

IMPLICATION OF CAPITAL ADEQUACY COMPLIANCE AND NON-COMPLIANCE IN RESPECT OF PROFITABILITY (A STUDY FOCUSED ON INDIAN PUBLIC-SECTOR BANKS)

Dr. Aroquiadasse Rayappin¹, Dr. Muthiah Kochadai²

¹*Department of Commerce, School of Management, Pondicherry University, Puducherry, India*

²*Department of Commerce, Kanchi Mamunivar Government Institute for PG Studies & Research, Puducherry, India*

draroquiadasse@gmail.com¹

ABSTRACT

The Banks have assets that generate income through interest from advances and enhance their financial value. The quality of the assets is a crucial concern for the bank's profitability, which reflects upon capital adequacy for smooth sailing without turbulence in the financial system. Following the methodology applied, this paper aims to test for the implication of capital adequacy ratio (CAR) compliance and non-compliance in respect of bank's profitability (PF) of Public-Sector Banks (PSBs) in India during Basel II & III regimes, covering 2008-2020 and adopted the panel data regression. In light of the above, the study has opted for a purposive sampling technique by taking 27 Indian PSBs as the sample size, progressively reduced to 19 due to mergers at the end of the study period. As well, the study examines the feasibility of several potential implications of profitability led by self-governing implication variables: interest income (INTINC), non-interest income (NONINTC), net interest margin (NIM), net non-performing assets (NNPAs), and return on equity (ROE) as dependent variable. The objective is divided into two: to find whether capital adequacy compliance and non-compliance have implications in respect to PF. The first takeaway result reveals that, interest income (INTINC) is positive and significant, which denotes 'interest income', an implication of Capital Adequacy compliance of PSBs, is set to be **good** regarding profitability (PF), thereby implying an increase in 'Reserve and Surplus' (R&S), 'business growth' and 'yield on advances' (YoA). Whereas, the second result depicts that net non-performing assets (NNPAs) are found to be positive and significant. It means NNPAs level is **high**, leading to the implication of Capital Adequacy Non-Compliance of PSBs in respect of PF, thereby this implication implies to reflect upon high provision coverage, mounting of bad loans, added write-offs and recovery costs, which, ultimately, leads to capital adequacy non-compliance.

Key Words: Capital Adequacy, Risk-weighted Assets (RWAs), Profitability, Provision Coverage Ratio, Interest Income, and Financial Stability.

JEL: Classification Codes: C23, G18, G21, G28, G32, G33

1 INTRODUCTION

The Capital Adequacy Ratio (CAR) is a crucial metric for assessing a bank's stability and efficacy for its long-term sustainability. The debt crisis's late 1980s (Koehn & Santomero, 1980) aftermath often raised concerns about bankers' stability, which forced international regulators to increase the capital adequacy basis for all banks. This focus forced the regulators to provide uniform rules, which ultimately cleared the path for the Basel Committee on Banking Supervision (BCBS) to create the Basel Capital Accord. This global standard is for calculating capital adequacy ratios called the Basel Capital Accord (BCBS, 1999a). At first, banks were advised to maintain a minimum CAR level of 8% and later raised to 11.5 percent under Basel III when passed through 2008 crisis. Consistency is only promoted in the financial system when a minimum quantity of capital is used. The accord advises that banks should adhere to certain minimum capital adequacy ratios for compliance during turbulences.

To safeguard their strength, banks and other financial institutions have to maintain an adequate amount of capital proportional to their risk-weighted assets.(Al-Sabbagh, 2000). Using negligible capital adequacy ratios will diminishes the risk of bank insolvency, thereby encouraging stability and efficiency in the financial system (BCBS, 1999b). When the bank goes bankrupt, the entire system may lose its confidence, which could cause economic challenges for other banks and perhaps threaten the resilience of the financial markets (Tanwar & Jindal, 2019). Hence, the banking

industry is considered important for the economy, and such regulations and supervision were highly regarded (Morgan, 1984).

The regulatory authorities which foresees, maintaining adequate capital is seen as compliance for key measure of "safety and stability" for banks and depository institutions, where capital is act shield against losses (Rifaat Ahmed, 1996). Furthermore, capital adequateness is of extreme importance to the global banking industry to avoid downside profitability (Lang & Forletta, 2020) which is proportional to credit risk of the Asset Quality. In order to offset credit risks and make larger provisions for unexpected losses, banks must hold onto more capital when their asset quality declines (Poloni et al., 2008).

1.2 In Indian Context

Periodically, the Reserve Bank of India (RBI) released its instructions for banks to follow, including the prudential standards of capital sufficiency. In 1991, the first Narasimham Committee was established by the Government of India (GOI) to recommend changes to the financial industry. Among other things, it recommended that all banks have a minimum capital of 8% of their risk-weighted assets when it made its initial report (Narasimham, 1991) in align to Basel norms. By March 1997, it was evident that all 25 PSBs in India—aside from Indian Bank and UCO Bank had met the 8% capital adequacy requirements as stipulated in Basel I guidelines. The second committee, chaired by Narasimham, was re-again established by the GOI in 1998 with the mission of *"reviewing the progress of Indian Banking and to design a program for additional strengthening of the financial systems in India"*. The committee suggested to raise the necessary capital adequacy to 9% and 10% by the years 2000 and 2002, respectively, in order to further strengthen the Indian banking system.

