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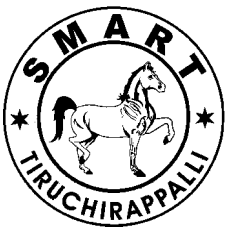

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INTEGRATED RISK MANAGEMENT IN THE INDIAN BANKING SECTOR AND IMPACT OF CREDIT RISK MANAGEMENT ON THE BANKS' PROFITABILITY

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Abstract

The emphasis, on risk management at banks, is growing globally and there is an urgent need for scheduled commercial banks in India, to integrate risk management processes with business and operating models. In addition, banks will also have to significantly enhance its stress testing capabilities and increase their knowledge on risk-management related, data requirements and analytics. The risk management processes at banks, need to be better integrated with their business and operating models. For this, risk management needs to be viewed as a key part of strategy and operations and go well beyond merely being a compliance exercise. Besides, there is a need to incorporate risk-based capital performance measures and stress testing more centrally into business decision-making processes. The purpose of this research is to investigate whether a relationship exists between credit risk management and profitability of scheduled commercial banks in India. In order to test our hypothesis, we used multivariate regression. Findings indicate that there is a positive relationship between credit risk management and profitability of scheduled commercial banks.

Keywords: Scheduled Commercial Banks, Profitability, Credit Risk, Non – Performing Assets, Return on Equity [ROE], Return on Assets [ROA].

JEL CODE: G21, G32, E58

1. Introduction

The greatest challenge, which the banks are currently confronting, relates to the proper management of risks. The most critical task before bank managements today is to put in place sound principles and framework, for risk management and control. This is also of significance to regulators and supervisors and calls for a review of the accounting standards, regulatory structures, and supervisory approaches. The challenge is far greater for banking markets like those of India, which have a vast network of branch banking, where there are thousands of staff in hundreds of branches, including vast network of rural branches catering to rural and farm clientele and bank managements have to put in place proper training standards on risk management skills for their staff. Risk management in financial markets has increasingly captured the attention of the regulators, the public and perhaps belatedly, the market participants themselves. Recent years have seen unprecedented levels of losses and litigation, resulting from risky trade and investments and growing number of angry investors and class-action lawsuits. The growth in complexity of products and trading strategies, and the systems required to support them, has been exponential. The responsibilities of the directors and the officers have come under public scrutiny. The tremendous growth of derivative activities, especially over the past decade, has provided banks and customers the benefits of more efficient allocation and management of risks. Wherever the derivatives markets have operated in a continuous, smooth and safe manner, the costs of risk intermediation have been lower and more finely tuned hedges are made available to investors, institutions and corporate. The end users of these products, as well as those who are market-makers in these products, must have a complete understanding of the systematic risks and the possibilities of a financial disruption, which may be caused due to operation of these and similar products. Skills and techniques must, therefore, be available to critically evaluate risk taking and risk management, the nature of market, credit, liquidity and operational risks. Proper valuation procedures as well as a responsive Management Information System (MIS) should be in place. A part of training and banking education would, therefore, involve risk management and also cover the aspect of understanding of the links between financial markets and their potential systemic implications. Together, these challenges have stressed the need for enhanced standards of control over the risks that are undertaken by any organization active in the financial markets.

Indian banking sector is presently confronted with various kinds of financial and non-financial risks viz. credit risk, interest rate risk, foreign exchange rate risk, liquidity risk, market risk, legal risk, regulatory risk, reputational risk, operational risk, etc. These risks are interdependent and events that affect one area of risk can have ramifications for a range of other risk categories. Increased competitions for business from banks and introduction of global standards for risk management have made the regulator to suitably adopt need-based changes in the risk management practices in the banking system. An independent risk governance structure is required to be put in place for Integrated Risk Management, covering credit, market, operational and group risks. As a part of regulatory compliance, scheduled commercial banks in India are making continuous efforts to enhance the degree of awareness at the operating level in alignment with better risk management practices, Basel III requirements and the overarching aim of conservation and optimum use of capital. It is being perceived as an enabler for business growth and in strategic business planning.

