

Do Technology Advanced Modern Banks Outperform Traditional Banks in India? - an Empirical Insight

T. Mohanasundaram, P. Karthikeyan, V. Krishnamoorthy

Abstract: *This research paper examined whether modern banks viz., foreign origin banks in India and the Indian new generation private banks outperform the conventional banks viz., public sector banks and old generation private banks. The modern banks are technology driven and have an upper hand in offering ancillary services vis-à-vis traditional banks. The study explores the performance of different banking groups by analysing the interconnections among asset quality, financial soundness, profitability and credit growth of different bank groups in India since 2005 to 2018. Asset quality signifies an important role in the financial health of the banks. Reserve Bank of India (RBI) levied severe asset quality measures on banks operating in India during 2015-16. This unfolds the long hidden financial miseries. The regulators and central banks across the world worked persistently towards enhancing the banks' ability to observe the inherent and external risks. As a result of this, stringent capital norms based on risk-weighted classification of assets were implemented to ensure financial soundness of the banks. These two policy measures brought a drastic change in the Indian banking sphere. These changes perhaps lead to interesting research questions viz., do they affect profitability and credit growth of the banks? We addressed this research question through empirical analysis. Further, to identify whether the technology-based modern banks perform better in comparison to traditional banks, the paper measures the effect of these norms on different bank groups viz., public sector banks, private old sector banks, private new generation banks and banks from foreign origin by drawing comparisons between pre-implementation period and post-implementation period of these norms. The study comprised all banks in different banking groups which were operating since 2005. The data were collected from CMIE prowess IQ and various Reserve Bank (RBI) reports. The study outcome is expected to disclose possible nexus among the chosen variables with reference to different bank groups and also reveals whether modern banks better than traditional banks.*

Keywords : *Technology, Asset quality, Financial soundness, Profitability, Credit growth, Risk*

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I. INTRODUCTION

Now-a-days, banks have become more contented with a higher speed of innovation. The modern banks – foreign banks and new generation banks – in India are using the data and analytics more widely for offering better services to the customers. The importance of innovation in the high competitive environment is well-known. A glance ahead displays a drastic emphasis on innovative technologies for inclusive banking. The consolidation in banking industry seems to be inevitable as the future is to be collaborative with high standards of customer centric services. The new technology oriented banking services using Artificial Intelligence (AI), Block chain technology etc. are expected to take a prominent place in banking. The digital banking has changed the landscape of financial services in a short-period.

The country's banking sector performs a far-reaching role for its economic enlargement. The Indian financial system including banking sector is operating in a more liberalized global circumstance since the year 1991. In India, the financial system is found to be more 'bank-based' rather than 'market-based' (Sahoo, 2013). Banks in India accomplish a significant chunk in the country's capital formation by mobilizing funds from the surplus units. Similarly, the credit extended by the banks are indispensable for the prosperous of the business in the country. Thus, the robustness of banks in terms of asset quality, financial soundness, profitability and credit growth goes a long-way in the economic exhilaration of a country. However, in the recent past, the Indian banking sector is confronting extreme stress which ruined the health of the banks' financial statement during the last four years since 2015-16. The prolonged deterioration in the quality of banks' asset demanded an abrupt escalation in the loan provisions for the first time since liberalization in 1991. Though the entire banking sector encountered the distress, the impact was felt more in the public sector banks (PSBs), as they recorded massive financial loss.

The Reserve Bank of India (RBI) stipulated three-diverge approach for revitalising the strained banking sector viz., Asset quality reviews for the recognition of stressed assets, recapitalisation of the Public Sector Banks to ensure financial soundness by fulfilling the regulatory norms for Capital Adequacy Ratio (CAR), and the Implementation of a new framework named Insolvency and Bankruptcy Code

(IBC) for the settlement of strained assets. The effect of higher provisioning owing to stressed loans had not only drained the banks' profitability but also deterred the credit growth. To ensure the financial soundness, banks are forced to adhere the strict regulatory norms of Capital adequacy ratio. This brought extensive shift in the bank portfolio in balancing the risk weighted assets which in-turn might have an adverse consequence on credit growth. In this paper, we address the research question 'Do the asset quality (measured by proportion of NPA to Total assets) and Financial Soundness (measured through CAR) hampers the bank's Profitability and Credit growth?' We also attempt to quantify this effect for various bank segments viz., Nationalized (public) banks, old sector private banks, private new generation banks and foreign origin banks during different phases of the study period.

