality due to corruption in lending procedure. In spite of having poor management, PSBs were having good productive efficiency as compared to private banks leaving Axis banks and HDFC.

Table 4.10: Management Efficiency Rating in CAMEL with DEA Score

SBI Group	CAMEL Rating	DEA Score	Public Banks	CAMEL Rating	DEA Score	Private Banks	CAMEL Rating	DEA Score	Foreign Banks	CAMEL Rating	DEA Score
State Bank of Hyderabad	3	85%	IDBI	1	100%	ICICI Bank	1	75%	Barclays Bank	1	100%
State Bank of B&J	3	86%	Oriental Bank of Commerce	2	86%	Axis Bank	1	100%	Bank of America	1	99%
State Bank of Patiala	3	87%	Corporation Bank	2	78%	HDFC Bank	1	93%	Deutsche Bank	1	80%
State Bank of Travancore	4	87%	Andhra Bank	3	86%	IndusInd Bank	1	59%	Citi Bank	1	80%
SBI	4	87%	Canara Bank	3	82%	Kotak Mahindra Bank	3	70%	Standard Chartered Bank	2	68%
State Bank of Mysore	4	100%	Allahabad Bank	3	81%	Yes Bank	3	66%	Bank of Ceylon	3	63%
			Bank of Baroda	3	79%	J&K Bank	3	83%	Royal Bank of Scotland	2	67%
			Union Bank of India	3	90%	City Union Bank	3	91%			
			Vijaya Bank	3	87%	Nainital Bank	3	84%			
			PNB	3	89%	South Indian Bank	3	86%			
			Bank of India	3	83%	ING Vyasya Bank	4	92%			
			UCO Bank	3	85%	Ratnakar Bank	4	90%			
			Punjab And Sind Bank	3	84%	DhanLaxmi Bank	4	86%			
			Central Bank of India	4	79%	Development Credit Bank	4	89%			

(Source: Author's Calculation)

Table 4.11 shows earning efficiency in CAMEL which tells us about return on asset of the banks and it was found that all sectors were having equal rating which shows that all sectors are well enough to get good return over asset but again it was found that lower rank bank of PSBs was having goof productive efficiency as compared to other sectors leaving Axis and HDFC banks.

Table: 4.11 Earning Efficiency Rating in CAMEL with DEA Score

SBI Group	CAMEL Rating	DEA Score	Public Banks	CAMEL Rating	DEA Score	Private Banks	CAMEL Rating	DEA Score	Foreign Banks	CAMEL Rating	DEA Score
SBI	1	87%	PNB	1	89%	ICICI Bank	1	75%	Citibank	1	80%
State Bank of Hyderabad	1	85%	Canara Bank	1	82%	HDFC Bank	1	93%	Standard Chartered Bank	1	68%
State Bank of Patiala	1	87%	Bank of Baroda	1	79%	Axis Bank	1	100%	Royal Bank of Scotland	1	67%
State Bank of Travancore	1	87%	Bank of India	1	83%	Kotak Mahindra Bank	1	70%	Deutsche Bank	1	80%
State Bank of B&J	1	86%	IDBI	1	100%	Yes Bank	1	66%	Barclays Bank	1	100%
State Bank of Mysore	1	100%	Central Bank of India	1	79%	J&K Bank	1	83%	Bank of America	1	99%
			Oriental Bank of Commerce	1	86%	IndusInd Bank	1	59%	Bank of Ceylon	1	63%
			UCO Bank	1	85%	ING Vyasya Bank	1	92%			
			Allahabad Bank	1	81%	South Indian Bank	1	86%			
			Corporation Bank	1	78%	City Union Bank	1	91%			
			Andhra Bank	1	86%	DhanLaxmi Bank	1	86%			
			Union Bank of India	1	90%	Development Credit Bank	1	89%			
			Vijaya Bank	1	87%	Ratnakar Bank	1	90%			
			Punjab And Sind Bank	1	84%	Nainital Bank	1	84%			

(Source: Author's Calculation).

Table 4.12 shows the liquidity ratio which tells about the advance deposit of the banks and all sector of the bank was found weak in that CAMEL rating that means all banks they were not able to manage their advances and deposits properly. On the other side, it might affect by higher capital adequacy ratio maintaining by banks because higher capital ratio will lead to less availability of funds to the banks for circulation so, liquidity and capital ratio are adversely affected by each other.

Table 4.12: Liquidity Ratio Rating In CAMEL with DEA Score

SBI Group	CAMEL Rating	DEA Score	Public Banks	CAMEL Rating	DEA Score	Private Banks	CAMEL Rating	DEA Score	Foreign Banks	CAMEL Rating	DEA Score
SBI	5	87%	IDBI	5	100%	Ratnakar Bank	5	90%	Barclays Bank	5	100%
State Bank of Mysore	5	100%	Andhra Bank	5	86%	ICICI Bank	5	75%	Bank of America	5	99%
State Bank of Travancore	5	87%	PNB	5	89%	Kotak Mahindra Bank	5	70%	Standard Chartered Bank	5	68%

State Bank of B&J	5	86%	Union Bank of India	5	90%	IndusInd Bank	5	59%	Deutsche Bank	5	80%
State Bank of Patiala	5	87%	Bank of India	5	83%	HDFC Bank	5	93%	Citibank	5	80%
State Bank of Hyderabad	5	85%	Bank of Baroda	5	79%	ING Vyasya Bank	5	92%	Bank of Ceylon	5	63%
			Corporation Bank	5	78%	Development Credit Bank	5	89%	Royal bank of Scotland	3	67%
			Canara Bank	5	82%	Yes Bank	5	66%			
			UCO Bank	5	85%	Axis Bank	5	100%			
			Central Bank of India	5	79%	City Union Bank	5	91%			
			Punjab And Sind Bank	5	84%	DhanLaxmi Bank	5	86%			
			Oriental Bank of Commerce	5	86%	South Indian Bank	5	86%			
			Allahabad Bank	5	81%	J&K Bank	4	83%			
			Vijaya Bank	5	87%	Nainital Bank	3	84%			

(Source: Author's Calculation)

Neural Tools software 7.5 has been using to predict and compare Non-Performing Assets and Net Profits. The software gives the prediction on the basis of previous data and results good or bad are given after adjustment of 10-20% movement. That has helped to know that are banks able to use their resources fully and are able to reach the expected level of profits and they are managing their NPA level. In table 4.14 prediction of NPA for the year 2016 was made on the basis of previous years (2007-15). And the result shows residual between expected and actual NPA that shows UCO Bank, Allahabad Bank, and Axis Bank were successful in reducing the NPA as compared to other banks whereas Canara Bank and corporation bank reached at the highest point of NPA as compared to prediction. In table 4.15 prediction of Net Profit for the year 2017 was made on the basis of previous years (2007-16). And the result shows residual between expected and actual profit that shows Yes Bank, Union Bank of India, IDBI Ltd. Bank of India were successful in achieving predicted level of profit whereas some of the banks exceeded the expected level of profits that is definitely a good sign for the banks.

Table 4.13: NPA Prediction for the Year 2016

Banks	Prediction	Good/Bad	Residual
State Bank of India	567460	Good	-206
Allahabad Bank	101830	Good	-18251
Andhra Bank	67972	Good	793
Bank of Baroda	162817	Good	-203

Banks			
Bank of India	219743	Good	2190
Canara Bank	110971	Good	19428
Central Bank of India	127588	Good	-8858
Corporation Bank	45537	Bad	25530
IDBI Bank Ltd.	129557	Good	-2707
Oriental Bank of Commerce	77432	Good	-770
Punjab & Sind Bank	26644	Good	4178
Punjab National Bank	244150	Good	12798
UCO Bank	115361	Good	-12710
Vijaya Bank	28023	Good	-3590
Union Bank of India	65757	Good	-228
City Union Bank	-1608	Bad	4967
Dhanalakshmi Bank	2280	Bad	3303
UTI Bank	46457	Good	-5355
Development Credit Bank	-2184	Bad	4045
HDFC Bank	25747	Good	8637
Kotak Mahindra Bank	8205	Bad	4167
ICICI Bank	151717	Good	-770
IndusInd Bank	4801	Good	828
Yes Bank	-4056	Bad	7190

(Source: Author's calculation)

Table 4.14: Net Profit prediction for the year 2017

Banks	Prediction	Good/Bad	Residual
State Bank of India	1,04,841.00	Good	0.00
Allahabad Bank	-30,367.12	Good	-984.88
Andhra Bank	22,472.83	Good	-5,039.83
Bank of Baroda	1,38,314.00	Good	0.00
Bank of India	1,38,314.00	Bad	-2,94,145.00
Canara Bank	11,209.59	Good	0.41
Central Bank of India	-24,287.67	Bad	-103.33
Corporation Bank	56,121.00	Good	0.00
IDBI Bank Ltd.	-11,636.79	Bad	-39,944.21
Oriental Bank of Commerce	-10,940.00	Good	0.00
Punjab & Sind Bank	39,881.16	Bad	-19,773.16
Punjab National Bank	13,248.00	Good	0.00
UCO Bank	1,725.53	Bad	-20,232.53
Vijaya Bank	50,172.50	Bad	24,876.50
Union Bank of India	3,41,146.21	Good	2,14,063.79

City Union Bank	37,528.14	Good	12,748.86
Dhanalakshmi Bank	18,027.54	Bad	-20,121.54
UTI Bank	3,67,928.00	Good	0.00
Development Credit Bank	19,891.25	Good	76.75
HDFC Bank	1,45,496.00	Good	0.00
Kotak Mahindra Bank	3,41,145.32	Good	4.68
ICICI Bank	9,80,109.00	Good	0.00
IndusInd Bank	25,602.41	Good	3,076.59
Yes Bank	28,293.14	Good	3,04,716.86

(Source: Author's calculation)

4.4. Discussion

Public bank's CAMEL rating was good except in Asset Quality (NPA) and Management Efficiency. Asset Quality reflects NPA condition whereas management efficiency includes employee's performance that contributes to NPA by poor and wrong lending which becomes the cause of high bad loans for banks. Merely generating more profits and expanding the business is not sufficient to prove the efficiency of the banks, the path of growth is also important. It all depends upon how the banks get maximum output from minimum inputs. Due to good capital adequacy, public banks have fewer amounts to lend which reflects in lower liquidity position for public banks but the surprising thing is in spite of less amount of lending they have high NPA. Banks have to maintain the balance between two as both have an adverse impact on each other. It was found in the study that even after getting much support from the government, public banks are not performing well.

Performance analysis was done for all sectors to find out the issues in the banking sector and study revealed that banks are suffering from higher level of Non-Performing Assets and lower management efficiency especially in case of public banks. Lower management efficiency has the direct impact on poor asset quality (NPA). Therefore, the study concluded NPA as biggest challenge and issue for the banking sector especially PSBs that mean public banks as compared to other sectors have more chance of failure as the level of NPA is very high for public banks with the comparison of other sectors.

CHAPTER 5

NPA AND PROVISIONING EFFECT ON PROFITABILITY OF BANKS
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5.1. <u>Introduction</u>

From the previous chapter, it was clear that performance of Indian banking sector was not up to the mark and in this chapters we shall also revealed that NPA is one of the biggest reason that is impacting bank's profitability especially in case of public banks. So, to explore this issue further, the present study delves into the provisioning norms of the bank which have to be created against the bank's NPA and which generates a huge dent on the top line (revenues) of the bank. Through this study, we made an attempt to measure the portion of a bank's profits that they sacrifice to cover the cost of creating these provisions every year to cope increasing levels of NPA which, otherwise, could have been allocated in more profitable ventures to generate a better ROI for their shareholders.

Liberalization process and reforms in the financial system were bringing together in 1991 and the banking system had to undergone the most important transformation after that period. The aim of this transformation was to make the banking institutions more regulated, productive, competitive and profitable. In order to keep the risk-return profile of the bank within the reasonable limits, the quality of loan portfolio is paramount.

Higher level of Non-Performing Assets pushes the banks to pursue high yields to keep the returns intact which leads into bank entering with high-risk clients leading in to further deteriorating their Loan Book quality and thus increasing their Non-Performing Assets in future. These high-risk borrowers sometimes are the major clients of the banks leading to huge bank exposure, on aggregate, towards high-risk loans and when these borrowers default this leads to major financial crunch on the banking book. It can be seen that bank in each and every economic system are major contributors in boosting an economic growth which in turn brings the business back to the bank at an increasing rate. But it is required for this cycle to

run in a smooth way so that banks can also keep their exposure to the risky assets at the minimum and the Non-Performing Assets can be controlled in an effective way.