1.1 Risk Management

The word, risk, is derived from the Latin word ***Risicare,*** meaning 'to dare'. The Basel

Committee on Banking Supervision (BCBS) has defined risk as the 'probability of the unexpected happening - the probability of suffering a loss'. Risk management can be defined as a function of risk identification, measurement, monitoring and reporting to ensure that the returns are appropriate to the risk undertaken and the risks undertaken are commensurate with the risk appetite and risk tolerance. Risk management has to ensure that the bank holds adequate capital and reserves, to make sure that its solvency and stability are not threatened, both in the short and the long run.

1.2 Need for Risk Management

There is a general perception that cost of managing risk is high. However, cost of not managing the risk can, at times, be larger than that of managing it. The securities fraud and IPO fraud and the incidence of Non-Performing Assets (NPAs) in banking sector are a few cases in point where ignoring the risk had resulted in high cost implications or losses for the organization concerned or the system as a whole. Further, proper risk management, while enabling meaningful comparison or risk adjusted business performance across the banking sector, also yields higher returns for the stakeholders. Thus, it creates value for the shareholders.

2. Review of Literature

Empirical studies, conducted on the subject in the past, have concluded that there exists a direct relationship between credit risk management and profitability of banks. **Thirupathi Kanchu and Manoj Kumar (2013)**, in their paper, stated that the banks can take risk more consciously, anticipate adverse changes and hedge accordingly, to become a source of competitive advantage, by offering its products at a better price than its competitors could offer. **Fan Li and Yijun Zoe (2014),** in their study on European banks, concluded that there is positive relationship between credit risk management and profitability of commercial banks. **Bashir Ahmad Joo (2015)**, in his study, stated that the credit quality is an important parameter to gauge the soundness of a bank. **Krishn A. Goyal and Sunita Agrawal (2010)** have concluded that risk management has emerged as a new and challenging area in banking. **Kalpataru Bandopadhyay and Souvik Bandopadhyay (2010)**, in their study, stated that the performance of a bank, from the viewpoint of profitability, is not very meaningful unless the same is accounted for along with the risk. **Ara Hosna, Bakaeva Manzura and Sun Juanjuan (2009)**, in their study on, "Credit Risk Management (CRM) and Profitability in Commercial Banks in Sweden", concluded that the CRM strategy defines profitability level of commercial banks to an important extent. **Abu Hanifa Md. Noman, Sajeda Pervin, Mustafa Manir Chowdhury and Hasanul Banna [2015]**, in their study on, "The Effect of Credit Risk on the Banking Profitability: A Case on Bangladesh", concluded that banks need to use prudent credit risk management procedure in order to ensure profitability and avoid crisis. **Samson A. Alalade, Babatunde O. Binuyo and James A. Oguntodu [2014],** in their research work on, "Managing Credit Risk to Optimize Banks' Profitability: A Survey of Selected Banks in Lagos State, Nigeria", concluded that there is "moderate and positive" relationship between credit risk management and profitability. **Million Gizaw, Matewos Kebede and Sujata Selvaraj (2015)**, in their study on, "The effect of credit risk on profitability performance of commercial banks in Ethiopia", concluded that credit risk measures like non-performing loans, loan loss provisions and capital adequacy, have a significant impact on the profitability of commercial banks.

3. Statement of the Problem

Banks today are the largest financial institutions in India, with branches and subsidiaries, which affect everyone's life. The alarming increase in gross non-performing assets in the period 2014-15, has forced many banks

to take a critical look at how they manage risk and expose some significant weaknesses in risk management across the financial services industry. It is a proven fact that banks do face risks while they operate. Credit risk is one of the most significant risks that banks face, considering that granting credit is one of the main sources of income in scheduled commercial banks. Therefore, the management of credit related risk affects the profitability of banks. The aim of the study is to provide stakeholders with accurate information, regarding the credit risk management of scheduled commercial banks, with its impact on profitability.