A. Asset Quality

Credit risk is one of the crucial risks met by the commercial banks across the world. The active administration of this risk is the integral constituent of holistic management of risk which is necessary for long-run success of any banks. Only those banks which have efficient risk administration practices will withstand for long period in this competitive field. The success of the bank is purely based on its ability to accept and manage the risk in such a way that risk component is very minimal in its portfolio. The assets quality is a significant measure to assess the goodness of the bank. The sole purpose for gauging the asset quality is to discover the quantum of NPA (non-performing assets) to the TA (total assets). This signifies how risky the loans are made by the banks to income from interest component. Thus, quality of assets represents the classification of debtors possessed by the bank and the evaluation of an asset to measure the credit risk associated with it. The decline in the quality of assets of all segments of banks, particularly Nationalized banks (PSB), can be drawn to the liberal credit policies and lending boom happened from 2006 to 2011 period. During this period, bank loans raised at a rate of above 20 percentage on an average. Some important reasons for drastic fall in asset quality were attributed to; liberal credit scrutiny; lack of post-loan sanction monitoring system; postponements in completion of the projects and budget overruns; and lack of a strong bankruptcy regime till recently.

B. Capital Adequacy

The premise behind capital adequacy is that an entity should assess its risks and hold capital in proportion with its risk profile and control environment. It specifies whether or not, the bank has adequate capital to face the unanticipated and abnormal losses. In order to reduce the systemic risk potential, global regulation and supervision was started in the year 1987 by setting up BCBS (Basel Committee on Banking Supervision) below the monitoring of the BIS (Bank for International Settlements). Banking regulators all over the world use the capital adequacy norms as the main instrument for effective supervision of the Banking system. RBI initiated the capital to risk-weighted asset system for banks in India since April 1992. The CAR (capital adequacy ratio) express the relationship between the bank's current capital and bank's risk-weighted credit exposure in percentage terms. It acts as an indicator of bank leverage and used to safeguard depositors and encourage the soundness and effectiveness of financial systems. The principle behind CAR is to regulate and control the behaviour of banks in India. Thus, capital

adequacy regulation is to forecast the inherent risks of a bank's balance sheet and the need for capital to cover those risks.

C. Bank Profitability

A profit is the balance portion available in the hands of a business concern after it pays for all expenses directly related to the generation of the revenue and those related to the conduct of the business activities. The mainstream share of a bank's profit is reaped through the interest income it earns on its assets and the fees that it charges for its services and. The bank's main expenditure is the interest payments made for its deposits and borrowings apart from the overhead expenses. The primary asset for any commercial banks is its lending money to the individuals and corporates apart from the securities that it holds, whereas, its main liabilities are the deposits received from individuals and firms; money it borrows either from RBI other commercial banks and, by selling debt instruments in the money market. Not all assets of the bank can be used to earn income, because banks should hold a certain portion of cash to fulfil the obligation of cash withdrawal from its customers. The bank's management and promoters are mainly concerned about its return on equity (ROE), because it is the benefit they receive on their investment.

D. Credit Growth

The expansion of banking activity is primarily measured through the magnitude of accepting deposits and lending of credits. Credit growth of a bank is an important financial barometer to evaluate the banks' progression. Usually, credit growth depends on prevailing economic cycle where the faster credit growth is supported by booming conditions and the lower credit growth is attained during recession phase of the economic cycle. Along with the banks' credit growth, the profitability of the bank also varies. During the past few years, the banks' credit growth was slowed down considerably. Though, the stipulated capital adequacy regulations are mainly implemented to ensure the bank's ability to observe any unforeseen risk which may arise from external environment, it also demands to maintain high reserves which in-turn led to lesser money for credit. It is widely believed that higher capital adequacy norms is affecting the banks' lending sphere.

II. BACKGROUND AND PROBLEM STATEMENT

The banking system is now facing the risk of losing its credibility because of large piling of bad loans, objectionable practices and frequent policy changes. Even though RBI regularly inspect the books of the banks on a yearly basis, as a process of annual financial inspection (AFI), a distinct review named as Asset Quality Review (AQR) was conducted in August-November 2015-16. Banks were given two quarters time to complete the asset classification. Reports suggested that nearly two hundred accounts were recognized which the banks were informed to consider them as NPA. This distinct review (AQR) has drastic negative impact on bank's profit and loss accounting statements because many big banks had fallen into huge distress not only in the said quarter, but also caused them reporting massive losses during the entire

financial year. Nearly all the nationalized (PSU) banks were adversely affected, whereas the effect among the private players was partial. Thus, the asset quality of the banks may have substantial effect on both net profitability and credit growth.

RBI, the regulator insists all Indian banks to strictly adhere to capital adequacy regulation norms to protect investors' confidence and to hold capital in proportion to risk-weighted assets. The impact of adopting global regulatory norms has resulted in shift in portfolio of banks during different Basel frameworks. This shift might affect the credit growth, profitability and credit risk of the banks. Indian banks have undergone various stressful situations after the implementation of global capital adequacy regulation norms along with national regulatory context and asset quality review for banks by RBI. Banks in India caters to the needs of credit for all sections of the economy. Thus, existing study is necessary in order to examine the effect of asset quality and capital adequacy regulation on the profitability and the credit growth of Indian banks for the period of fourteen years (2005-2018). The effect of AQR was felt till 2018, therefore analysis was carried out separately to identify the change in asset quality and its effect the period 2015 to 2018.