The present study makes an attempt to evaluate the problems of Non-Performing Assets in public, private, and foreign sector banks and also its impact on the profitability of these banks. A deeper study of this aspect should be able to bring the reasoning and steadfastness of NPA provisioning in banks and should give us a platform to critically review the robustness of these provisioning models and their contribution in the liquidity and profitability with these banks. It has also been discussed that the Non-Performing Assets to total advances are a key variable that does not only upset the bank's revenue but also bank's liquidity.

To progress in our study, we perused through the Basel norms, which have been formed to overcome the weakness of the system's loophole and to bring transparency to the system along with proper NPA identification. To match international standards overdue for 90 days has been applied from March 31, 2004. With effect from March 31, 2004, a non-performing asset shall be a loan or an advance where:

(I)   If instalment/interest of principal amount continues "Overdue" for the duration of 90 days or more with reference of the term loan.

(II)   The account remains "Out of Order" for the period of more than 90 days, with respect of an Overdraft/Cash Credit.

(III)   The bill remains overdue for a period of more than 90 days in the case of Bills Purchased and discounted.

(IV)   In the case of agricultural loans, other than direct finance to farmers for agricultural purposes, identification of NPAs would be done on the same basis as Non-Agricultural Advances.

(V)   Any amount to receive remains overdue for a period of more than 90 days in respect of other accounts.

5.2. Methodology

In the current study portion of the bank's profits have been measured for 14 years which banks are compromising due to higher NPA and provision norm. The aim of this study is to know the impact of NPA and provision on bank's revenue and to see how big a challenge is NPA for bank's earnings. To carry out the research, secondary data has been collected from Bank's Annual Reports, Journal of Indian Banking Association and Report on Trend and Progress of Banking in India and Statistical Tables Relating to Banks in India as published by RBI for the year (2001-14). The data has been collected for different parameters agitating the bank's revenue and has been divided into dependent and independent variables as given in table 5.1. In this phase of the study, return and loans have been taken as the dependent or the variable whereas gross NPA, Net NPA, Provision Coverage ratio have been taken as the independent or the predictor variables. Figural representation with the help of MS-Excel has been shown that has explained the impact of provision creation by banks on their average profits and which also highlights the growth of gross loans, gross NPA, and average provision for the period of 2001-2014.

Table 5.1: Description of Dependent and Independent Variables

Factor	Variable	Description
Non-performing assets	Gross NPA ratio	Gross NPA/Gross Advances
	Net NPA ratio	Net NPA/Net Advances
	Provision Coverage Ratio	Total Provision/Gross NPA
Loans		Total advances made by banks in years

(Source: Author's Compilation)

5.3. Data Analysis and Results

Figure 5.1 shows the average impact of provision creation on bank's profitability for 14 years and the absence of which would have increased bank's profitability. The study shows that among SBI group, State Bank of Travancore and State Bank of Patiala were losing very less portion of its profit at cost of provision creation whereas State Bank of Hyderabad was foregoing an astonishing 311% of its profits at cost of provisioning. We have to understand

that this high provisioning requirement is the direct result of the high NPA levels in this bank and the sheer magnitude of the provisioning is not only eroding the business capability of this bank but also eroding its profitability. This is a clear example of why high NPAs is such a big issue hitting almost all the banks in the industry.
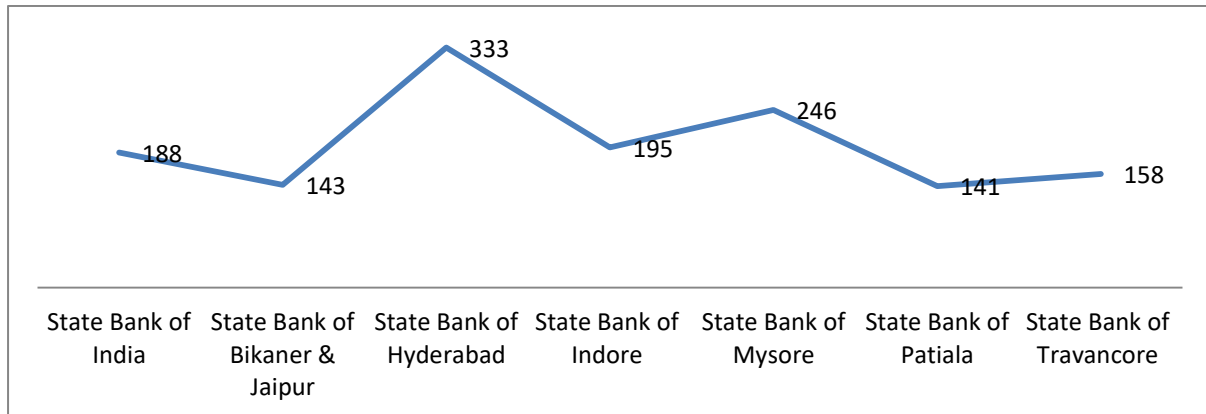
(Source: Author's Calculation)

Figure 5.1: Average Impact of NPA provision on Profits-SBI & Associates
(In Rs. lakhs)

Figure 5.2 reveals that among public banks Punjab & Sind Bank was forgoing the highest portion of its profits at the cost of provision creation whereas Canara Bank was forgoing, comparatively, a very less amount of profit for the creation of provision. Data shows that NPA is a big issue for the bank's revenue and NPA issue is higher for public banks as compared to private and foreign banks.

	Allahabad Bank	Andhra Bank	Bank of Baroda	Bank of India	Canara Bank	Central Bank of India	Corporation Bank	IDBI Bank Ltd.	Oriental Bank of Commerce	Punjab & Sind Bank	Punjab National Bank	UCO Bank	Vijaya Bank	Union Bank of India
Series1	343	128	251	205	85	541	97	237	165	1976	217	331	149	202
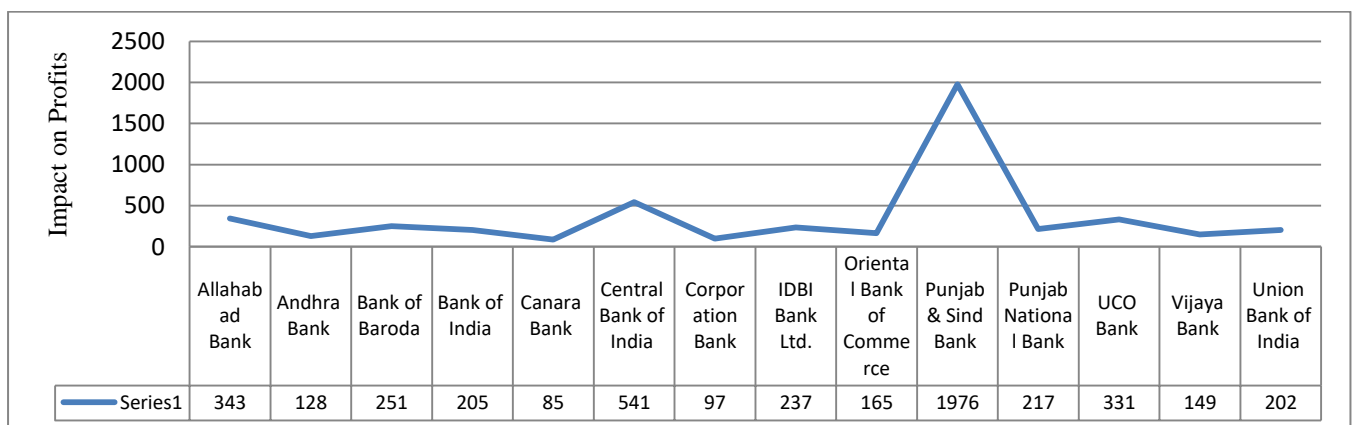
(Source: Author's Calculation)

Figure: 5.2: Average Impact of NPA Provision on Profits of Public Banks
(In Rs. lakhs)

Figure 5.3 show, Development Credit Bank was forgoing a huge portion of its profit at the cost of its provision to be created every year whereas the profits of Yes Bank and HDFC Bank were, comparatively, getting less impacted by its provision creations. This Data also reveals that though NPA is a major issue for every bank, probably it is a much bigger issue for the Public Sector banks when compared with their Private Sector counterparts.

	City Union Bank	DhanLaxmi Bank	ING Vyasya Bank	J&K Bank	Nainital Bank	Ratnakar Bank	South Indian Bank	Axis Bank	Development credit Bank	HDFC Bank	Kotak Mahindra Bank	ICICI Bank	IndusInd Bank	Yes Bank
Series1	125	546	41	84	103	555	280	57	1017	58	54	277	108	8
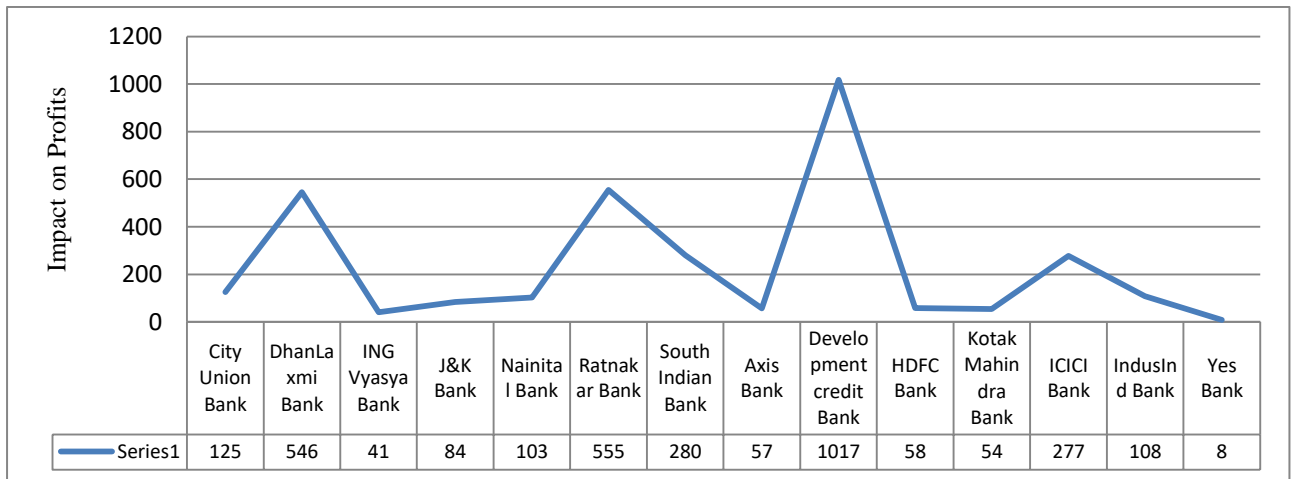
(Source: Author's Calculation)

Figure 5.3: Average Impact of NPA provision on Profits of Private Banks
(In Rs. lakhs)

Figure 5.4 reveals that among foreign banks, Bank of Ceylon was forgoing the highest amount of its profits at the cost of provision creation norm, whereas Royal Bank of Scotland bank was forgoing a very small amount of its profits in the creation of provision. Data shows NPA such a big issue for the bank's revenue but in comparison with private and public banks, it is quite less

	Bank of America	Bank of Ceylon	Barclays Bank	Citibank	Deutsche Bank	Royal bank of Scotland	Standard Chartered Bank
Series1	29	3554	17	23	31	110	99
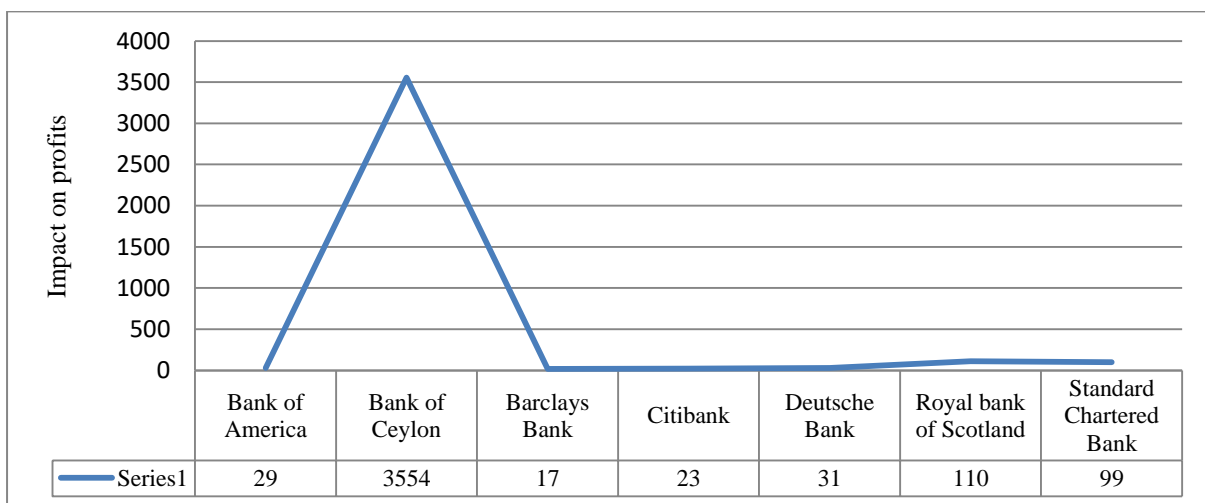
(Source: Author's Calculation)

Figure 5.4: Average Impact of NPA provision on Profits of Foreign Banks
(In Rs.lakhs)

It was found in the study that State Bank of Hyderabad and State Bank of Mysore in SBI group were forgoing a huge portion of their profits in comparison to private and foreign banks. In this study, an average of provisions and profits have been calculated for 14 years It was found that public banks, involving the SBI group, were forgoing the huge amount of their profit at the cost of provision creation negatively impacting their profitability. From the previous study, it was concluded that NPA and poor management efficiency was a big challenge for banks, especially for public banks, whilst current study data also revealed that impact of NPA on bank's profitability cannot be ignored especially for public banks. NPA's impact is much higher and much more significant on public bank's financials as compared to other sectors banks and thus these public sector banks need more focus and refinement in their business practices to control these hard-hitting NPAs.