4. Objectives and Significance of the Study

The main purpose of the study is to investigate whether there is a relationship between credit risk management and profitability of scheduled commercial banks in India. It also proposes to investigate if the relationship is stable or fluctuating. Significant crisis is an extensive unsoundness of banking sector, in terms of deterioration in credit quality or loan losses and thereby eliminating fully or partly bank capital. In recent years, banking and financial crisis have become common phenomenon and various nations have already experienced the fallout of deteriorating credit quality and poor credit risk management in banks. Therefore, Indian banks are left with no alternative but to manage quality of credit portfolio in order to meet ever-increasing customer expectations and to remain competitive in the global market. This scenario has forced banks to pay attention to competing pricing of credit instruments, credit risk management and maintenance of high credit quality. In this context, the present study makes a modest attempt to analyze the credit risk management in Indian banks and its impact on their profitability.

5. Hypothesis of the Study

The study was based on secondary data which were collected from Capital Line, Ace Equity and IBA websites, for a three year period, from FY 2012 to 2014, with reference to scheduled commercial banks (both Public and Private Sectors), which are available in public domain. In the present study, Return On Equity (ROE) and Return On Assets (ROA) were considered as determinants of profitability while Non-Performing Assets Ratio (NPAR) and Capital to Risk (weighted) Assets Ratio (CRAR) were considered as determinants of credit risk management. Four hypotheses were formulated which are related to the study question as under:

H1: There is a correlation amongst CRAR, NPAR and ROE of scheduled commercial banks.

H2: There is a correlation amongst CRAR, NPAR and ROA of scheduled commercial banks.

H3: The correlation amongst CRAR, NPAR and ROE is fluctuating over time.

H4: The correlation amongst CRAR, NPAR and ROA is fluctuating overtime.

Hypothesis 1:

Null hypothesis: There is no correlation amongst CRAR, NPAR and ROE of scheduled commercial banks. H_o: $\beta_1=\beta_2=\beta_3=0$; where β_1, β_2 and β_3 are correlation coefficients for CRAR, NPAR and ROE respectively.

Alternative hypothesis: There is correlation amongst CRAR, NPAR and ROE of scheduled commercial banks. H_a: H_0 is not true

Hypothesis 2:

Null hypothesis: There is no correlation amongst CRAR, NPAR and ROA of scheduled commercial banks. H_o: $\beta_1 = \beta_2 = \beta_3 = 0$: where β_1, β_2 and β_3 are correlation coefficients for CRAR, NPAR and ROA respectively.

Alternative hypothesis: There is correlation amongst CRAR, NPAR and ROA of scheduled commercial banks. H_a: H_0 is not true.

This hypothesis has similar expression as Hypothesis 1 but uses ROA as the independent variable, which is another indicator of profitability.

Hypothesis 3:

Null hypothesis: The correlation amongst CRAR, NPAR and ROE is stable over time.

H_o: $\beta_{1,t} = \beta_{1,t-1,} \beta_{2,t} = \beta_{2,t-1,} \beta_{3,t} = \beta_{3,t-1}$

- Alternative hypothesis: The correlation amongst CRAR, NPAR and ROE is fluctuating over time. H_a: H_0 is not true.

This hypothesis is used to test the stability of relationships amongst CRAR and ROE and between NPAR and ROE.

Hypothesis 4:

Null hypothesis: The correlation amongst CRAR, NPAR and ROA is stable over time.

H_o: $\beta_{1,t} = \beta_{1,t-1,} \beta_{2,t} = \beta_{2,t-1,} \beta_{3,t} = \beta_{3,t-1}$

Alternative hypothesis: The correlation amongst CRAR, NPAR and ROA is fluctuating overtime. H_a: H_0 is not true.

This hypothesis is aimed to test the stability of relationship between ROA and CRAR and between ROA and NPAR.

6. Methodology of the Study

In the study, deductive approach was selected, which means that focus was on testing a theory rather than generating a theory. A series of statistical tests were performed in order to test if the relationship exists. Other statistical tests were performed to investigate if the relationship is stable or not.