Parallely the Basel II norms were also introduced in 2007–2008 by Basel Committee on Banking Supervision (BCBS), and all Indian banks had to comply with the BCBS so called "New Capital Adequacy Framework." In line with, the RBI had also required commercial banks to maintain a minimum level of capital adequacy of 9% in adherence to the BCBS CAR scale of 8%. The RBI additionally stated that the Basel II transition would take effect from March 31, 2007, with an extension to April 1, 2009.

The global financial crisis (GFC), which emerged in the middle of 2007 and the beginning of 2009, showcase of the main extreme pressure that the banking sector was under. The US housing market's breakdown, which made the crisis worse, was the main contributing factor. Furthermore, rebound from the GFC was slower than that of past recessions that were not directly related to a financial crisis (Reserve Bank of Australia, 2010). As a result, the Bank of International Settlement (BIS) developed Basel III in 2010 to amend Basel II's shortcomings (Douglas J Elliott, 2010). Basel III, a set of new regulations that BCBS enacted in response, intends to make the banking industry more resistant to shocks caused by strain in the financial and economic system.

Conferring to the BCBS assessment, Scheduled Banks in India must implement Basel III in accordance with the RBI's recommendations from 1st April 2013. In this attempt, the Indian government and banks both face formidable obstacles. The asset quality, profitability and liquidity, especially PSBs, are expected to be impacted by the 11.5% (CAR) due to capital expansion. Prior to Basel III, Indian scheduled commercial banks (SCBs) have maintained regulatory ratio of 9% and above at end of the Basel II era, which was concluded on March 31, 2013. In addition, as stated by (Kochadai Muthiah & Aroquidasse, 2020), all Indian Public-Sector Banks (PSBs) had complied with Basel II criteria of 9 percent CAR.

The RBI had hosted its deadline for Basel III compliance on 31.03.2020, of the nineteen PSBs as on said date, thirteen PSBs had prepared themselves for achieving the deadline of capital adequacy compliance and six lacked behind in non-compliance. This highlighted the pro-cyclical characteristics of the banking system.

1.3 Statement of Problem

Given the implementation of the Basel III compliance, it is pertinent to find the implication left behindhand by capital adequacy compliance and non-compliance in respect of profitability pertaining to PSBs in India.

1.4 *Objectives of the Study*

To estimate the implications of capital adequacy of compliance and non-compliance of India Public Sector banks in respect of Profitability (PF).

1.5 *Hypotheses of the Study*

Implication on Profitability

H_{a1}- All the selected independent implication variables of capital adequacy compliance of PSBs together in respect of profitability have a significant effect on ROE_y.

H_{a2}- All the selected independent implication variables of capital adequacy non-compliance of PSBs together in respect of Profitability have a significant effect on ROE_y.

1.6 *Significance of the Study*

Basically, all banks in the financial system are recommended to have the required minimum capital and, computed as percentage of banks capital towards the risk-weighted assets (RkWAs). This commendable CAR percentage will augment the effective control of Banking financial operations.

Therefore, by not differing to the fact there are few researches that have provided the ground of evidence in implication of CAR in other parts of the country. But there has been found smaller studies in this area especially in Indian PSBs. Thus, this study moving head to focus on Implication of Capital adequacy in respect of Profitability (PF).

1.7 *Scope of the Study*

The study has covered Basel II and III full periods starting from 2008 to 2020. Further, the study has entrusted only the data of Indian Public Sectors Banks among Scheduled Commercial Banks (ScCBs).

2 REVIEW OF LITERATURES

Berger (1995), in his study, “relationship between capital and earning” asserts that a gain in capital may raise profit levels by lowering the expected cost of financial stress. He also finds a positive and significant relationship between CAR and profitability. According to **Kalhoefer & Salem (2008)**, analysis of profitability using ROE, public sector banks are less profitable than private ones. This is because public banks' low income and large loan loss provisions are what drove their profitability. Additionally, the result confirmed the bank's declining net interest margin, which was an indication of a serious operational issue and was mostly caused by loan borrowers. Further, **Pasiouras et al., (2009)**, suggest that strict adherence to capital sufficiency, strong oversight, market discipline, and surveillance measures will all theoretically increase banks' profit efficiency. While profit competence was statistically positively impacted, cost efficiency was dramatically impacted negatively by stronger capital adequacy. It is clear from **Albulescu (2015)**, that banks' CAR, liquidity, and NIM all had a beneficial impact on their revenue. The non-performing loans and the non-interest expense both had a detrimental effect. According to **Terraza (2015)**, the capital and liquidity proportions have a major impact on bank profitability, which was anticipated to raise the level of capitalization and so comply with regulatory standards. Additionally, **Nguyen et al., (2020)**, finds that non-interest income (NII), CAR, and NIM were unquestionably connected with profitability. However, the state ownership and non-performing loan measures had a significant negative impact on the bank's profits. In accordance with **Dhanapal & Ganesan (2012)**, an increase in non-performing assets (NPA) has an effect on overall revenue and expenses, which in turn affects banks' profit margin. **Garg et al., (2013)**, reveals that major portion of NPA comes from priority sector due to loan-settle off for farmers by the government. This pulls back the profitability level down and places in the non-compliance of CAR. **Goyal et al., (2016)**, confirmed that the primary causes of non-performing

assets (NPA) were small-scale industries and various sub-sectors, as well as Priority Sector lending under PSBs.