Figure 5.5 shows that among SBI group, SBI Bank scored highest gross NPA (Rs. 1180583 crores) against their gross loan (Rs. 3339841 crores) with an average provision for SBI to (Rs. 654099 crores) in the last 14 years. Higher NPAs compared to NPA provision is a brutal scenario for any bank leaving them no option but to increase their NPA provisioning. The data also reveals that the bank having the highest loan is also having the highest provision and NPA expressing positive relationships with these three variables, which is logically consistent with the business of banking.
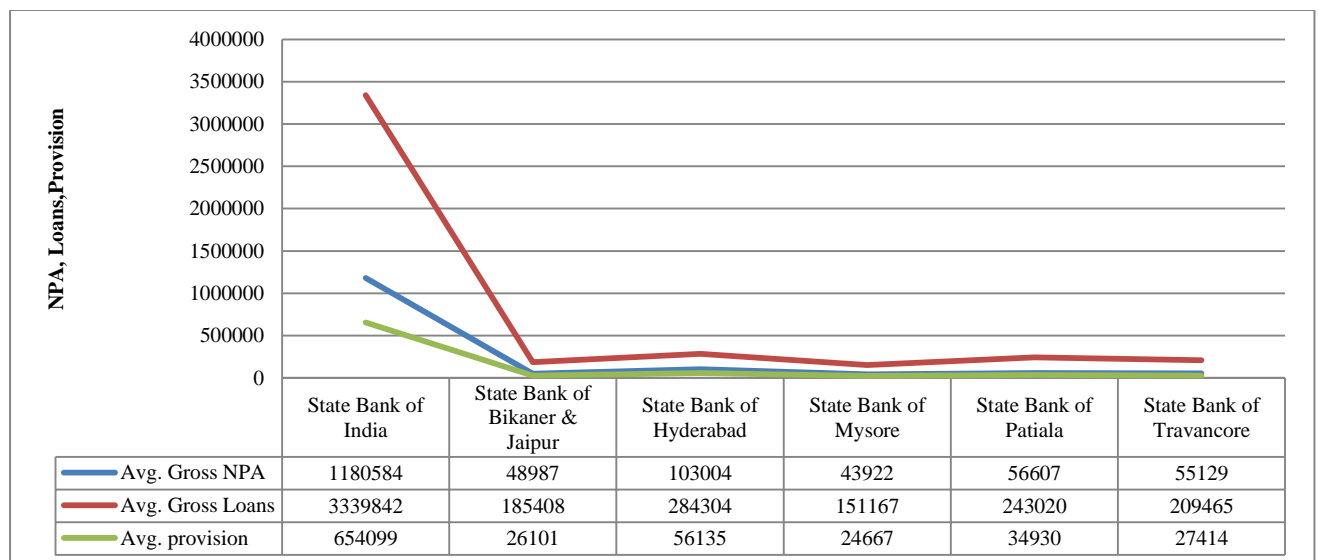
	State Bank of India	State Bank of Bikaner & Jaipur	State Bank of Hyderabad	State Bank of Mysore	State Bank of Patiala	State Bank of Travancore
Avg. Gross NPA	1180584	48987	103004	43922	56607	55129
Avg. Gross Loans	3339842	185408	284304	151167	243020	209465
Avg. provision	654099	26101	56135	24667	34930	27414

(Source: Author's Calculation)

Figure 5.6 shows that among public banks, PNB scored highest gross NPA (Rs. 323793 crores), against their gross loan (Rs. 1027672 crores), and with an average provision (Rs. 215406 crores). This just confirms our previous finding that the bank having the highest loan is also having highest provision and NPA expressing positive relationship within these three variables.

	Allaha bad Bank	Andhra Bank	Bank of Baroda	Bank of India	Canara Bank	Central Bank of India	Corpor ation Bank	IDBI Bank Ltd.	Orienta l Bank of Comm erce	Punjab & Sind Bank	Punjab Nation al Bank	UCO Bank	Vijaya Bank	Union Bank of India
Avg. Gross NPA	122368	48757	261815	264855	185173	235576	54526	127858	119649	63111	323794	136371	50940	164200
Avg. Gross Loans	402195	305722	1001959	922796	866876	554692	360505	666589	424617	169813	1027672	429873	220473	645987
Avg. provision	66654	32373	173230	136031	79250	132503	33392	59197	82846	30278	215406	59556	28447	79968

(Source: Author's Calculation)

Figure 5.6: Trend of Gross NPA/Gross Loans/Provision for 14 years
(In Rs. crores) Public Banks

Figure 5.7 shows that among private banks, HDFC scored highest gross NPA (Rs. 60755 crores), against their gross loan (Rs. 700474 crores), with an average provision (Rs. 25024 crores). This again confirms our previous finding that the bank having the highest loan is also having highest provision and NPA expressing positive relationships within these three variables.

	City Union Bank	Dhanala kshmi Bank	ING Vysya Bank	Jammu & Kashmir Bank	Nainital Bank	Ratnaka r Bank	South Indian Bank	UTI Bank	Develop ment Credit Bank	HDFC Bank	Kotak Mahindr a Bank	ICICI Bank	IndusIn d Bank
Avg. Gross NPA	9758	9157	15961	30506	1185	2883	23654	44939	17813	60756	21770	406449	24560
Avg. Gross Loans	42282	29009	104708	125856	7082	18182	92809	592222	20553	700474	131810	1035051	123261
Avg. provision	4589	3928	3146	20151	1049	1636	12490	28213	15268	47563	25024	271067	8020
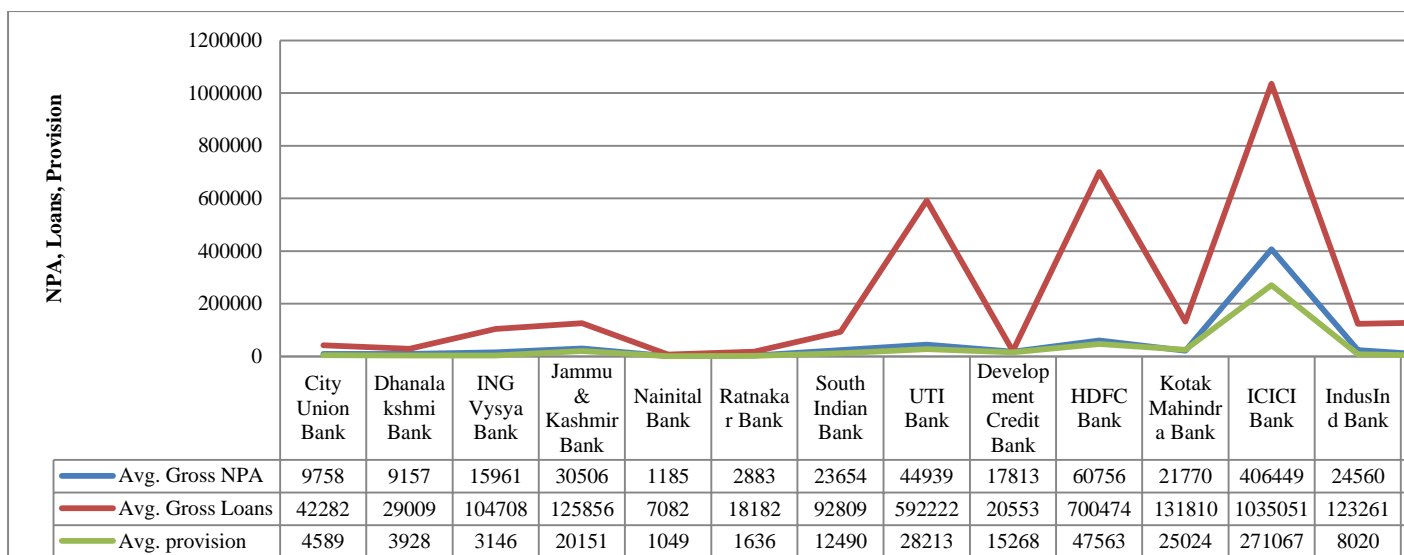
(Source: Author's Calculation)

Figure 5.7: Trend of Gross NPA/Gross Loans/Provision for 14 years
(In Rs.crores) Private Banks

Figure 5.8 shows that among foreign banks, Standard Chartered Bank scored highest gross NPA (Rs. 60812 crores), against their gross loan (Rs. 216949 crores), with an average provision (Rs. 42538 crores). That also reveals that the bank having the highest loan is also having the highest provision and NPA expressing positive relationships within these three variables.

	Bank of America	Bank of Ceylon	Barclays Bank	Citibank	Deutsche Bank	Royal bank of Scotland	Standard Chartered Bank
Avg. Gross NPA	2189	1930	15893	45922	6665	17211	60812
Avg. Gross Loans	24083	314	36949	193015	61166	82106	216949
Avg. provision	1367	944	16733	23777	5474	12558	42539
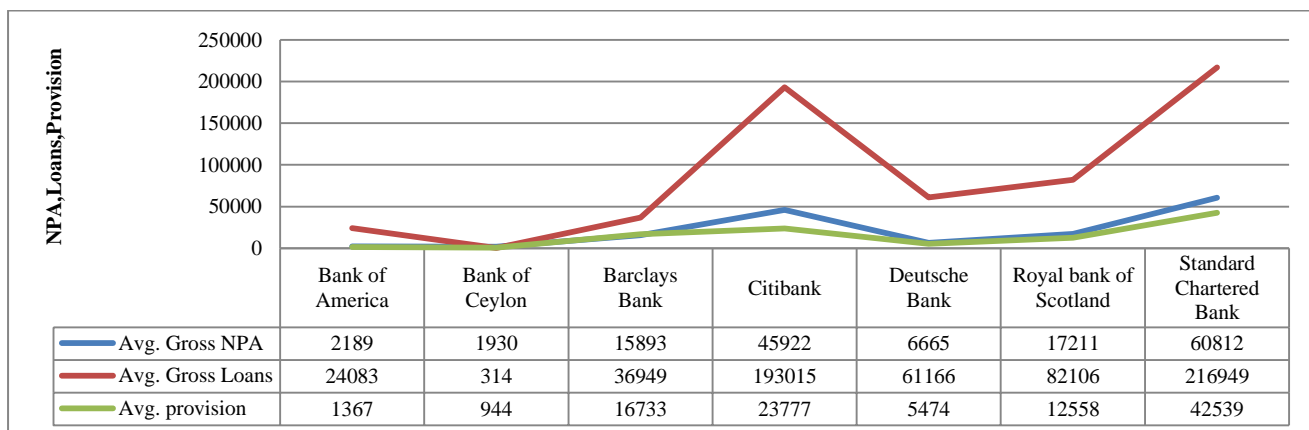
(Source: Author's Calculation)

Figure 5.8: Trend of Gross NPA/Gross Loans/Provision for 14 years
(In Rs.crores**)** Foreign Banks

Figure 5.5-5.8 shows growth of different variables like average gross loans, average gross advances, and average provision. It was found in the Figure that among all banking sectors SBI group had the highest NPA, loans, and provision. As per the provisioning rules, every

bank has to maintain adequate provision ratio against NPA and thus, higher NPA leads to higher provision ratio. The provision ratio is; total provision held for NPA to gross NPA by the banks, which specifies safety degree methods embraced by the banks in India for their bad loans.