6.1 Data Source

For the purpose of study, data were collected from secondary sources, like Center for Monitoring Indian Economy (CMIE), Capitaline, Ace Equity Database and RBI website.

6.2 Sample Selection

There are 87 commercial banks in India out of which 46 scheduled commercial banks in India, both public and private sectors, were selected to test the hypotheses. The selection was done, based on their business size [advances + deposits]. Adequacy of sample size did ensure that the sample statistics was true representation of the population.

6.3 Period of the Study

The period of the study was three financial years from FY 2012 to FY 2014.

6.4 Tools used for the Study

Stata12.0 was used in this study, to perform correlation and regression analysis.

6.5 Operationalization and description of the variables

6.5.1 Credit Risk Management Indicators

For the indicators of credit risk management, the study considered CRAR and NPAR. The reason was based on their properties, related to the credit risk management. It implies that lower NPAR is related to lower risk and deposit rate. Meanwhile, there might be a positive relationship between deposit rate and NPAR, based on the possibility that bank's deposit base will be increased by the high deposit rate, for funding high risk loans. And the increasing high-risk loans might enhance the probability of higher NPAR. Hence the allocation of banks risk management, deeply relies on the diversification of credit risk, to decrease the NPA in banks' books. NPA is also a probability of loss, which requires provision. The amount of provision is "accounting amount" which can be further subtracted from the profit. Thus high NPA increases the provision while reducing the profit.

6.5.2 Determinants for Credit Risk Management

There are two methods to calculate CRAR; one is using the total capital while another one is using only Tier 1 capital. In our study, it was decided to use the former one as the formula for calculating CRAR. That is,

CRAR=Total Capital/Risk Weighted Assets [RWA]

As to NPAR, it is calculated as:

NPAR = Gross NPA/Total Loans & Advances

Where NPAR is non-performing loan ratio, NPAs is non-performing assets.

Non-performing assets (NPAs) are defined as the loans overdue, by more than 90 days. It should be the gross value of the loan asset as recorded in the balance sheet and not just the amount that is overdue, **Reserve Bank of India (2015).**

6.5.3 Determinants of Profitability

Return on Equity [ROE] is estimated as under:

ROE = Net Income/Total Equity Capital

Net Income means the net income after tax [PAT]. Total equity capital is contributed by the bank's shareholders.

The estimation of ROA follows the formula as:

ROA = Net Income/Total Assets

Net income can be collected from income statement. Total assets and total equity are available from the balance sheet.

6.5.4 Control Variable and Summary of Variables

It was proposed to study only one of internal determinants of scheduled commercial banks' profitability - credit risk management. In order to avoid the possibility that the relationship is due to some other factors, the study has introduced bank's size as control variable. Interchangeable to use as a measure for bank's size is the natural log of total assets. As mentioned before, the variables used were ROE, ROA, CRAR, NPAR and Bank Size. ROE and ROA were the dependent variables while independent variables included CRAR and NPAR **Swamy (2012).**

7. Analysis of the Study

In order to answer the question, the study established eight different hypotheses and to test those hypotheses, the researchers conducted two regression analyses.

7. 1 Multivariate Regression Analysis

To test the hypotheses, there was a need to build regressions, to measure the relationships between dependent and independent variables. The regression analysis tests the statistical strength of the model, as hypothesized. The technique that the study decided to use to build to the model was Ordinary Least Squares (OLS).The general form of OLS uses a set of data, to create an estimated equation like:

$$Y_i = \beta_0 + \beta_1 X_i + \in_i$$

Where:

'i' goes from 1 to N and indicates the observation number

'X_i' is the independent variable

'Y_i' is the dependent variable

'β_0' is the intercept

'β_1' is the slope

'$\in_i$' is the residuals

Considering that the study used more than one independent variable, there was a need to move from single-independent-variable regressions to equations with more than one independent variable. Accordingly, multivariate regression model was introduced:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots. + \beta_k X_{ki} + \in_i$$