3 METHODOLOGIES, DATA SOURCE AND VARIABLES

The study's objective is to identify the implications of capital adequacy compliance and non-compliance of Indian Public-sector banks (PSBs) during the Basel II and III periods.

3.1 *Source of Data*

The study relies on the secondary mode of gathering data directly from the audited balance accounts of financial institutions in the Indian public sector that fall under the Scheduled Commercial Bank (ScCB) category, totalling to 1296 observations. Total population of the study consists of ScCB and Non-Schedule Commercial Banks (NScCB). The study has used a purposive sampling technique.

3.2 *Sample Selection Technique, Frames and Tools*

The sample frame was designed by compiling the data collected from the PSBs and RBI's website. As of March 31, 2020, there were 150 banks in the Scheduled Commercial Banks(ScCBs) category. Of these, 18 were PSBs, 22 were private banks (PvBs), 46 foreign banks(FBs), 53 regional rural Banks(RRBs), 10 small finance bank(SFB), and one payment bank. The study had taken a total sample of 27 PSBs and progressively reduced to 18 due to merger of banks towards the end of the study period. The present study employed both descriptive and inferential statistical tools such as panel regression to analyse the data.

3.3 *Shortlisted Independent Implication Variables description*

The shortlisted variables for the study are Return on Equity(ROEy), Interest Income (INTINC), Non-Interest Income (NONINTC), Net Interest Margin (NIM), and Net Non-Performing Assets (NNPAs).

3.3.1 *Independent variable for Implication on Profitability (PF)*

Return of Equity (ROEy): Its signifies the financial ratio that show how well it manages the shareholders capital and how much profit the bank generates for each rupee of equity it owns. Profitability and the capital adequacy ratio should be positively correlated because, in most situations, a bank will need to increase asset risk in order to obtain better returns (Bateni et al., 2014). ROEy is a ratio of net income to shareholder's equity of a bank.

3.3.2 *Dependent variables description for Implication on Profitability (PF)*

Interest Income (INTINC): Interest Income is the revenue earned by lending money to entities. Normally banks have financial assets through which it earns interest income. In simple, an asset is anything bank own that adds financial value (Dietrich & Wanzenried, 2010). It is calculated by Interest Income to Total Income.

Non-Interest Income (NONINTC): The money that banks and other financial institutions make from non-core operations (such as processing fees for loans, penalties for late payments, credit card fees, service fees, fines, etc.) is known as non-interest income. Non-Interest Income is determined by subtracting Interest Income from Total Revenue.

Net Interest Margin (NIM): Amount of money that a bank is earning as interest from loans compared to the amount it is paying in interest on deposits. It shows how profitable banks are at lending and investing. (Demirguc-Kunt et al., 2013). It's computed by difference between interest earned less paid to average earning assets.

Net Non-Performing Assets (NNPAs): Net non-performing assets are the total amount of non-performing loans less the amount set aside for bad and doubtful debts. Thus, net non-performing assets are the amount that remains after subtracting the provision for outstanding debts from the total amount of unpaid obligations (Albulescu, 2015). It is expressed as NNPAs = Total Gross NPAs less the provisions.

4 ANALYSIS AND INTERPRETATION

The analysis and interpretation of the data are covered in this chapter. The results are analysed and interpreted in accordance with the two objectives that the study has set. To highlight, according to the research period, thirteen banks out of the 19 PSBs were able to comply with CAR standards of 11.5 percent during the Basel III period, whereas six banks were unable to comply as on 31.03.2020. During Basel II period (2008-2013), all the 27 PSBs had complied the CAR norms of nine percent.

4.1 *Econometric Model for the Implication of Capital Adequacy in respect of Profitability (compliance and non-compliance of PSBs)*

The study used a regression model to analyse the implications of profitability (PF), which is advantageous and more appropriate because the study looks to the link between ROE_y and its implication variables, usually after determining the factors that influence CAR compliance and non-compliance. Based on literature reviews, the study hypothesizes the model between ROE_y and its independent implication variables viz. INTINC, NONINTC, NIM, and NNPA_s. The regression model of the study is grouped under the:

ROE_y (Compliance)

$$\text{ROE}_y \text{ it} = \beta_0 + \beta_1 \text{ INTINC it} + \beta_2 \text{ NONINTC it} + \beta_3 \text{ NIM it} + \beta_4 \text{ NNPA}_s \text{ it} + \varepsilon \text{ it} \dots\dots (1)$$

ROE_y (Non-compliance)