5.3.1. Correlation Study

Correlation techniques show the strength and association between the different set of variables. The correlation table shows correlation coefficients ranging in value from –1 (a perfect negative relationship) and +1 (a perfect positive relationship), 0 indicates no linear relationship.

Table 5.2: Correlations between Gross NPA/Gross Loan/Gross Provision

		Average Gross NPA	Average Gross Loan	Average Gross Provision
Average Gross NPA	Pearson Correlation	1	.972[**]	.994[**]
	Sig. (2-tailed)		.000	.000
	N	41	41	41
Average Gross Loan	Pearson Correlation	.972[**]	1	.964[**]
	Sig. (2-tailed)	.000		.000
	N	41	41	41
Average Gross Provision	Pearson Correlation	.994[**]	.964[**]	1
	Sig. (2-tailed)	.000	.000	
	N	41	41	41

[**]. Correlation is significant at the 0.01 level (2-tailed).

(Source: Author's Calculation)

In table 5.2, the correlation study devised for the bank shows the degree of association among three important variables i.e. average gross loans, average gross NPA and average gross provision. It shows the statistical relationship between two sets of data that reveals that gross NPA has a very strong association with gross provision (.994) and gross loans have very significant relation with gross NPA (.972) whereas gross provision has a significant correlation of (.994) with gross NPA. By moving one variable (gross loan) in a specified direction other variables also move in the same direction.

5.3.2. <u>Reliability</u>

Cronbach's is considered a very useful and effective measure when it comes to talking about internal consistency (reliability). In the case of multiple variables in the study, Cronbach is proved good to form a scale. Reliability test has been done in this study to check whether variables used are reliable for the study or not. Reliability score higher than 0.70 is considered reliable.

Table 5.3: Case Processing Summary

		N	%
Cases	Valid	41	100.0
	Excluded[a]	0	.0
	Total	41	100.0

List wise deletion based on all variables in the procedure.

(Source: Author's Calculation)

Table 5.4: Reliability Statistics

Cronbach's Alpha	N of Items
.761	3

(Reliability coefficient of .70 or higher "acceptable)

(Source: Author's Calculation)

Cronbach's Alpha is the most common measure of internal consistency ("reliability"). It is most commonly used when you have multiple variables in a study and you wish to determine if the variables are reliable for the study or not. We can see that Cronbach's Alpha is 0.761, which indicates a high level of internal consistency for our variables with the study.

In Figure 5.9, gross loans have been taken as independent variables whereas gross provision is taken as dependent one and reveal that gross provision is very strongly associated with gross loans which show a number of loan increases for any bank, the amount of provision will also rise.
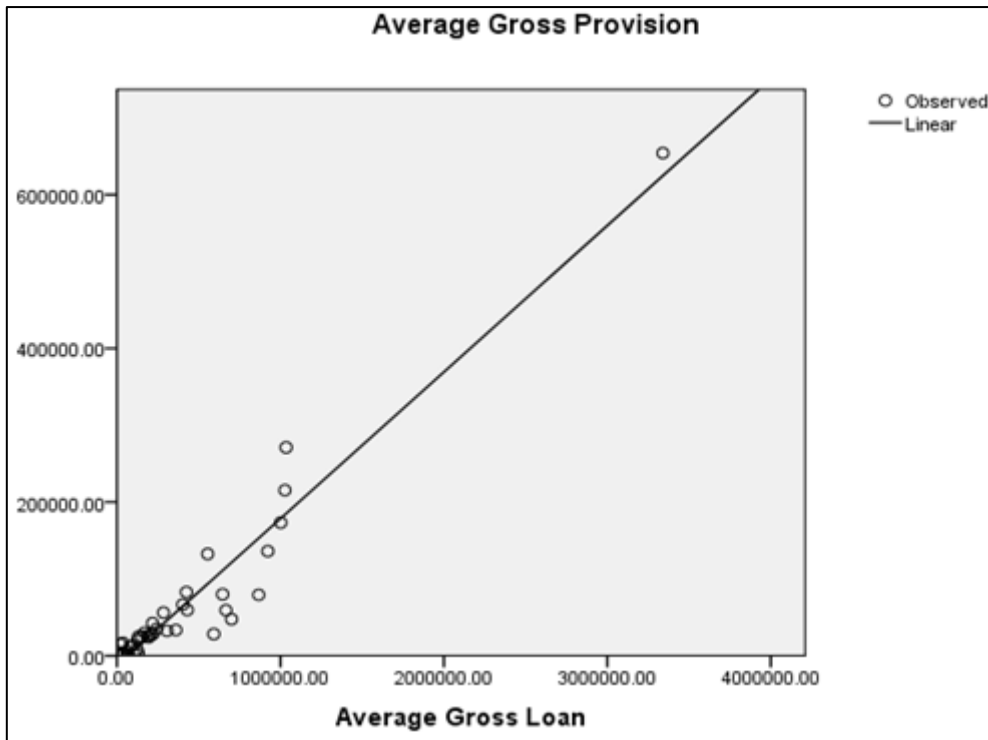
(Source: Author's Calculation)

Figure 5.9: Loan/ Provision Relationship

In the Figure 5.10, Gross Loans has been taken as an independent variable whereas Gross NPA is taken as a dependent variable. The graph clearly depicts a linear relationship between the two variables and it could be surmised as, 'NPA increases/decreases with an increase/decrease of loans disbursed by the bank.
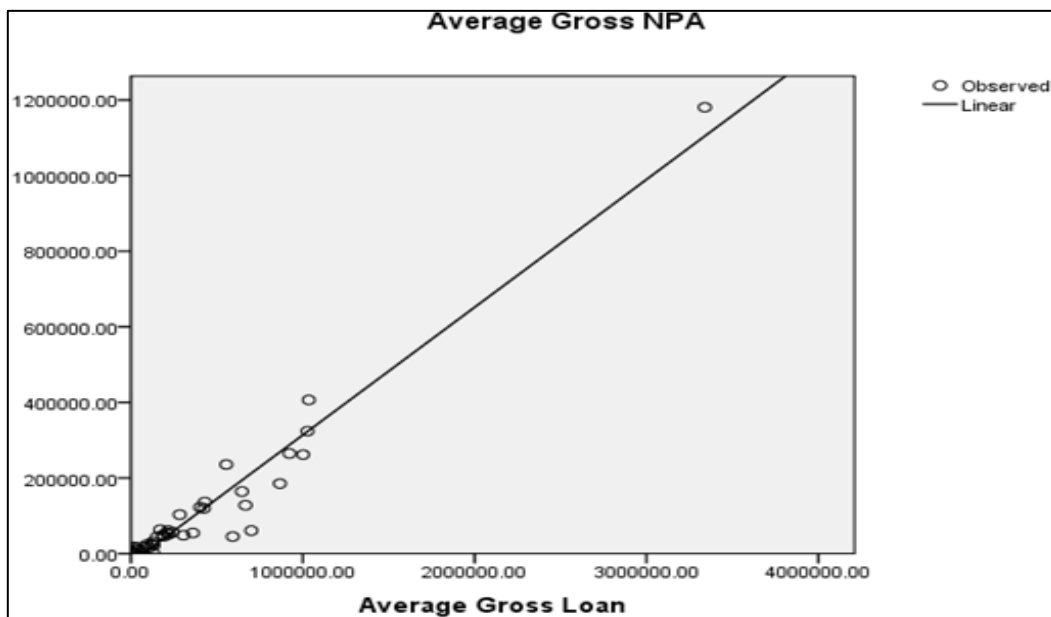
(Source: Author's Calculation)

Figure: 5.10: NPA/ Loan Relation

5.4. <u>Discussions</u>

Current research shows the influence of Non-Performing Assets of banks, which eat away a bank's profitability due to the provisional norms in place. NPA negatively hits the profitability of banks which in turn impedes the required impetus for a healthy growth of the Indian economy. Public banks were sacrificing a huge portion of their profits at the cost of provision creation as compared to private and foreign banks. It affects the bank's profitability and as we discussed, is creating more problems for public banks compared to private banks which requires a serious deliberation on the part of public sector banks necessitating taking serious steps like preventive management and curative management for the recovery of Non-Performing Assets and further refinement in their loan recovery management. It was found in the research that public sector banks were sacrificing a huge portion of their profits against their NPA provisioning and this frivolous bleeding may halt the staggering growth the Indian economy has witnessed in the last decade or so.

A strong correlation was also found between gross NPA, gross advance and NPA provision creation that clearly states that rise in NPA dictates commensurate rise in provisions leading to deteriorating profits.

In the previous chapter, NPA was found as the biggest challenge for banks, especially for public banks whilst the data analysis in this chapter further revealed that impact of NPA on provision and bank's profitability is more for public banks as compared to other banks in the industry. These revelations point to some lackadaisical attitude in the loan management of the banks which is crippling their ability to generate higher profits.

CHAPTER 6

BANK FAILURE PREDICTION USING FINANCIAL RATIOS / CAMEL

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6.1. Introduction

The previous chapter explained the impact of NPA provision creation on bank's profitability in which it was found that NPA provisions were eroding a major portion of banks' profits making their balance sheet bear the strain. We found in the study that public banks were getting much more affected through NPA provision creation on their profitability which shows that major portion of banks revenue is getting into NPA which is not only hurting the bank's profitability but in fact reducing their efficiency to recoup such losses. Previous chapters also revealed that besides hitting the profitability and efficiency of the bank, NPA can have a substantial negative impact and can even contribute towards the bankruptcy of the bank. In last few years RBI has taken few major decisions to shut down some bank businesses and required some banks to be merged with other banks for their survival; taking this picture further, attempt has been made to explore that can banks failure be predicted in advance using its financials or can any sign from bank financials be picked up to see its probable failure stage, that could actually be a helpful for organization to take corrective actions in advance and to stabilize its performance on time.

The banking industry is widely using the CAMEL rating system for many years to analyse the performance of banks. In the current study, the financial ratio has been used to predict failure of the bank using data from 2005-2016. The study is divided into two parts, in first part CAMEL ratio is utilized to analyse the banking performance whereas in second part these ratios have been used to predict bank failure using discriminant analysis and logistic regression. The study revealed that it is possible to predict bank failure using multi-variant discriminant analysis with the help of financial ratios.

The last few decades were noticeable in the financial industry esp. in the midst of banking and financial which have necessitated severe regulatory norms thus increasing the bank's

operating cost and reducing its efficiency. In fact, many developing countries and developed countries as well have faced insolvency, extreme losses, and disturbance in cash flow that has even led to the contraction of many banks and closure of many of their branches. Today, most countries are affected by banking inefficiency and downfall of the revenue due to the 2008 crisis and could not find any solution to come out of it yet. Furthermore, the impact of the 2008 crisis needs to be given greater attention because of its long-lasting effect on banking performance. Failure in adopting Basel Norms effectively along with implementing necessary rules and regulations are major reasons for bank failure and downfall in revenue, Ayyoup [17]. Banks must do their operations according to the guidance of banking rulebook given by the Central Bank.

Generally, banking activities are supervised by using two approaches named on-site and off-site supervision approach. The first approach includes supervisory staff evaluating the qualitative components defining efficiency and performance of banks such as administrative mechanism defiance with commandment and practice, with the support of composed evidence through CAMEL rating system, whereas offsite supervision includes evaluation of cash flow and material on the financial standing of the banks. This study has applied Regression, Multivariate Discriminant analysis to predict failure of Indian banks. The bankruptcy of any bank creates suffering in productivity, and due to the negligence of vigilance staff takes losses to the higher level that cannot compensate even by using any predictive tool, Kupiec, Ramirez [7].