Where:

'i' goes from 1 to N and indicates the observation number

X_i is the independent variable

Y_i is the dependent variable

β_0 is the intercept

β_1 is the slope

$\in_i$ is the residuals

A multivariate regression coefficient indicates change in dependent variable, associated with one unit increase in one independent variable, holding other independent variables constant. Based on the information above, the following regressions were performed:

$$ROE_t = \alpha + CAR_t + NPLR_t + LNTA_t$$

$$ROA_t = \alpha + CAR_t + NPLR_t + LNTA_t$$

Where,

ROE is the return on equity at time t

ROA is the return on asset at time t

CRAR is the capital adequacy ratio at time t

NPAR is the non-performing loan ratio at time t

LNTA is the natural log of total assets of banks

While evaluating the 'goodness of fit' of a regression equation, the researchers employed the measure named R^2 or the coefficient of determination. R^2 is the ratio of the explained sum of squares to the total sum of squares:

$R^2 = [1 - \text{sum of } \in_i^2] / \text{sum of } [Y_i - Y_{mean}]^2$

Higher the R^2, closer the estimated regression equation to fit the data. R^2 measures the percentage of the variation of Y around Y_{mean} that is explained by the regression equation. R^2 lies between 0 and 1, closer the value to 1, better the overall fits.

Before presenting the regression analysis, the researchers tested the model for multi-collinearity. **Table-1** and **2** display the results for multi-co linearity test. Multi-collinearity is a situation where the explanatory variables are nearly linear dependent. In the Table, one can observe that the highest correlation among all the variables was 0.7376, which was the correlation between CRAR and ROA. However, it is always preferable to have an absolute value larger than 0.8, to be adequate to cause multi-co linearity. Considering that 0.7376 was less than 0.8, one can conclude that there was no problem of multi-collinearity among the variables, selected for the testing.

8. Results and Discussion

The results of the hypotheses are summarized as under:

8.1 Hypothesis-1

Testing of Null Hypothesis

The first regression analysis was performed to test for the first hypothesis:

$$ROE_t = \beta_0 + \beta_1 \times CAR_t + \beta_2 \times NPLT_t + \beta_3 \times LNTA_t$$

Hypothesis 1 is about the correlation between CRAR and NPAR and ROE of scheduled commercial banks. **Table-3** shows the result of regression 1.

The first regression analysis shows that the p-value for CRAR was 0.4929 and for NPAR, it was 0.3073. Under the condition that the level of significance is 5 percent, a p-value being less than 5 % (0.05) would call for the rejection of null hypothesis. Considering the above p-values of CRAR and NPAR, which were greater than 0.05, the study did not propose to reject both the first part and second part of null hypothesis 1 that "there is no correlation between CRAR and ROE" and "there is no correlation between NPAR and ROE". In other words, the results for regression analysis 1 demonstrate that the relationship between CRAR and ROE was insignificant while the relationship between NPAR and ROE was also insignificant. Besides, the p-value of LNTA was even less than 1%, which demonstrated that the relationship between bank size and ROA was quite significant.

8.2 Hypothesis-2

Testing of Null Hypothesis

The second regression analysis was performed to test the second hypothesis:

$$ROA_t = \beta_0 + \beta_1 \times CAR_t + \beta_2 \times NPLR_t + \beta_3 \times LNTA_t$$

Hypothesis 2 is about the correlation between CRAR and NPAR and ROA of scheduled commercial banks. **Table-4** shows the result of regression 2.

The second regression analysis shows that the p-value for CRAR was 0.2091 and for NPAR, it was 0.0003. Under the condition that the level of significance is 5 %, p-value being less than the 5 % (0.05) would justify the rejection of null hypothesis. As the p-value of CRAR was greater than 0.05, the study found that the first part of null hypothesis 2 that "there is no correlation between CRAR and ROA" should not be rejected. Further, the p-value for NPAR being less than 0.05, which implied that the second part of null hypothesis 2 that "there is no correlation between NPAR and ROA" should be rejected. In other words, the results for regression analysis 2 demonstrate that the relationship between CRAR and ROA was insignificant while the relationship between NPAR and ROA was quite significant [p-value<1%]. Besides, the p-value of LNTA was also less than 1%, which demonstrated that the relationship between bank size and ROA was quite significant.