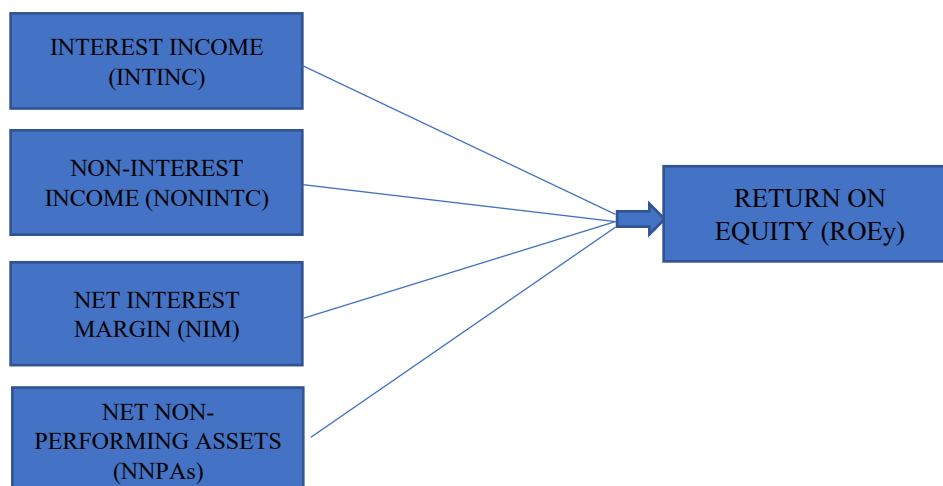
$$\text{ROE}_y \text{ it} = \beta_0 + \beta_1 \text{ INTINC it} + \beta_2 \text{ NONINTC it} + \beta_3 \text{ NIM it} + \beta_4 \text{ NNPA}_s \text{ it} + \varepsilon \text{ it} \dots\dots (2)$$

In the regression

- ROE_y is dependent implication variable
- ROE_y it denotes the ROE_y of bank i at time t.
- β_0 is the constant term
- β shows coefficient of implications

4.1.1 *Framework for the Implication of Capital Adequacy in respect of Profitability (PF) (compliance and non-compliance of PSBs)*

Figure. 1. Implication in respect of Profitability (PF)



4.2 *Result and Analysis*

The descriptive statistics of the analysis of capital adequacy in respect of profitability (compliance and non-compliance) are shown in **tables 4.2.1.1 and 4.2.2.1** with four independent implication variables and considering 'ROE_y' as a dependent variable. Additionally, it summarizes

the model and verifies the data measures—central tendency, variability spread out, and frequency distribution.

4.2.1.1 Descriptive Statistics (DS) of Implication variables of Capital Adequacy in respect of Profitability (compliance)

The descriptive statistics of "ROEy, INTINC, NONINTC, NIM," and NNPA's from 2008–09 to 2019–20 are shown in Table 4.2.1.1.

The DS heads for the observed profitability variables are displayed in Table 4.2.1.1, and the implications are given horizontally, one below the other. ROEy ranges from a minimum of -27.17 with a mean of 2.03 to a maximum of 18.56. The mean values are favourable for each of the study's implications of capital adequacy in relation to profitability (compliance). The variation from the mean is negligible for the remaining implication variables, which are INTINC, NONINTC, NIM, and NNPA's. The ROEy mean and SD, however, are shown to be high. The implication variables are asymmetrical and skew because their mean occurs at irregular frequency.

Three series 'NONINTC' (0.33), 'NIM' (0.36), and 'NNPA's' (0.86) have positive skewness, indicating a greater likelihood of favourable implications. Despite this, "ROEy" (-0.62) and "INTINC" (-0.27) exhibit negative implications, indicating that these variables have a bigger tail and a higher likelihood of having a negative impact on profitability. Since the kurtosis has shifted, the calculated value of kurtosis for all implication variables indicates that the data distribution is not normal. Thus, it demonstrates that during the study period, the implication factors of Capital Adequacy with regard to Profitability (compliance) do not fit the normal distribution.

4.2.1.2 Descriptive Statistics (DS) of Implication variables of Capital Adequacy in respect of Profitability (non-compliance)

The central tendency, variability spread out, and frequency distribution of the descriptive statistics (DS) of "ROEy, INTINC, NONINTC, NIM," and 'NNPA' for 2008–09 to 2019–2020 period that are compiled in table 4.2.2.1.

In table 4.2.2.1 displays the observed descriptive statistics of the profitability implication variables. Based on the table value, the mean ROEy is 0.20, with a maximum of 17.93 and a minimum of -23.58. All of the profitability (non-compliance) implication variables have positive mean values during the course of the investigation. There is a large mean deviation since the mean and SD of ROEy are found to be high; however, the variance from the average is minimal for the other implication variables, namely "INTINC," "NONINTC," "NIM," and "NNPA's." In addition, the implication variables' mean value is asymmetrical, indicating skewness, as it occurs at certain uneven frequencies.

NONINTC (0.43), NIM (0.46), and NNPA's (0.57) are the three variables with the highest skewness among implication variables, indicating that they have a greater likelihood of producing favourable outcomes. However, "ROEy" (-0.50) and "INTINC" (-0.20) are negative, indicating that these variables had a higher value with a wider tail and that there was a greater likelihood that they will have a negative implication on profitability. Because the kurtosis values vary, the calculated kurtosis value for each of the implication variables indicates that the numbers are not regularly distributed. This indicates that the implication variables of Capital Adequacy with regard to Profitability (non-compliance) do not follow a regularly distributed distribution over the course of the study period.