Present chapter has examined the bankruptcy model which will help small or big banks come out of sinking sail of financial depression. The empirical result shows that even large banks are more likely to fail in these crises because of having the big spread of their financials and low capital and reserve ratios. Their deposits and liquidity per se are dependent on broken portfolios that raise the level of their Non-Performing Assets from each and every portfolio, relatively, Mester [18]. A huge percentage of Non-Performing Assets is due to bank's ineffectiveness, their poor credit evaluation, and negligent loans monitoring process. It was also observed in the literature that those banks that grew prior to the period of financial distress went through operation failure as compared to established banks West [42] introduce a novel approach as an early warning system for the banking sector and discovered logit estimation and factor analysis as a favorite technique of weighing banks performance and its stability, Espahbodi [26] improves and tests discriminant and logit models in detecting the

probable failure among banks. His study also calculated and compared the failure parameters and reason of failed and non-failed banks, Lu & Whidbee [13] discussed that insolvency of the bank has the number of side effects that cannot be cured in the short term. Due to these stakeholders including depositors, individual and institutions have to lose their deposits at the cost of failure and inefficiency of banks. Moreover, escalation of bank failure and insolvency effects on the overall health of economy and nation's wealth too. Therefore RBI has given the strict regulations and instructions for the banking industry to identify those factors that may contribute to the insolvency of banks so that banks can take corrective action to eradicate the failure risk. In a few cases, ratios are proposed as bottom level of acceptance, whereas in other cases, ratios are considered at the suitable level of capital for the bank. This differentiation between two different levels is discussed in depth Estrella [50]. Other current researchers have prolonged this study to numerous emerging countries, Leightner & Lovell [56]. Most important part of the literature is dedicated to inspecting the banks efficiency using cross-country sample.

A lot of research has been done to measure the efficiency of banks on different parameters including NPA, Profits, CAR, and Equity Return. Many of the researchers have discussed the impact of bankruptcy and bank failure that explained that bank failure has the very bad impact of the nation's wealth. Some work has also been done to predict the bank working capability and utilization of resources; however, there appears to be not much research on predicting factors that can help in forecasting bank defaults and failure rate. No work has given any remedial tool to prevent this stage that what we have incorporated in our study by validating RBI decision of mergers and winding up that will help bankers and mangers to identify the failure stage of the bank in advance in order to take corrective actions timely.

6.2. <u>Methodology</u>

Current study focus on predicting bank failure using CAMEL ratios and discriminant analysis and this test has been validated on the merger and winding up decision taken by RBI for banks in India. Performance of banks in India is getting poor due to higher NPA which may cause for bank failure in future, therefore the study has focussed in this area which will help bankers, managers in prediction their bankruptcy stage by themselves using their financials.

6.2.1. Data Collection

This study incorporates a sample of 24 commercial banks. Data has been collected for a period of eleven years (2005-16) from RBI website while financial statements information is gathered from the database of Moneycontrol.com. CAMEL and DEA have already been discussed in chapter 3 and 4 but to remind the concept, it has been discussed again in the current chapter. Reason for choosing a particular set of banks in this study is based on previous studies of this research that have proven these banks as an efficient and good performer in their respective sector.

6.2.2. Tools and Techniques

a). CAMEL

CAMEL is a ratio based model which is used to study the performance and efficiency of banks. This model focuses on the criteria like Capital Adequacy, Asset Quality, Management Efficiency, Earning Ratio and Liquidity Ratio. We have tried to analyses each of these criteria with the help of different ratios which has been captured in the following tables.

Capital Adequacy Ratio: To study the capital adequacy, top officials at most of the banks rely on capital- risk asset ratio. In our study, we have focused on a few ratios to capture the significance of these criteria of the CAMEL model. In table 6.1, the capital adequacy is examined by using two very important measures, namely, capital to risk-weighted assets or capital adequacy ratio and the ratio of capital with a comparison to assets.

Table 6.1: Capital Ratio Analysis

Ratios	Formula	Criteria
CAR	$CAR = \dfrac{\text{Tier one Capital} + \text{Tier Two Capital}}{\text{Risk Weighted Assets}}$	$\geq 8\%$

(Source: Credit Analysis of Financial Institution)

Capital Adequacy Ratio: As you can see in from the table, the CAR is the minimum capital required for the bank to project a stable functioning. The minimum capital, as provided by regulators, varies from country to country. For e.g., even when CAR as per BASEL II is 8%, Reserve Bank of India requires a minimum CAR of 9%

Table 6.2: Capital Adequacy Ratio Scale

Assigned Scale	Scale 1 (Well Capitalized)	Scale 2 (Adequately Capitalized)	Scale 3 (Significantly Capitalized)	Scale 4 (Under Capitalized)	Scale 5 (Critically undercapitalized)
Range	Between CAR 12% +	Between CAR 12%-9%	Between CAR 9%-6%	Between CAR 6%-3%	Less Than CAR 3%

(Source: Credit Analysis of Financial Institution)

Table 6.2 provides a scaling system for CAR to identify whether a bank is in a strong or a weak financial position on the basis of CAR. As per the rating scale used here, a rating of 1 reflects sufficient capital in a bank when compared to its risk level whilst a rating of 5 indicates deficient capital in the FI compared to its risk.

Table 6.3: Asset Quality Ratio Scale

Ratios	Formula	Criteria
Net NPA Ratio	$\dfrac{\text{Net NPA}}{\text{Total Advance}}$	$\leq 1\%$

(Source: Credit Analysis of Financial Institution)

Asset Quality: Asset quality needs to be understood as the quality of the bank's loan book. It is imperative that the main business of bank is to lend but lend to whom is very important and this is governed by the lending policies of each bank. A poor lending policy leads to deteriorating loan book and increasing NPA which puts a pressure on the short-term funding of the bank. This may even lead to the liquidity crunch in the bank or even an outright 'Bank Run'.

Table 6.4: Non-Performing Asset Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
Avg Net NPA	$\leq 1\%$	$\geq 1\% \leq 4\%$	$\geq 4\% \leq 7\%$	$\geq 7\% \leq 10\%$	$\geq 10\%$

(Source: Credit Analysis of Financial Institution)

As discussed in table 6.4 Asset Quality is scaled from 1 to 5. Where a rating of 1 indicates a strong asset quality and minimal portfolio risks; rating of 5 reflects poor and deficient asset quality for any bank which may foretell an imminent threat to bank's performance.

Table 6.5: Business per Employee Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
Business per Employee	$\geq$ 4 Crore	$\leq$ 4 Crore $\geq$ 3 Crore	$\leq$ 3 Crore $\geq$ 2 Crore	$\leq$ 2 Crore $\geq$ 1 Crore	$\leq$ 1 Crore

(Source: Credit Analysis of Financial Institution)

Management Efficiency: Management is considered one of the crucial element in the success of any organization. However, it is quite subjective to judge the performance of a management or to directly provide a rating to it in order to determine whether in future it would be a taking concrete profitable decisions for the bank or not. But a closer look reveals that management's decisions have an impact either directly or indirectly on: asset quality, asset growth, earnings levels and funding strategies. In the CAMEL rating system, each of the components is scaled from 1 to 5. In the context of management, the rating of 5 reflects a critically deficient management but a rating of 1 is depicts a strong management within a bank.

Table 6.6: Earning Ratio

Ratio	Formula	Criteria
Return on Asset	$\dfrac{\text{Net Interest Income}}{\text{Assets Growth Rate}}$	$\geq$ 1%

(Source: Credit Analysis of Financial Institution)

Earnings Ratio: A consistently profitable company not only becomes financially strong to wither the losses which may accrue in the future but also builds goodwill for itself in public. Profits help banks in improvising on its capital structure besides increasing the wealth for its shareholders. Thus, consistent healthy earnings are vital for the sustainability of banking institutions. Profitability ratios measure the ability of a company to generate profits from assets and revenue.

Table 6.7: Return on Asset Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
ROA	$\geq$ 1.5 %	$\leq$ 1.5 % $\geq$ 1.0 %	$\leq$ 1.0 % $\geq$ 0.5 %	$\leq$ 0.5 % $\geq$ 0.25 %	$\leq$ 0.25%

(Source: Credit Analysis of Financial Institution)

Table 6.7 shows the rating 1 reflects strong earnings that are adequate to maintain loan allowance with sufficient capital and support operations. On the flip side, a rating of 5 reflects regular losses and represents a risk to the firm's solvency through the loss of capital.

Table 6.8: Liquidity Ratio

Ratio	Formula	Criteria
Credit Deposit Ratio	$\dfrac{\text{Total Credit}}{\text{Total Deposits}}$	$\leq 80\%$

(Source: Credit Analysis of Financial Institution)

Liquidity: Liquidity in bank's management is required for two major reasons: first, to fulfil a demand for fresh loans without recalling present loan or realize term investments such as bond holdings and second to match both daily and seasonal variations in deposits so that withdrawals can be met in a timely and orderly manner. The business of banking involves raising funds/deposits at the lower interest rate and lending these in terms of retail/corporate loans at a higher interest rate, making the spread in the meantime. But this business of lending and borrowing creates an Asset-Liability mismatch in a bank which, if not controlled properly, can result is a severe liquidity crisis within the bank.

Table 6.9: Credit Deposit Ratio Scale

Assigned Scale	Scale 1 (Very Good)	Scale 2 (Satisfactory)	Scale 3 (Fair)	Scale 4 (Marginal)	Scale 5 (Worst)
Credit Deposit Ratio	$\leq 50\%$	$\geq 50\% \leq 55\%$	$\geq 55\% \leq 60\%$	$\geq 60\% \leq 65\%$	$\geq 65\%$

(Source: Credit Analysis of Financial Institution)

In Table 6.9 a rating 1 represents strong level of liquidity as the bank has access to adequate sources of funds to meet present and predict liquidity needs. On the flip side, the rating of 5 signifies critical liquidity-issues, and to meet liquidity needs, the institution demands immediate external assistance.

Table 6.10: The CAMEL's Composite Rating

Rating Scale	Rating Range	Rating Analysis	Exposure Limits	Rating Interpretation
1	1.0-1.4	Outstanding	1st Limit	The bank performs in good and efficient manner in every way.
2	1.6-2.4	Superior	2nd Limit	Evidently healthier than the average bank performance, but not fairly outstanding in every respects
3	2.6-3.4	Average	3rd Limit	A well-run, banking institute that only fulfil all of the important criteria.
4	3.6-4.4	Under-perform	NR	The bank reveals a foremost issues that if not corrected, could lead to as very severe or disappointing condition that will hover its survival. This would also involve key financial and or

				supervisory disclosures
5	4.6-5.0	Doubtful	NR	The bank's financial condition is poor along with asset quality ruining over half of the bank's prime resources. If not improved further worsening will lead to supervisory control and a high possibility of failure.

(Source: Credit Analysis of Financial Institution)

The computation will be in such a way that after calculating the rating of each component (CAMEL), the rating is being combined and an average of the sum then calculated. Rating from 1.0-1.4 comes under the outstanding category which indicates that bank is able to perform all of its functions fully with the future protection of solvency. Whereas rating range 4.6- 5.0 comes under doubtful performance that indicates that bank's financial health is in danger and it is on the way of bankruptcy expressing the high probability of bank failure. So it is not at all recommended for the bank to reach this rating scale. The bank that comes underrating scale of 4 or 5 should not be even considered by investors as a viable investment option.

Thus the purpose of the study is to observe banks different level of efficiency with the help of CAMEL and build a model that can predict bank failure which will be an early warning system for the bank itself and for anyone exposed to it.

b). Multivariate Discriminant Analysis

Multivariate Discriminant Analysis also is known as (MDA) is a very influential and descriptive technique developed by Fisher in 1936 to define components that are specific to different groups called Descriptive Discriminant Analysis and categorizing different cases into pre-existed groups based on connections between different cases belong to the groups called predictive discriminant analysis.

The linear equation involving regression helps in predicting the case belongings to a group. The form of the equation or function is:

$$D = v1X1 + v2 X2 + v3 X3 + \cdots \ldots \ldots \ldots \ldots \ldots \ldots + vi Xi + a$$

Where

D= Discriminant Function

v = Discriminant coefficient or weight for that variable

X= Variable Score (Independent)

a = Constant

i = number of predictive variables

MDA is applied on 13 banks which are merged with different banks from the year 2005 to 2016. As those merged banks are considered as the banks which are not performing well and are financially unstable banks but still have scope to improve if associated with another bank. Here 2 groups are created; the first group is '1' - which is considered a group of below average banks (merged bank) or financially troubled banks. Another group is '2' - which is a group of financially unstable banks. RBI is thinking to wind up these banks in the year 2017. Here 13 banks are used in this bankruptcy model.