8.3 Hypothesis-3

Testing of Null Hypothesis

To test the stability of those relationships, the study included further regression analyses. The researchers decided to divide the time horizon of 3 years to 3 sub-periods; each sub-period containing one-year's observations. Therefore, three regression analyses were performed for each sub-period. The following are regression 3 to 5:

$$ROE_1 = \beta_0+\beta_1\times CAR_1 + \beta_2 \times NPLR_1+ \beta_3\times LNTA_1$$

$$ROE_2 = \beta_0 + \beta_1 \times CAR_2 + \beta_2 \times NPLR_2 + \beta_3 \times LNTA_2$$

$$ROE_3 = \beta_0 + \beta_1\times CAR_3 + \beta_2 \times NPLR_3 + \beta_3 \times LNTA_3$$

The regression 3 contains observations in FY 2014, the regression 4 contains observations in FY 2013 and the regression 5 contains observations in FY 2012.The correlation coefficients for the 3 sub-periods (CRAR, NPAR and ROE) are presented in the **Table-5**. From the correlation coefficients of CRAR and NPAR, it is obvious that relationships between CRAR and ROE and between NPAR and ROE were never constant, and always fluctuating. In addition, it was observed that the correlation coefficients of CRAR and NPAR did not exhibit any obvious pattern. Correlation coefficient of CRAR fluctuated between negative and positive, with the correlation coefficients of CRAR, NPAR and ROE. CRAR recorded the highest value in FY 2014 and the lowest value in FY 2012. Correlation coefficients of NPAR were always negative, with the fact that the highest results of negative correlation were in the FY 2014 and the lowest value was in FY 2013. The researchers inferred that the variables in the study were more aligned in periods of high instability. As to the p-values for those correlation coefficients for CRAR, one of them was a number larger than 0.05 (FY2013), which indicated an insignificant relationship. This is in accordance with regression 1. The p-values for NPAR were less than 5% from FY 2012 to FY 2014. In other words, the relationship between CRAR, NPAR and ROE was not stable. In view of the above results, the researchers decided to reject the null hypothesis.

8.4 Hypothesis-4

Testing of Null Hypothesis

In view of the results presented by Hypothesis 3 and Hypothesis 4, the study concluded that there was a correlation between CRAR and ROA and between NPAR and ROA of banks. To test the stability of such relationship, similar tests were performed as in Hypothesis 5 and Hypothesis 6. That is, to make regressions of 3 sub-periods. The following are regressions

6 to 8:

$$ROA_1 = \beta_0 + \beta_1 \times CAR_1 + \beta_2 \times NPLR_1 + \beta_3 \times LNTA_1$$

$$ROA_2 = \beta_0 + \beta_1 \times CAR_2 + \beta_2 \times NPLR_2 + \beta_3 \times LNTA_2$$

$$ROA_3 = \beta_0 + \beta_1 \times CAR_3 + \beta_2 \times NPLR_3 + \beta_3 \times LNTA_3$$

The regression 6 contains observations in FY 2014, the regression 7 contains observations in FY 2013 and the regression 8 contains observations in FY 2012. **Table-6** displays the results of those 3 regressions (CRAR, NPAR and ROA). From the Table, it is clearly indicated that CRAR recorded a positive correlation with ROA and NPAR recorded negative correlation with ROA. Therefore, the relationships between CRAR and ROA and between NPAR and ROA were more or less constant. The highest result of correlation coefficient of CRAR was in the FY 2014 while the lowest result was in year 2012, respectively. Moreover, the highest value of negative correlation coefficient of NPAR was in FY 2012, while the lowest was in FY 2013. In addition, the correlation coefficients of CRAR and NPAR for ROA demonstrated a more stable trend than for ROE and therefore, indicate a higher stability of the relationship. As to the p-values for those correlation coefficients for CRAR, all of them recorded a number less than 0.05, which indicated a significant relationship. In other words, the relationship between CRAR, NPAR and ROA was more stable. In view of the above results, the researchers accepted the null hypothesis.