4.2.2 Relationship among implication variables of Capital Adequacy in respect of PF (compliance and non-compliance)

According to the Correlation Analysis (CA) result, there is a positive, negative, or zero correlation between "ROEy," "INTINC," "NONINTC," "NIM," and "NNPA's," with values ranging

from -1 to 1. The findings of CA for CAR compliance and non-compliance are displayed in Tables 4.2.2.1 and 4.2.2.2 respectively.

Referring to Table 4.2.2.1 relationships between the dependent variable "ROEy" and "NONINTC"

(-0.269) and "NNPAs" (-0.796) are negative, whereas those between "INTINC" (0.781) and "NIM" (0.529) are positive. As the implication variables' dataset expands, the other implication variables follow suit, and vice versa. Therefore, it has been verified as a trustworthy starting point for further research on the implications that affect capital adequateness in relation to profitability (compliance).

The CA's findings in Table 4.2.2.2 show that "NONINTC" (-0.224) and "NNPAs" (-0.799) have a negative connection with ROEy, but "INTINC" (0.726) and "NIM" (0.705) have an optimistic correlation. Therefore, the CA has affirmed that it supports additional research on the relationship between capital adequacy and profitability (non-compliance).

4.2.3 *Relationship Strength of the implication variables of Capital Adequacy in respect of Profitability (CAR compliance and non-compliance)*

A relationship known as multicollinearity (MC) arises when more independent implication variables in the regression model have a high degree of correlation with one another. This indicates that the independent implication variables have a strong linear relationship. ROEy serves as the study's dependent variable, while "INTINC," "NONINTC," "NIM," and "NNPA" serve as independent implication variables. VIF and TOL tests support the multicollinearity (Abba et al., 2013). The inverse of VIF represents the Tolerance (TOL). The independent implication variables' VIF/TOL test values demonstrate how accurate the implications are. Multicollinearity between the independent implications variables can be detected by a tolerance < 0.1 and a VIF value > 10 (O'Brien, 2007).

According to table 4.2.3.1, the variables' observed VIF values are "INTINC" (3.099), "NONINTC" (3.423), "NIM" (4.508), and "NNPA" (4.282) in that order (see table 4.2.3.1). It can be seen from the table that the VIF values range from 3.099 to 4.508, which are below 10, and the TOL values range from 0.222 to 0.323, which are much higher than 0.10. This indicates that there isn't a single implication with an advanced linear relationship in regression. Therefore, multicollinearity is not a problem among the independent implication variables for further analysis; the VIF and TOL support the implication of Capital Adequacy with regard to Profitability (**compliance**) datasets.

For the implication variables, Table 4.2.3.2 displays the VIF values as "INTINC" (3.577), "NONINTC" (2.536), "NIM" (2.787), and "NNPA" (4.054), in that sequence. INTINC (0.280), NONINTC (0.394), NIM (0.359), and NNPA (0.247) are the tolerance values that were observed. Accordingly, the table displays that the TOL values range from 0.247 to 0.394, which are greater than 0.10, while the VIF values range from 2.536 to 4.054, which are less than 10. Therefore, it shows that no single implication variable is associated with the regression deeper linear relationship. Therefore, since the observed values of VIF and TOL handle the implication of Capital Adequacy with regard to profitability (**non-compliance**) datasets, the problem of multicollinearity among the independent implication variables does not arise.

4.2.4 *Regression test results of the implication variables of Capital Adequacy in respect of Profitability (compliance and non-compliance of PSBs)*

The results of the regression analysis (RA) are shown in **Tables 4.2.4.1**. The independents implication variables are 'INTINC', 'NONINTC', 'NIM', 'NNPAs', and 'ROEy' is considered as dependent variable.

4.2.4.1 *Results of implication variables of Capital Adequacy compliance of PSBs in respect of Profitability (PF)*

The **Table 4.2.4.1** displays the findings from the study "Implication variables of Capital Adequacy Compliance of Indian PBSs in respect to Profitability." The table displays the combined effect of NNPAs, NII, NIM, and INTINC on ROEy, with an observed Adj R^2 of **0.826**. The remaining

percentage, however, is affected by the other independent implication variables that were not taken into account for the current study ($100\% - 82.60\% = 17.40\%$). According to the R^2 (0.889), **88.90%** of the variation can be explained by the implications. Durbin-Watson (DW) statistics backing the residuals' serial autocorrelation. Accordingly, the practical DW value in the analysis is **2.248**, which specify an absence of autocorrelation.

At 5 percent level, the coefficient of interest income (INTINC) is positive and substantial. In terms of profitability (PF), the outcome indicates that the **"interest income,"** which is a consequence of PSBs' capital adequacy compliance, is expected to be **strong**. This implies an increase in the Reserve and Surplus (R&S), Business Growth, and Yield on Advances (YoA). The **F value of 0.002** (**F 0.002 < P0.01**), as indicated by the Probability F-Statistics test, is considerably impacting because of the Good Profitability resulting from interest revenue from advances. This inference is that R&S, credit expansion, and bank lending cycles have increased capital, which in turn complies with PSBs' CAR compliance.

Hence, H_{a1} , "All the selected independent Implication variables of Capital Adequacy compliance of PSBs together in respect of Profitability have a significant effect on ROEy", is accepted.