Table 6.11: Bank Group for the Study

Group 1	Group 2
Below Average(Merged)	**About to Fail**
State Bank of Hyderabad	UCO Bank
State Bank of Mysore	Indian Overseas Bank
State Bank of Patiala	Central Bank of India
State Bank of Travancore	Dena Bank
INGVyasya	Bank of Maharashtra
Bank of Rajasthan	
Centurion Bank	
Bharat Overseas Bank	
IDBI Ltd.	

(Source: Author's Configuration)

Bankruptcy Score Evaluation

Z' > 2.9 -"Safe" Zone
 1.23 < Z' < 2. 9 -"Grey" Zone
Z' < 1.23 -"Distress" Zone
_ve -   Enter Bankruptcy Stage

Above is the evaluation score range of bankruptcy which helps in identifying the bankruptcy stage of the bank. Z score > 2.9 shows banks are performing well, a score between 1.23- 2.9 shows the grey area where the bank is probably not doing well but it is not easy to identify bank's failure stage. Whereas score < 1.23 put bank's performance in questionable stage and the negative score shows that the bank has entered in bankruptcy stage and there is a possibility to shut down its business in coming years.

6.3. Data Analysis and Results

Table 6.12 depicts the CAMEL ratings of banks from the period of 2005-2016. It is found that under the CAMEL rating system, Axis Bank and Yes Bank were the good performers. Whereas DCB and Dhanlaxmi Bank came under below performer rating and rest of banks came under average performer rating. This is a real hurting picture on display of the Indian Banking Industry where banks reflecting the sorry stage were actually few of the topmost banks in India. This begs a critical question on the efficiency of Indian banking sector.

Now up to here, we have only analysed the performance of Indian banks but these ratios have not given any clue as to which ratios are important that can predict bank failure. For this purpose Discriminant analysis is used to get the same set of ratios which helps in identifying the financially troubled banks.

Table 6.12: Overall Rating of CAMEL Analysis

Banks	C	A	M	E	L	AVG	Rating Scale	Rating Analysis
State Bank of India	1	2	5	3	5	3	3rd	Average
Allahabad Bank	1	2	5	3	5	3	3rd	Average
Andhra Bank	1	2	5	2	5	3	3rd	Average
Bank of Baroda	1	2	4	3	5	3	3rd	Average
Bank of India	2	2	4	3	5	3	3rd	Average
Canara Bank	1	2	4	3	5	3	3rd	Average
Central Bank of India	2	2	5	3	5	3	3rd	Average
Corporation Bank	1	2	4	3	5	3	3rd	Average
IDBI Bank Limited	1	2	3	3	5	3	3rd	Average
Oriental Bank of Commerce	2	2	4	3	5	3	3rd	Average
Punjab and Sind Bank	1	2	5	3	5	3	3rd	Average
Punjab National Bank	1	2	5	3	5	3	3rd	Average
Uco Bank	1	2	5	3	5	3	3rd	Average
Union Bank of India	2	2	5	3	5	3	3rd	Average
Vijaya Bank	1	2	5	3	5	3	3rd	Average
Axis Bank	1	1	4	1	5	2	2nd	Superior
City Union Bank Limited	1	2	5	1	5	3	3rd	Average
DCB Bank Limited	1	2	5	5	5	4	4th	Under Performer
Dhanlaxmi Bank	2	2	5	5	5	4	4th	Under Performer
HDFC Bank	1	1	5	1	5	3	3rd	Average
ICICI Bank	1	2	5	2	5	3	3rd	Average
Indusind Bank	1	2	5	2	5	3	3rd	Average

Kotak Mahindra Bank ltd	1	2	5	1	5	3	3rd	Average
Yes Bank ltd.	1	1	4	1	5	2	2nd	Superior

(Source: Authors Calculation)

MDA is applied on 13 banks which are merged with different banks from the year 2005 to 2016. As those merged banks are considered as the banks which were not performing well and were financially unstable banks but still have scope to improve if associated with another bank. Here 2 groups are created; the first group is '1' - which is considered a group of below average banks (merged bank) or financially troubled banks. Another group is '2' - which is a group of financially unstable banks. RBI was thinking to wind up these banks in the year 2017. Here 13 banks are used in this bankruptcy model.

Table 6.13 reveals that among both groups of banks, 3 ratios out of 5 were negative i.e earning capability, Management Efficiency and capital adequacy ratio and all three ratios plays important role in bank's financial health which was not good for both of the sample group.

Table: 6.13: Classification Function Coefficients

	Group(Banks)	
	Below AVG	About to fail
Liquidity ratio	.612	.539
Earning Capability	-5.248	-8.560
Management Efficiency	-.062	-.027
Capital Adequacy Ratio	3.882	4.486
Asset Quality	2.129	3.739
(Constant)	-44.393	-59.324

(Source: Author's Calculation)

By applying Discriminant analysis we got the ratios that are the very important indicator of bank failure and observance of these ratios are very important for the bank to keep eye on bank failure. Earning efficiency and management efficiency are found critical ratios that can put the bank in financial trouble.

Table: 6.14: Functions at Group Centroids

Group (Banks)	Function 1
Below AVG	1.311
About to fail	-2.360

Unstandardized canonical discriminant functions evaluated at group means
(Source: Author's Calculation)

In table 6.14 Group (Banks) 1 reflects merged banks that have positive mean and group 2 i.e. those bank RBI is thinking of winding up has negative mean which shows that these group of the bank cannot survive now and need to be shut down.

Table 6.15: Discriminant Score with Case wise statistics

	Case Num ber	Actual Group	Highest Group Predicted Group	Highest Group P(D>d | G=g) p	Highest Group P(D>d | G=g) df	Highest Group P(G=g|D=d)	Highest Group Squared Mahalanobis Distance to Centroid	Second Highest Group Group	Second Highest Group P(G=g|D=d)	Second Highest Group Squared Mahalanobis Distance to Centroid	Discriminant Scores Function 1
Original	1	1	1	.747	1	1.000	.104	2	.000	15.960	1.634
	2	1	1	.725	1	.996	.124	2	.004	11.019	.959
	3	1	1	.396	1	.974	.719	2	.026	7.974	.463
	4	1	1	.083	1	.593	3.004	2	.407	3.759	-.422
	5	1	1	.662	1	.994	.191	2	.006	10.467	.875
	6	1	1	.339	1	1.000	.913	2	.000	21.411	2.267
	7	1	1	.742	1	1.000	.108	2	.000	16.005	1.640
	8	1	1	.205	1	1.000	1.605	2	.000	24.390	2.578
	9	1	1	.620	1	1.000	.246	2	.000	17.374	1.808
	10	2	2	.434	1	1.000	.612	1	.000	19.841	-3.143
	11	2	2	.128	1	1.000	2.319	1	.000	26.984	-3.883
	12	2	2	.454	1	.982	.560	1	.018	8.548	-1.612
	13	2	2	.687	1	.995	.162	1	.005	10.689	-1.958
	14	2	2	.248	1	.924	1.333	1	.076	6.336	-1.206

(Source: Author's Calculation)

The discriminant score of the banks has been calculated for the previous year when the decision is taken to merge or shut down the units. Table 6.15 shows a very important result of the study which clearly displays that group 1 discriminant score is positive whereas group 2 score is negative and according to bankruptcy evaluation score group 2 (about to fail) comes under the category of failed bank which has the possibility of going to bankrupt in coming years and RBI has made announcement for these banks to be on an alert in coming few years. Results prove that discriminant analysis can be used as a predictive tool of bank failure. A negative score means banks are going in the direction of closing down and soon it will fail or

go bankrupt. Hence discriminant analysis is successful in predicting bank failure 1 year prior to the merger decision with another bank.

6.4. <u>Discussions</u>

This study concludes that overall rating of banks gives the clear picture of the performance of Indian banking industry. Axis Bank and Yes Bank are top rated, Whereas DCB and Dhanlaxmi Bank came under below performer rating and rest of bank came under average performer rating. The discriminant model worked on 5 such ratios from the set of 35 ratios prescribed by RBI for evaluating the performance of banks in India. Further analysis is done to check whether these ratios are capable to predict bank failure or not. As the analysis is done on the basis of 5 ratios, Discriminant score of banks, 1 year prior to the merger, is negative in case of those banks which have been indicated by RBI to be shut down. MDA is applied to the same set of ratios of the bank to whom RBI has merged with other banks and the results are positive. Hence it can be concluded that MDA model is useful in predicting bank failure 1 year prior to the merger or closing down so, this model will be very helpful for bank's management in identifying at which stage their bank stands and take corrective actions as soon as possible if required.

CHAPTER 7

NON-PERFORMING ASSETS AND SWING TRADING IN CAPITAL MARKET

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7.1. **Introduction**

Till last chapter performance of banks has been discussed and NPA was found the very crucial component in banks performance which banks have to declare quarterly, half yearly and yearly. The rise in NPA impacts shareholder's and investor's return negatively and it also erodes the bank's public image which further can create a problem and lower the bank's credit rating. Literature gave rise to one question that when banks declare their results, how crucial that information can be for equity market players as trading opportunities and according to the current scenario going on in banking industry how shareholder, traders can minimize their loses and can protect their return. In this case, it becomes important to find any remedial measures to hedge against these loss-making scenarios.

Considering the importance of the financial system in attaining the overall economic performance with changes in the regulatory environment and the globalization of financial markets, a great deal of effort has been made to investigate the relation between NPA movement and share price movement along with its application for the short-term trading opportunity.

The study examines the relationship between announcements made by banks and the sudden movement in share price carried due to these announcements.

7.2. **Methodology**

The main effort of the current study is to develop a model or strategy which can protect the interest of shareholders and investors by minimizing their losses in the negative scenario when banks are not performing well. To achieve this objective we created a database spanning ten years (2005 to 2016) and collected the daily share prices of eight banks listed on

the Bombay Stock Exchange (BSE). The linkage between change in NPA and stock price is studied on the basis of correlation studies and panel-data analysis. Though no significant relationship was found through correlation but the result of panel-data analysis clearly shows a negative relationship between the two, which shows the rise in NPA will lead to falling in the share price of the banks.

The result was further utilized to develop a model or strategy named Swing Trading Model. The model works on the basis of correlation result and helps in minimizing the shareholder's and trader's losses in the equity market. The novelty of the present study is that it clearly guides the swing traders as to how to earn benefit because of fluctuations in share price during the announcement of NPA result.

The main objective of this study is two-fold. Firstly, it delves into investigating the relation between NPA movement and its impact on share price movement before and after 2 days of NPA declaration by the bank. Secondly, it tries to refine this knowledge into an objectively defined trading plan for a short-term trader.

The study tries to answer following questions:

1. What is the relation between NPA movement and movement of share price of banks within 2 days of NPA declaration?
2. Can Short term trader use NPA as a catalyst for short-term trading specifically swing trading?
3. Can investor make a good trade by using NPA variable, if using correlation result correctly?

7.2.1. <u>Swing Trading</u>

Swing trading is a trading which is being done for 2 to 4 days mostly but can go for up to few weeks or months. In the current study, the focus is put on analysing share price movement when banks declare their NPA results. These results usually have a huge impact on the stock price of the declaring bank and a system has been created to exploit this market anomaly. In the current study, share prices have been observed 2 days before to days after NPA declaration by the banks. Reason for choosing 2 days before of NPA declaration date is, few people do insider trading by using insider information that reflects on the share price. Though

this may not be conclusively proved a deeper understanding of technical analysis can help in revealing few tenets.

7.2.2. Correlation

Correlation study is used to measure the relationship between changes in NPA compared to the preceding year and change in stock price from 2 days before to 2 days after NPA declared by banks. The study was found helpful for an investor to know whether they can take NPA as a catalyst for swing trading or not.

7.2.3 Panel Data Regression Analysis

To get the more robust result, we have performed a panel data regression, where % change in share price is taken as dependent variable and % change in NPA is taken as an independent variable. Before going for panel data analysis, we have tested the data for pooled regression also. The equations used for all the three cases are as follows:

$$\text{For Regression: } SP = \beta_0 + \beta_1 \, NPA + \varepsilon \quad \dots\dots\dots\dots\dots \quad (Eq.\,1)$$

where SP represent % change in share price before and after two days of declaring NPA result, NPA represent % change in NPA from the last year's result, β_0, β_1 and ε represent constant, the coefficient of % change in NPA and error term respectively.