9. Findings and Suggestions of the Study

It was explained the beginning of the study that the purpose was to investigate the relationship between credit risk management and profitability of scheduled commercial banks in India. This was done by collecting data from the annual reports of 46 banks (26 public sector banks and 20 private sector banks, including new generation banks) from FY2012 to 2014. In order to test the relationship between two abstract concepts, determinants were used. In the study, ROE and ROA were selected as the determinants for profitability and CRAR and NPAR as determinants for credit risk management. After finishing the data collection from secondary sources, an attempt was made to use statistic program STATA to test the study question. In the study, it was decided to make four hypotheses and two regression tests for the two independent variables, ROE and ROA, based on the 3-year data. The second part of the test was concerned with the stability of such relationship. Therefore, it was decided to use 3 sub-periods to make more regressions to investigate if the correlation coefficients experienced large fluctuations.

The study question, "*What is the relationship between the credit risk management and profitability of scheduled commercial banks in India from FY 2012 to FY 2014?",* was answered after undertaking a series of regression analyses. With the statistical evidence, it was concluded that there was relationship between credit risk management and profitability. From the study, it has been found that there was negative relationship between NPAR and ROE and between NPAR and ROA. Higher the NPAR, less the available capital for banks to invest. Further, the findings of trend for the relationship, demonstrated a fluctuating relationship between all the four variables. This could be explained by the effect of rise in NPAs during the period, which implied that profitability was influenced by more economic factors.

Combined with the findings from the two determinants (CRAR and NPAR) for credit risk management, it has been concluded that there was positive relationship between credit risk management and profitability of scheduled commercial banks.

10. Conclusion

Over the years, especially in the wake of the learning from the global financial crisis, banks, particularly in the Indian context, have enhanced their efforts in the direction of improving risk management practices, as explained earlier. An independent risk management function, headed by a Chief Risk Officer (CRO), with sufficient freedom and stature, assumes critical importance. Banks must ensure that the board level risk committees must conduct internal and external audit / reviews in the real sense and they must be supported by resources and wherewithal, to perform their responsibility in a meaningful way. Senior management of the banks can play a proactive role, by way of communicating the risk management policies, risk appetite and tolerance statement, risk management practices to the operational in-charges at the business units and corporate levels, for proper understanding and compliance. These efforts need to be supplemented by robust Management Information System (MIS) and information technology platforms, to provide the board and the top management, with timely, reliable and complete risk-related information on the bank, for effective decision making and decisive action taking.

11. Limitations of the Study

The study shows that the relationship between CRAR and ROE and CRAR and ROA was not significant. This could be due to the imperfect theoretical prediction of the relationship between CRAR and banks' profitability. The imperfection of the model modification could be another reason for the lack of significant relationships. In addition, the impact of systematic risks, during the period, should not be neglected.

Over-reliance on quantitative models may grossly under estimate tail risks and it is necessary to use expert judgement also in dealing with risk estimation and management. Stress tests, as also reverse stress tests and back testing, should be gainfully utilised as complements to model based risk estimation

12. Scope for Further Work

The study focussed on credit risk management and profitability of scheduled commercial banks. Further suggestion on this study could be to move the core of credit risk management to other risk aspects in IRM framework. For the banking industry's development, diversified types of banks have built to satisfy the demand for innovation in financial markets. In the study, the stress was on credit products of commercial banks while ignoring investment products. Further study can focus on the risk management measurement of the investment activities of commercial banks. Apart the credit risk management, liquidity risk, market risk, operational risk or reputational risk can also be taken into consideration. In addition, profitability is only one aspect of banks' financial performance. Exploring the other aspects of financial performance is also an interesting expansion of this study.