According to the results, **"interest income"** has an impact on PSBs' capital adequacy compliance in terms of profitability. This means that it increases the reserve and surplus, business growth, and yield on advances (YoA) of Indian PSBs that are subject to **capital adequacy compliance**.

4.2.4.2 Results of Implication variables of Capital Adequacy non-compliance in respect of Profitability (PF)

The following **Table 4.2.4.1** displays the findings of the study "Implication variables of Capital Adequacy Non-Compliance of Indian PBSs in respect of Profitability." The Adj R^2 value of **0.854** indicates that the combined impact of NIM, NNPA's, INTINC, and NONINTC on ROEy is significant, with a reported value of **85.40%**. In the current investigation, the additional independent implication variables represent the remaining ($100\% - 85.40\% = 14.60\%$). R^2 is **0.907**, meaning that **90.70%** of the variation in ROEy can be explained by the implications. Further the analysis shows no autocorrelation, as indicated by the observed DW findings of **2.806**.

At the five percent significance level, the Net Non-Performing Assets (NNPAs) coefficient is determined to be positive. Given the significant outcome, which indicates a bad level of non-performing assets leading to the implications of capital adequacy, thereby leading to non-compliance of PSBs which implies that bad loans, write-offs, recovery expenses, and large provision coverage are signified.

The Probability F-Statistics is **0.001** (**F 0.001 < P0.01**), indicating a highly significant effect due to the **high NNPA's**, which raise risk-weighted assets (RkWA) and result in a high provision on profitability that affects ROEy and causes **Capital Adequacy Non-compliance**.

Henceforward, H_{a2} , "All the selected independent implication variables of Capital Adequacy Non-compliance of PSBs together in respect of Profitability have a significant reason on ROEy", is accepted.

The investigation discloses that the Non-performing asset level is found to be bad, and NNPA's is considered having an implication of Capital Adequacy Non-compliance of PSBs in respect of Profitability, thus implies that it reflects upon bad loans, high provision coverage, write-off, and an increased recovery costs, which are all considered having implications of Capital Adequacy non-compliance of Indian PSBs on Profitability (PF).

5 SUMMARY OF FINDING AND CONCLUSIONS

This section gives a comprehensive summary list of finding, the conclusion and suggestions.

5.1 *CAR Compliance and non-compliance of Indian PSBs – Basel II & III periods*

In India, the Basel II period was scheduled from 1st April, 2008 to 31st March, 2013. The RBI has stipulated the Indian PSBs to maintain a minimum CAR of 9. Initially, there were 27 PSBs and all the PSBs during this period have complied to CAR norms of 9 percent. Subsequently, Basel III period was introduced which was scheduled from 1st April 2013 to 31st March 2020. The statutory minimum CAR norms for Basel III period was fixed to 11.50 percent by BCBS and RBI has instructed the Indian Scheduled Commercial Banks (SCBs) to maintain a minimum 11.5 percent CAR as per Basel guidelines.

At the beginning of the study period, there were 27 PSBs and gradually reduced to 19 because of banks merger. Of which, 13 PSBs under is found to have complied with CAR norms of 11.5 percent and six banks failed to comply with the Basel III norms. From the identified compliance and non-compliance group, the current study moved forward in recording the finding of the implications of capital adequacy compliance and non-compliance in respect of Profitability (PF).

5.2 *Implications of Profitability (PF) - CAR compliance*

The summary of discoveries of implications of selected variables on capital adequacy compliance in respect of profitability (ROE_y) is given below.

The implication variables viz. '*INTINC*', '*NONINTC*', '*NIM*' & '*NNPAs*' are were put into *t* & *F* test. The results *t*-test ($0.01 < P_{0.05}$) and *F*-test ($F\ 0.00 < P_{0.01}$) proposes that *INTINC* alone is found to have a substantial implication at 1 percent level which in turn marks the **CAR compliance**. The analysis reveals that the interest revenue of the PSBs under consideration is significant. It additionally reveals that a growth in interest income has a major impact on profit, which raises reserves and surpluses and, ultimately, Indian PSBs' capital adequacy compliance. Thus, it could be found that *INTINC* has a significant implication of Capital Adequacy compliance with respect to Profitability (ROE_y). Ultimately increases the reserves & surpluses, business growth cycle and yield on advances (YoA).

5.3 *Implications of Profitability (PF) - CAR non-compliance*

The findings on the implication of Capital Adequacy non-compliance in respect of profitability (ROE_y) are as follows.

The implication variables viz. '*INTINC*', '*NONINTC*', '*NIM*' & '*NNPAs*' are carried into *t* & *F* tests. From the *t*-test ($0.05 < P_{0.05}$) and *F*-test ($F\ 0.00 < P_{0.01}$) results, *NNPAs* show a significant effect on ROE_y at 1 percent level on ROE_y which, in turn, affects the **CAR non-compliance**. The study reveals that *NNPAs* is **high** for PSBs CAR non-compliance group. It makes an interlinks with high **credit risks** and **high provisions** towards bad loans, which, in turn, rises **write-off and recovery costs**. The growth in *NNPAs* replicates upon **high credit risk weighted assets** which run to **decrease profitability**. Thus, the *NNPAs* implication is considered to be a vital for the implication of poor profitability under CAR non-compliance group.