For Fixed Effect Panel Regression (FEM): FEM is a statistical model which involves parameters of Nom-Random or fixed quantities.

$$SP_{it} = \beta_{1i} + \beta_2 \, NPA_{it} + \varepsilon_{it} \quad \dots\dots\dots\dots. \quad (Eq.\,2)$$

Where, i represent different banks (here i = 1 to 8) and t represent different time period (here t = 1 to 10). The Eq. 2 refers to Fixed Effect because although the intercept differ across individuals (here 8 banks), each individual's intercept does not vary across time, i.e., time invariant.

For Random Effect Panel Regression (REM): In REM many of the parameters to be considered as random variable.

$$SP_{it} = \beta_{1i} + \beta_2 \, NPA_{it} + \varepsilon_{it} \quad \dots\dots\dots\dots. \quad (Eq.\,2)$$
$$\text{Here, } \beta_{1i} = \beta_1 + \delta_i \quad \dots\dots\dots\dots\dots\dots \quad (Eq.\,3)$$

Therefore, from Eq. 2 and 3, we can deduce the equation for random effect as,

$$SP_{it} = \beta_1 + \beta_2 \, NPA_{it} + \varepsilon_{it} + \delta_i \quad \dots\dots\dots\dots. \quad (Eq.\,4)$$

Hence, $SP_{it} = \beta_1 + \beta_2 NPA_{it} + \omega_{it}$ .... (Eq. 5)

Where, $\omega_{it} = \varepsilon_{it} + \delta_i$ .... (Eq. 6)

7.2.4. Variables Used

Table 7.1: Variables Definition

Variable 1. Share Price	% Change In Share Price (Share Price before and after 2 days of declaring results)
Variable 2. Non-Performing Asset	% Change In NPA (% change in NPA from last year)

(Source: Authors' Configuration)

7.3. Data Analysis and Results

The study has calculated the correlation between NPA and share price movement for 10 years. This correlation result will help in taking investment decisions to the investors and traders.

Following assumptions to be considered while making investment decisions:

1. Positive correlation signifies positive trades to be taken, positive trade means when NPA is increasing and share price is also rising.
2. Negative correlation signifies negative trades to be taken, negative trades means when NPA is falling and share price is increasing and vice-versa.

Table 7.2: Movements in Share Price and NPA

Years	SBI		PNB		BOB		Axis Bank		HDFC		ICICI		Kotak Mahindra		IDBI	
	% Δ in NPA	% Δ in Share Price	% Δ in NPA	% Δ in Share Price	% Δ in NPA	% Δ in Share Price	% Δ in NPA	% Δ in Share Price	% Δ in NPA	% Δ in Share Price	% Δ in NPA	% Δ in Share Price	% Δ in NPA	% Δ in Share Price	% Δ in NPA	% Δ in Share Price
2006-07	7	9	245	-9	-3	14	22	2	31	5	89	10	45	-2	28	2
2007-08	41	-2	4	-5	-2	-2	-7	4	47	4	75	-10	27	-3	50	4
2008-09	29	-5	-65	14	-9	10	32	3	110	2	30	3	44	-11	-12	3
2009-10	14	-5	272	3	34	3	28	11	-38	3	-16	4	-9	15	48	11
2010-11	14	-12.1	108	-4	31	-10	-2	5	-24	2	-37	1	-41	9	19	5
2011-12	28	6	118	-7	95	-13	15	-1	19	4	-23	5	12	3	73	-1
2012-13	39	-14.8	62	2	172	3	49	2	33	2	20	0.12	31	0.4	7	2
2013-	-87	7	-86	4	-86	11	-85	-1	-83	1.072	-85	-2	-82	-2	-84	-1

89

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2014-15	13	-5	55	-11	34	6	28	3	9	0.369	90	6	6	-2	22	3
2015-16	-29	-8	132	-2	140	-10	92	-2	47	1.532	107	-10	107	-1	144	-2

(Source: Authors' Calculation)

Table 7.3 shows the movement of Non-Performing Assets and share prices of eight banks explaining the impact of the change in NPA compared to preceding year on share price before two days of NPA declaration to 2 days after it. We focus here on the subtle changes between the two variables, the magnitude of these changes and how it culminates in trading opportunities. In the above table, we can observe some important patterns, for e.g.

a). In case of SBI maximum increase in NPA of 41 % with the decrease in share price of 2% whereas in case of a maximum decrease in NPA (87%) leads to only 7 % increase in share price. This points to the irrelevancy of magnitude of the movement between both variables but provides an insight on the negative correlation between YoY change in NPA and the corresponding stock price.

b). In case of Punjab National Bank maximum increase in NPA (272%) leads to increase in share price with 3% whereas maximum decrease in NPA (86%) leads to 4 % increase in share price which again strengthens our observations in point(a) above. Similarly, we can draw a similar inference from other banking stocks.

c). In case of Bank of Baroda maximum increase in NPA (172%) leads to 3% increase in share price whereas maximum decrease in NPA (86%) leads to 11% increase in share price but again no direct conclusion can be drawn about the magnitude of movement.

d). For Axis bank maximum increase in NPA (92%) leads to only 2 % decrease in share price whereas maximum decrease in NPA (85%) leads to 1 % decrease in Share Price that was again an unexpected result for same.

e). In case of HDFC Bank, we found that maximum increase in NPA (110%) leads to 2 % increase in share price whereas maximum decrease in NPA (83%) leads to only 1% increase in share price that was the quite surprising thing.

f). If we talk about ICICI, the maximum increase in NPA (109%) leads to 10 % decrease in share price that is quite justifiable whereas 85 % decrease in NPA decrease in NPA leads to 2 % decrease in share price that shows NPA does not impact on share price movement.

g). In case of Kotak Mahindra, Mahindra maximum increase in NPA (107%) leads to 1 % decrease in NPA whereas maximum decrease in NPA (82%) leads to 2 % fall in price that was again unexpected result.

h). At last for IDBI Bank maximum increase in NPA (144%) leads to only 2 % decrease in share price whereas maximum decrease in NPA (84%) leads to 1 % decrease in share price that was again showing no impact of NPA on the share price.

In the above table 7.2 it can be seen easily that movement of most of the bank's NPA does not lead to the conclusion that whether changes in NPA influences the share price or not. This may be due to the influence of other factors which have not been considered in correlation studies. However, we may expect a negative relationship between the changes in share price with respect change in NPA.

Table 7.3: Regression result between % Δ in Share Price Vs. % Δ in NPA

Test	Intercept		Coefficient of NPA		F – statistics	
	Value	Prob	Value	Prob	Value	Prob
Pooled OLS	1.5561**	0.0422	-0.0286***	0.0064	7.8525***	0.0064
Fixed Effect Model (FEM)	1.5988**	0.0388	-0.0300***	0.0070	1.9098*	0.0718
Random Effect Model (REM)	1.5626*	0.0590	-0.0288***	0.0064	7.9461***	0.0061

(Source: Authors' Calculations). ***, ** and * represent significant at 1%, 5% and 10% respectively.

As shown in Table 7.3 all the model regression, FEM, and REM, shows a negative relationship between % changes in share price with % change in NPA, as expected. Here, as compared to pooled regression, our reliance is more on fixed-effect or random-effect model. According to the given condition, we expect that the random-effect model should be more reliable because according to the economic theory, NPA should have a negative impact on share price irrespective of the banks. Therefore, we are expecting that the error term and repressor's (% change in NPA) are uncorrelated. But, as shown in Table 7.3, both fixed-effect and random-effect model are significant. However, the F-statistics of REM is significant at

1%, therefore, we can rely more on REM. But we need to ascertain it which one is suitable in this case; hence, we'll run Hausman Test. The result of the test is given below in table 7.4.

Table 7.4: Result of Hausman Test

Test Summary	Chi-Sq statistics	Probability
Cross-Section Random	0.1341	0.7142

(Source: Author's Calculations)

As we know, the null hypothesis of Hausman Test is Random Effect Model is appropriate and in this case, the probability value is more than 10%, therefore, we fail to reject the null hypothesis. Hence, we can say that Random Effect Model is appropriate to study the relationship between % changes in share price with the % change in NPA. Therefore, we can say that, beyond doubt, the share price of different banks (taken here) is adversely affected by the level of NPA.

Now here the question arises that can the investor make use of correlation and panel-data analysis results while doing swing trading in the capital market and can minimize the loss in the negative scenario of bank's performance. Can there be any strategy that can prove NPA as one of the variables which can be used while trading? To get an answer to all these questions a correlation and trading model is set up to do backtesting.

Table 7.5: Summary of Correlation and Win/Lose Traded

	SBI		PNB		BOB		Axis Bank		HDFC		ICICI		Kotak Mahindra		IDBI	
Correlation	-0.36		-0.44		-0.55		0.003		0.21		-0.13		-0.34		-0.08	
	Win Trade	Lose Trade	Win Trade	Lose Trade	Win Trade	Lose Trade	Win Trade	Lose Trade	Win Trade	Lose Trade	Win Trade	Lose Trade	Win Trade	Lose Trade	Win Trade	Lose Trade
No. Of Trades	7	3	8	2	6	4	6	4	7	3	5	5	7	3	3	6
Return	50%	6%	56%	4%	67%	8%	22%	7%	18%	15%	30%	9%	43%	5%	6%	12%
Total Return	44%		52%		59%		15%		3%		21%		38%		-6%	

(Source: Author's calculation with reference to above Table No.7.2)

One example of SBI has been discussed below to make calculation and process understandable. Other bank's details has been given in appendix.

Table 7.6: Trading Model of SBI

Years	Change in NPA (in %)	Change in Share price (in%)	
2006-07	7%	9	Positive Trade
2007-08	41%	-2	
2008-09	29%	-5	Negative Trade
2009-10	14%	-5	
2010-11	14%	-12	
2011-12	28%	6	
2012-13	39%	-14	
2013-14	-87%	7	
2014-15	13%	-5	
2015-16	-29%	-8	

(Source: Author's Calculations)

Correlation: -.036

Table 7.7: Trader's Decision on the Basis of Correlation

Winning Trade	Losing Trade	Return
7	3	
50 %	6%	44%

In table 7.6 correlation has been calculated for the share price movement and NPA movement and we can see that correlation is -0.36, the further trading decision has been taken on the basis of this negative sign of correlation which we can see in table 7.7. Table 7.7 shows the return which a trader would have earned if he would have taken the decision on the basis of correlation sign.

Likewise, the calculation has been done for all the banks which we can see in Table 7.5 that explains the correlation between change in NPA and change in Share price. It was found in the study that all public sector banks except IDBI having negative but insignificant relation and in the case of Axis Bank and HDFC were found the positive but insignificant relationship.

It was further tested in the model that if a swing trader makes the trade on the basis of given correlation what return along with different trades he will get. To improve on this model we have also back-tested the more profound 2% stop loss scenario to improve upon the Risk-

Reward profile for the trader. So in brief, the strategy we suggest for this swing trading model can be defined as follows

1. Understand the correlation between NPA and 4-day stock movement for your banking stock.
2. On the basis of above correlation, +ve or –ve, trade this stock on the next result event.
3. Do not focus on the magnitude of the correlation only caveat being that it should not be close to zero.
4. After entering the trade, hold the stock for 4 days and exit on the close of this 4th day.
5. Do not set any profit target but it is advisable to put a loss target of 2%.

It was found in case of SBI that if trader on the basis of negative correlation, go with the short trade if NPA increases and vice-versa, his winning trade will be more than losing trade with 44% return. In case of other banks as well except IDBI, all the banks were giving positive returns on basis of win-lose trade.

It was found in the model that if the correlation was very insignificant (close to 0) the return based on the above rules provide paltry returns whereas trades where we observe significant correlation (close to +/- 1) we can expect generating fair returns. That shows that if a swing trader on the basis of given correlation make a trade and take the position 2 days prior of NPA results to 2 days after he/she can generate positive returns on these stocks.

Table 7.8 shows the correlation and return earned on the basis of correlation signs and further back testing has been done to validate the results. It can be seen in the study that as correlation figure is higher, the return is also higher, as these figures are going down, the return is also going down. Finally, it can be said that the correlation of NPA and share price movement is helpful in trading decisions. By using swing trading model investors can maximize their return and minimize their loss when banks are suffering from higher NPA.

Table 7.8: Back Testing Model

Banks	Correlation	Return
Bank of Baroda	-0.55	59 %
PNB	-0.44	52 %
SBI	-0.36	44 %
Kotak Mahindra Bank	-0.34	38%
HDFC	0.21	13 %
ICICI	-0.18	21 %
IDBI	-0.08	7 %
Axis Bank	0.003	15 %

7.3. Discussions

The Non-Performing Assets have always created a big problem for the banks in India. It is not just the problem for the banks but for the economy as a whole. The money locked up in NPAs has a direct impact on shareholder's investment, profitability and market capitalization of the bank as Indian banks are highly dependent on income from interest on funds lent. This analysis has been emphasized for the period of 2005- 2016.