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Table-1: Correlation Matrix for the Regression-1 (ROE)

FY 12	CRAR	NPAR	LNTA	ROE
CRAR	1			
NPAR	-0.22732	1		
LNTA	-0.15315	0.184605	1	
ROA	0.262227	-0.34001	0.268608	1
FY 13	**CRAR**	**NPAR**	**LNTA**	**ROE**
CRAR	1			
NPAR	-0.52652	1		
LNTA	-0.06359	0.16165	1	
ROA	0.405427	-0.71766	0.082521	1
FY 14	**CRAR**	**NPAR**	**LNTA**	**ROE**
CRAR	1			
NPAR	-0.49732	1		
LNTA	-0.06508	0.185848	1	
ROA	0.400752	-0.67137	0.282738	1

Source: Output Data obtained using STATA 12.0

Table-2: Correlation Matrix for the Regression-2 (ROA)

FY 12	CRAR	NPAR	LNTA	ROA
CRAR	1			
NPAR	-0.227324604	1		
LNTA	-0.153147131	0.184605	1	
ROA	0.541064929	-0.60106	-0.10279	1
FY13	**CRAR**	**NPAR**	**LNTA**	**ROA**
CRAR	1			
NPAR	-0.526516596	1		
LNTA	-0.063590286	0.16165	1	
ROA	0.733336042	-0.65358	-0.03604	1
FY14	**CRAR**	**NPAR**	**LNTA**	**ROA**
CRAR	1			
NPAR	-0.497324945	1		
LNTA	-0.065078091	0.185848	1	
ROA	0.737647528	-0.74592	0.034098	1

Source: Output Data obtained using STATA 12.0

Table-3: Results of Regression-1

Variable	Coefficient	Standard Error	T stat	P>(t)	95% Confidence Level		R^2
					Lower	Upper	
CRAR	9.280592641	13.20505181	0.702806227	0.49294057	-18.86530891	37.42649419	0.6318189
NPAR	-0.418075958	0.395594264	-1.05683018	0.307313391	-1.261265169	0.425113252	
LNTA	-2.870447963	0.57095598	-5.0274418	0.000150175	-4.087411822	-1.653484104	
Constant	1.456948266	1.198522068	1.215620726	0.242915949	-1.097641039	4.01153757	

Source: Output Data obtained using STATA 12.0

Table-4: Results of Regression - 2

Variable	Coefficient	Standard Error	T stat	P>(t)	95% Confidence Level		R^2
					Lower	Upper	
CRAR	-1.539130368	1.172741864	-1.312420419	0.20910654	-4.038770469	0.960509733	
NPAR	0.125697262	0.027588707	4.556112915	0.00037857	0.066893326	0.184501198	0.794918737
LNTA	-0.154039316	0.045331927	-3.39803149	0.0039738	-0.250662032	-0.0574166	
Constant	0.102915297	0.097421402	1.056393097	0.30750652	-0.104733505	0.310564098	

Source: Output Data obtained using STATA 12.0

Table-5: Correlation coefficient for CRAR, NPAR and ROE across years (p-values are in the brackets)

	FY12	FY13	FY14	Mean	Standard Deviation
CRAR	-0.00618 (0.307313391)	0.317192 (0.982686515)	0.356986 (0.486075602)	12.87473684	2.270700745
NPAR	-0.76622 (0.000150175)	-0.67688 (0.003273984)	-0.77013 (0.003299603)	3.95	1.494817243

Source: Output Data obtained using STATA 12.0

Table-6: Correlation coefficient of CRAR, NPAR and ROA across years (p-values are in the brackets)

	FY12	FY13	FY14	Mean	Standard Deviation
CRAR	0.123209514 (0.00485146)	0.125697262 (0.00037857)	0.146518374 (0.00065835)	12.87473684	2.270700745
NPAR	-0.212229485 (0.00131175)	-0.154039316 (0.0039738)	-0.174338061 (0.0036232)	3.95	1.494817243

Source: Output Data obtained using STATA 12.0