5.4 *Suggestion of the Study*

According to the findings, recommendations are made that,

- In order to strengthen PSB's capital, reserves, and surpluses and relieve demand for further capital infusion, it is advised that write-offs of loans to priority and non-priority industries be avoided.

5.5 *Scope of Future studies*

There are plenty of chances to look into other unknown consequences related to credit, market, and operational risks.

Table 4.2.1.1
Descriptive Statistics in respect of PF (compliance) during 2008-09 - 2019-20

Implication	Mean	Median	Minimum	Maximum	Std.	Skewness	Kurtosis(K)	No. of Observations
ROEy	2.03	7.55	-27.17	18.56	16.5	-0.62	-1.15	1296
INTINC	7.92	7.96	6.87	8.82	0.72	-0.27	-1.39	1296
NONINT	0.99	0.91	0.84	1.17	0.15	0.33	-2.09	1296
NIM	2.38	2.34	2.03	2.80	0.23	0.36	0.19	1296
NNPAs	3.83	2.91	0.71	9.37	3.09	0.86	-0.45	1296

Source: The results are computed based on secondary data compiled from RBI and PSBs Audit Reports.

Table 4.2.2.1

Implication	Mean	Median	Minimum	Maximum	Std. Dev.	Skewness	Kurtosis	No. of observations
ROEy	0.20	5.15	-23.58	17.93	15.42	-0.50	-1.29	1296
INTINC	7.99	7.99	6.89	8.97	0.72	-0.20	-1.38	1296
NONINTC	0.86	0.84	0.67	1.15	0.18	0.43	-1.45	1296
NIM	2.22	2.22	1.77	2.76	0.25	0.46	1.60	1296
NNPAs	4.42	3.35	0.84	10.34	3.29	0.57	-1.09	1296

Descriptive Statistics in respect of PF (non-compliance) during 2008-09 - 2019-20

Source: The results are computed based on secondary data compiled from RBI and PSBs Audit Reports.

Table 4.2.2.1
Correlation results in respect of PF (compliance) during 2008-09 - 2019-20

IMPLICATION VARIABLES	ROEy	INTINC	NONINTC	NIM	NNPA
ROEy	1.000	.781	-.269	.529	-.796
INTINC	.781	1.000	-.605	.433	-.621
NONINTC	-.269	-.605	1.000	-.644	.345
NIM	.529	.433	-.644	1.000	-.721
NNPAs	-.796	-.621	.345	-.721	1.000

Source: The results are computed based on secondary data compiled from RBI and PSBs Audit Reports

Table 4.2.2.2
Correlation results in respect of PF (non-compliance) during 2008-09 - 2019-20

Collinearity Statistics			
	Implication	TOL	VIF
	INTINC	.777	1.286
	NONINTC	.797	1.253
	NIM	.777	1.286
	NNPAs	.234	4.282
a. Dependent Variable: ROEy			

Source: The results are computed based on secondary data compiled from RBI and PSBs Audit Reports.

Table 4.2.3.1
Relationship Strength result in respect of PF (compliance) during 2008-09 - 2019-20

IMPLICATION VARIABLES	ROEy	INTINC	NONINTC	NIM	NNPA
ROEy	1.000	.726	-.224	.705	-.799
INTINC	.726	1.000	-.608	.506	-.688
NONINTC	-.224	-.608	1.000	-.491	.239
NIM	.705	.506	-.491	1.000	-.693
NNPAs	-.799	-.688	.239	-.693	1.000

Table 4.2.3.2
Relationship strength result in respect of PF (non-compliance) during 2008-09 - 2019-20

Collinearity Statistics			
	Implication	TOL	VIF
	INTINC	.780	1.282
	NONINTC	.204	4.906
	NIM	.359	2.787
	NNPAs	.747	1.338
a. Dependent variable: ROEy			

Source: The results are computed based on secondary data compiled from RBI and PSBs Audit Reports.

Table 4.2.4.1
Regression results of Implication variables of Capital Adequacy Compliance & Non-compliance of PSBs in respect of Profitability during 2008-09 - 2019-20

ROE _y (Dependent variable)			
Independent Implication variables of Capital Adequacy Compliance / Non-Compliance		Results of Compliance	Results of Non-compliance
IMPLICATION VARIABLES	INTINC	.673 (0.019)** {5.117}	.379 (.125) {4.656}
	NONINTC	0.406 (0.124) {26.421}	.268 (.187) {15.845}
	NIM	0.178 (0.527) {19.456}	0.267 (.207) {12.044}
	NNPAs	-0.445 (0.131) {1.401}	-0.544 (0.050)** {1.086}
RESULTS	R-squared	0.889	0.907
	Adjusted R-square	0.826	.854
	DW Statistics	2.248	2.806
	F-Equation	14.033	17.148
	Prob. (F-Statistics)	0.002***	0.001***
	Observations	1296	1296

Sources: The results are computed based on secondary data compiled from RBI and PSBs Audit Reports.

*** denoted 1% level of significance; ** denoted 5% level of significance.

Figures in parentheses denote p values of the respective independent implication variable. Figures in square brackets denote Standard Error.