The study has proposed model named swing trading model which will help shareholder, trader to minimize their losses and can protect their return. Because of the negative performance of banks impacts and lock shareholder's amount which also negatively impact of bank's stock price. So in that scenario, it becomes important to give any remedial measures for the same.

In this period, NPA of SBI was on a rise and its stock prices were, as usual, in their waves. Similar observations could be made for other banking stocks as well. Through this study we can safely conclude that NPA, though, may not be a strong or the only criteria for making an investment decision, can be used as a catalyst in generating positive returns by exploiting the behavioural science of herd mentality and the emotional baggage the investors carry in the market, though in the short term.

CHAPTER 8

FINDINGS AND CONCLUSION OF THE STUDY

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8.1. <u>Findings</u>

The banking sector in India has undergone through many developmental stages, starting from the 18th century, a time of constant failures to the banking system, to the period of nationalization in 1960's and then an exponential growth stage of the 21st century. There is a large scope and hope for the Indian banking sector to grow and go the distance. Banks in India still needs to grow more as compared to banks in developed nations. According to the publication of Bankers Almanac, Indian banks still do not come under top 50 banks in the world, where 6 Chinese banks are already there on the list. This is a surprising fact because China and India both are in the race of developing countries. Banks in China are comparatively bigger in size and are concentrated by a few selected large players as compared to banks in India.

Privatization and liberalization have supported the banking system a lot and private banks have performed very well as compared to public banks according to CAMEL whereas in some instances public banks are in lead to private and foreign banks. Public banks still have to go long way and compete with operational and productive efficiency of private banks.

In addition, this thesis found out that banks in India have recovered well from the financial crisis and many of the private banks are on a trajectory of positive profitable trends along with sufficient liquidity.

Public banks were having good productive efficiency with reference to input-output. And in case of separate variables analysis of CAMEL rating which reflects financial health of the banks, it was found that all banks are having good capital adequacy ratio. In case of public banks, high Capital Adequacy Ratio leads to the low availability of funds for business as most of the funds have been reserved in form of Capital Adequacy. At the same time, poor

management also lead to bad loans due to wrong lending decisions that we can see on Asset Quality and Management Efficiency ratio but shocking results were found when even after lower circulation of funds PSB are having higher NPA and when earnings ratio was compared among sectors, all sectors were found comparatively satisfactory. It was also revealed in the study that when the performance of all three sectors was compared, foreign banks may not be taken on their face value for direct comparison with other banks as these foreign banks are more inclined towards investment side of the banking instead of the lending side.

8.1.2   Major Findings of The Study are as Under

With reference to first objective public sector banks were found efficient but merely generating more profits and expanding the branches is not sufficient to prove the efficiency of the banks, the path of growth and NPA management is also important. It all depends upon how the banks get maximum output from minimum inputs. So all sectors were rated well but PSBs were found poor in asset quality (NPA) and lower management performance and public banks need more attention.

In the context of the second objective, the study worked as an indicator of bankruptcy and it was found that public sector banks sacrifice a huge portion of their profits for the NPA provision creation as compared to private banks which is one of the biggest reasons for their failure in CAMEL ratio. NPAs upon banks erode current profit through provisioning requirements which result in reducing the interest income and profit. Consistent higher level of NPA can bring banks to the failure stage, the hence continuous rise in NPA is not a healthy sign for the bank's survival. Bank failure model was proposed and tested on the decisions taken by RBI was found useful in predicting bank failure and if banks are regularly using this model they can get a sign of bankruptcy in advance and can cure it especially in case of public banks.

With reference to the third objective, this study has developed a backtesting model named Swing Trading Model as far as author's knowledge has been done first time in India and it revealed NPA performance as a reliable information in generating positive returns as this can be used to identify and exploit the herd mentality of the crowd and the emotional impact. The money locked up in NPAs has a direct impact on shareholders' investment, profitability and

image of the banks as Indian banks are highly dependent on income from interest on funds lent. Working on the relationship between NPA and stock price relationship with its efficacy in trading opportunity through backtesting model in the capital market, the possibility for swing trader to predict the return and hedge their risk using this model was found possible.

The results of all banks for efficiency score was found very interesting that revealed that it's not necessary all the time that bank which is financially strong will always be productive efficient also. Productive efficiency is the tool that helps in measuring how banks are using and converting their inputs for producing maximum output. The bank that is able to generate maximum output with minimum input will be most efficient. In the current study banks efficiency was measured on parameters that involve key input and key output. In the present study, SBI was found least efficient. Whereas among public banks IDBI Ltd. and Bank of Baroda, Bank of India and UCO Bank were found to be performing relatively well as was the case with PNB. In the case of private banks, HDFC Bank was found to be most efficient when compared to other banks in the group.

The Non-Performing Assets have always created a big problem for the banks in India. It is not just the problem for the banks but for the economy as a whole. The money locked up in NPAs has a direct impact on shareholder's investment, profitability and market capitalization of the bank as Indian banks are highly dependent on income from interest on funds lent. This analysis has been emphasized for the period of 2005- 2016. In this period the NPA of SBI was on the rise and the stock prices were as usual in their waves. Similar observations could be made for other banking stocks as well. Through this study we can safely conclude that NPA, though, may not be a strong or the only criteria for making an investment decision, but can be used as a catalyst in generating positive returns by exploiting the behavioural science of herd mentality and the emotional baggage the investors carry in the market, though in the short term.

CAMEL ratios of banks give the clear picture of the performance of Indian banking industry. Public sector banks and SBI groups have more NPA as compared to private banks but still, PSB is able to control it in recent years as compared to other sectors. The study shows that due to higher NPA, a bank's survival is in danger for the long term. Considering that the banks included in the study are some of the topmost banks in India, a poor performance of the sample surely depicts the sorry state of this industry in the nation.

Further analysis is done to check whether financial ratios (CAMEL) are capable to predict bank failure or not. An analysis is done on the basis of 5 ratios, MDA score of banks one year prior to the merger is negative in case of those banks to whom RBI warned to be put to closure. MDA is applied to the same set of ratios of the bank to whom RBI has merged with other banks and the results are positive. Hence it can be concluded that MDA model is useful in predicting bank's failure 1 year prior to the merger or closing down.

NPA can be used as a catalyst in generating positive returns by exploiting the herd mentality of the crowd in the stock market, though this phenomenon exists only for a short-term. This herd mentality and its short-term impact on the stock prices is more of a market anomaly but a savvy investor can use it profitably.

8.2. <u>Conclusion of the study</u>

Public banks are the crucial segment of the financial sector, somehow being government bank they have a more social responsibility towards their stakeholders and society as a whole. Though they were found more efficient as compared to others but still not up to the mark. Banks are under too much pressure to implement Basel III norm till 31st March 2019 which is also affecting their strategic and tactical decisions as these banks, in aggregate, will be required to have CAR of Rs. 120 lakh crore rupees. Merging decision of SBI group is taken by RBI to consolidate and strengthen the domestic banks and bring Indian banking industry at par with global standards and not only make open the door for Indian banks overseas but also make them competitive and efficient as well.

The thesis contributes to analysing a bank's performance by measuring it through the prism of its efficiency and productivity. In the case of financial health (CAMEL) private banks were found good whereas in the case of productive efficiency (DEA) public banks were found more efficient. Study found NPA, a big issue for the banking industry especially for public banks which clearly shows the bad loan quality of public banks which may be a danger for bank survival in future, therefore, current study has validated the bankruptcy model on RBI merger and closure decision and the bankruptcy model was found valid in predicting bank failure in advance which will help bankers, managers in identifying their failure stage in order to take corrective measures timely. Many studies analysed the bank's performance and

its impact on share price but none has explained or created any Model to exploit this scenario. The current study has developed a model, which has also been back-tested for the period of the study, which will help a swing trader in predicting the return in equity market using NPA information. By using the model a positive return for the investor is quite feasible and it can also be used to hedge the open positions in a banking stock, therefore, the study is an indicator for bank's survival stages in the scenario when banks are producing higher NPA and Losses.

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APPENDIX

Trading Models for all Sample Banks

A)   **SBI**

i).   % Change in Share Price and NPA

Years	Change in NPA (in %)	Change in Share price (in%)
2006-07	7%	9
2007-08	41%	-2
2008-09	29%	-5
2009-10	14%	-5
2010-11	14%	-12.13
2011-12	28%	6
2012-13	39%	-14.77
2013-14	-87%	7
2014-15	13%	-5
2015-16	-29%	-8

ii).   Correlation between Share price and NPA

Correlation	
Correlation	-0.36288324

iii).   Investor's decision on basis of correlation

Winning Trade	Losing Trade	Return
7	3	
50 %	6%	44%

B).   **Punjab National Bank**

% Change in Share Price and NPA

Years	Change in NPA(in %)	Change in Share price (in%)
2006-07	245%	-9
2007-08	4%	-5

2008-09	-65%	14
2009-10	272%	3
2010-11	108%	-4
2011-12	118%	-7
2012-13	62%	2
2013-14	-86%	4
2014-15	55%	-11
2015-16	132%	-2

ii).   Correlation between Share price and NPA

Correlation	
Correlation	-0.444321163

iii).   Investor's decision on basis of correlation

Winning Trade	Losing Trade	Return
8	2	
56%	4%	52%

C).   **Bank of Baroda**

i).   % Change in Share Price and NPA

Years	Change in NPA(in %)	Change in Share price (in%)
2006-07	-3%	14
2007-08	-2%	-2
2008-09	-9%	10
2009-10	34%	3
2010-11	31%	-10
2011-12	95%	-13
2012-13	172%	3
2013-14	-86%	11
2014-15	34%	6
2015-16	140%	-10

ii).   Correlation between Share price and NPA

Correlation	
Correlation	-0.55

iii).   Investor's decision on basis of correlation

Winning Trade	Losing Trade	Return
6	4	
67%	8%	59%

D).   **Axis bank**

i).   % Change in Share Price and NPA

Years	Change in NPA(in %)	Change in Share price (in%)
2006-07	22%	2
2007-08	-7%	4
2008-09	32%	3
2009-10	28%	11
2010-11	-2%	5
2011-12	15%	-1
2012-13	49%	2
2013-14	-85%	-1
2014-15	28%	3
2015-16	92%	-2

ii).   Correlation between Share price and NPA

Correlation	
Correlation	0.0033

iii).   Investor's decision on basis of correlation

Winning Trade	Losing Trade	Return
6	4	

22%	7%	15%

E). **ICICI**

i). % Change in Share Price and NPA

Years	Change in NPA(in %)	Change in Share price (in%)
2006-07	89%	10
2007-08	75%	-10
2008-09	30%	3
2009-10	-16%	4
2010-11	-37%	1
2011-12	-23%	5
2012-13	20%	0.12
2013-14	-85%	-2
2014-15	90%	6
2015-16	107%	-10

ii). Correlation between Share price and NPA

Correlation	
Correlation	0-.013

iii). Investor's decision on basis of correlation

Winning Trade	Losing Trade	Return
5	5	
30%	9%	21%

F). **Kotak Mahindra Bank**

i). % Change in Share Price and NPA

Years	Change in NPA(in %)	Change in Share price (in%)
2006-07	45%	-2
2007-08	27%	-3
2008-09	44%	-11

2009-10	-9%	15
2010-11	-41%	9
2011-12	12%	3
2012-13	31%	0.4
2013-14	-82%	-2
2014-15	6%	-2
2015-16	107%	-1

ii).   Correlation between Share price and NPA

Correlation	
Correlation	-0.34

iii).   Investor's decision on basis of correlation

Winning Trade	Losing Trade	Return
7	3	
43%	5%	58%

G).   **IDBI**

i).   % Change in Share Price and NPA

Years	Change in NPA(in %)	Change in Share price (in%)
2006-07	28%	2
2007-08	50%	4
2008-09	-12%	3
2009-10	48%	11
2010-11	19%	5
2011-12	73%	-1
2012-13	7%	2
2013-14	-84%	-1
2014-15	22%	3
2015-16	144%	-2

ii).   Correlation between Share price and NPA

Correlation	
Correlation	-0.086

iii).   Investor's decision on basis of correlation

Winning Trade	Losing Trade	Return
3	7	
6%	13%	7%

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