References:

- Abba, G. O., Peter, Z., & Inyang, E. (2013). Capital Adequacy Ratio and Banking Risks in the Nigeria Money Deposit Banks. *Research Journal of Finance and Accounting*.
- Al-Sabbagh, N. M. (2000). *Determinants of Capital Adequacy Ratio in Jordanian Banks*. Yarmouk University, Irbid, Jordan.
- Albulescu, C. T. (2015). Banks' Profitability and Financial Soundness Indicators: A Macro-level Investigation in Emerging Countries. *Procedia Economics and Finance*, 23(October 2014), 203–209. [https://doi.org/10.1016/s2212-5671\(15\)00551-1](https://doi.org/10.1016/s2212-5671(15)00551-1)
- Bateni, L., Vakilifard, H., & Asghari, F. (2014). The Influential Factors on Capital Adequacy Ratio in Iranian Banks. *International Journal of Economics and Finance*, 6(11), 108–116. <https://doi.org/10.5539/ijef.v6n11p108>
- BCBS. (1999a). *A New Capital Adequacy Framework*.
- BCBS. (1999b). *Core Principles Methodology*.
- Berger, A. (1995). (1995). The Relationship between Capital and Earnings in Banking. *Journal of*

- Money, Credit and Banking*, 27(2), 432–456. <http://dx.doi.org/10.2307/2077877>
- Demirguc-Kunt, A., Detragiache, E., & Merrouche, O. (2013). Bank capital: Lessons from the financial crisis. *Journal of Money, Credit and Banking*, 45(6), 1147–1164. <https://doi.org/10.1111/jmcb.12047>
- Dhanapal, & Ganesan. (2012). International Conference on Business and Management. *Measuring Operational Efficiency of Public Sector Banks in India*, 6(7), 700–713.
- Dietrich, A., & Wanzenried, G. (2010). *Determinants of bank profitability before and during the crisis : Evidence from Switzerland. January.*
- Douglas J Elliott. (2010). *Basel III , the Banks , and the Economy.*
- Garg, S., Jindal, P., & Bhavet. (2013). A Study of Operational Efficiency of Selected Public Sector Banks in Indai - Issues and Challenges. *International Journal of Research in Commerce, Economics and Management*, 3(1), 10–14.
- Goyal, N., Agrawal, R., & Aggarwal, R. (2016). A Study for Identifying Reasons for Low Preference of Priority Sector Lending of Indian Commercial Banks. *International Journal of Sustainable Economies Management*, 5(2), 21–34. <https://doi.org/10.4018/ijsem.2016040103>
- Kalhoefer, C., & Salem, R. (2008). Profitability Analysis in the Egyptian Banking Sector by. *Faculty of Management Technology, German University in Cairo*, 7, 1–20.
- Kochadai Muthiah, Aroquiadasse Rayappin, & Kavidha. (2020). Basel III, Capital Adequacy Status of Indian Public Sector Banks. *Studies in Indian Place Names (UGC Care Listed Journal)*, 40(20), 201–214.
- Koehn, M., & Santomero, A. M. (1980). Regulation of Bank Capital and Portfolio Risk. *The Journal of American Finance*, 35(5), 1235–1244.
- Lang, J., & Forletta, M. (2020). Cyclical systemic risk and downside risks to bank profitability. *Working Paper Series.*
- Morgan, G. (1984). On the Adequacy of Bank Capital Regulation. *Journal of Financial and Quantitative Analysis*, 19(2), 141–162.
- Narasimham, M. (1991). *The Financial System.*
- O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality and Quantity*, 41(5), 673–690. <https://doi.org/10.1007/s11135-006-9018-6>
- Pasiouras, F., Tanna, S., & Zopounidis, C. (2009). The impact of banking regulations on banks' cost and profit efficiency: Cross-country evidence. *International Review of Financial Analysis*, 18(5), 294–302. <https://doi.org/10.1016/j.irfa.2009.07.003>
- Poloni, P., Agresti, A., & Baudino, P. (2008). The ECB and IMF indicators for the macro-prudential analysis of the banking sector: a comparison of the two approaches. *ECB Occasional Paper.*
- Reserve Bank of Australia. (2010). *The Global Financial Crisis.*
- Rifaat Ahmed, A. K. (1996). The impact of the Basle capital adequacy ratio regulation on the financial and marketing strategies of Islamic banks. *International Journal of Bank Marketing*, 14(7), 32–44.
- Tanwar, A., & Jindal, P. (2019). CRAR-An analysis of financial soundness of selected public sector banks, private sector banks and foreign banks in India. *International Journal of Innovative Technology and Exploring Engineering*, 8(7), 327–331.
- Terraza, V. (2015). The Effect of Bank Size on Risk Ratios: Implications of Banks' Performance. In *Procedia Economics and Finance* (Vol. 30, pp. 903–909). [https://doi.org/10.1016/s2212-5671\(15\)01340-4](https://doi.org/10.1016/s2212-5671(15)01340-4)
- Thoa, P. T. X., Anh, N. N., & Minh, N. K. (2020). The determinant of capital adequacy ratio: Empirical evidence from Vietnamese banks (a panel data analysis). *Afro-Asian Journal of Finance and Accounting*, 10(1). <https://doi.org/10.1504/AJFA.2020.104406>