Hypothesis:

H₀: Asset quality and financial soundness have negative impact on profitability

H₀: Asset quality and Financial Soundness have negative impact on Credit Growth

III. LITERATURE REVIEW

This *Laveena and Guleria (2016)* studied the NPA and stressed loans of PSU banks in India during 2010-2015. The study found that public sector banks had higher level of NPA and suggested remedial measures to reduce NPA in Indian banking sector. *Vishwanathan (2016)* reported that the increase in poor assets was primarily because of the quick and liberal credit lending during the period from 2006 to 2011. At this time, the credit growth (in nominal value) was higher than 20 per cent on yearly basis. Further, stressed loans had recorded a stable progress since the year 2011, nevertheless the growth was muted until 2014. RBI undertook a rigorous examination on the quality of bank assets, called (AQR) in 2015-16 which led to identification as NPA of several loans, which lenders had treated them as good loans (standard assets). *Seth (2016)* examined the influence of global capital adequacy norms on the credit growth with the sample of banks functioning in India from 1996 to 2014. The findings revealed that increase in credit growth is supported by increase in the deposit growth and the regulatory changes have helped Indian banks in improving its credit quality. The study concluded that global regulatory norms are successful in improving the credit quality of Indian banks without inhibiting the credit growth significantly. *Pausch and Welzel (2002)* analyzed the effect of CAR (capital adequacy ratio and its bearing on the variation in the deposit rates and lending rates and found that CAR encouraged banks follow risk averse behavior. Also, due the influence of capital adequacy norms, there is an encouragement for banks to involve in the risk management practices, i.e., hedging,

Wanjohi and Njeru (2016) examined the effect of capital adequate norms on the Kenya's SACCO bank credit

risk profile and revealed that Capital adequate norms, which is computed in the form of bank's Capital to its Risk weighted assets, has an adverse and statistical significance impact on the quantum of Credit risk of SACCO banks in Kenya. *Boudriga et al. (2009)* done an empirical analyses on the cross-countries' causes of non-performing loans and the potential effect of regulatory factors on credit risk acquaintance in the MENA (Middle East and North Africa) nations by employing data pertaining to banking, economic, financial and legal and regulatory environment in a panel framework for 59 nations from 2002 to 2006. The findings revealed that CAR is both positive and significant in supporting the view that higher capitalized financial institutions and banks are not having regulatory pressures to mitigate their credit risk. *Swamy (2012)* investigated the macroeconomic determinants and indigenous factors of non-performing loans of Indian banks. The study used panel data set having different variables of various banks for the period 1997-2009 and disclosed that size of the bank has the statistically significant negative impact on the non-performing loans. On the other hand, real GDP rate, inflation rate, capital adequacy norms and bank loan rate had negligible impact on NPAs in Indian banks. *Djiogap and Ngomsi (2012)* I nvestigated the factors influencing bank long-term loans in CEMAC (Central African Economic and Monetary Community). The study applied panel data framework for 35 commercial banks spread over six different African countries from 2001-2010. The results revealed that there was a negative and significant effect of capital adequacy ratio on the quantum of non-performing loans. The outcome of the study supported that highly diversified and capitalized banks are performing better and has potential to survive when credit risk arises.

Poudel (2018) attempted to discover the key indices of credit risk among the commercial banks in Nepal by means of the sample of fifteen banks functioning in Nepal and identified that bank liquidity has a positive and significant effect on credit risk on the banks in Nepal. CAR and interest spread (i.e. difference between interest income and interest expenses) had statistically significant and negative impact on the bank's credit risk. The result additionally established that the size of the bank and interest spread have no specific direction of effect on the credit risk. *Kasana and Naveed (2016)* investigated the antecedents of credit risk of banks operating in Pakistan by applying Ordinary Least Square regression analysis and panel data analysis using the extensive data of 26 banks for the period from 2007 to 2013. The outcome revealed that CAR (capital adequacy ratio) had high significant and positive association with credit risk. Further, bank size had significant but adverse effect on credit risk among the banks in Pakistan. Interest rate growth doesn't found to be having any impact on the Pakistan bank's credit risk. *Godlewski (2004)* informed about the regulation of capital in banks by the regulatory body was conducive and favourably associated to risk taking behavior. High level of credit risk had resulted in an upsurge in the non-performing loan ratio. *Nachane et al. (2001)* analyzed the effect of capital variations due to regulatory changes on bank behavior by using data from the public sector banks (PSBs) in India during

1997-1999 and explored that the implementation of CAR (capital adequacy regulation) had an impact on the bank's decision on capital ratio.

Petria et al (2015) inspected the antecedents that disturb profitability of banks by considering the bank-specific determinants, industry specific determinants and economic determinants from 2004 to 2011 and identified the following risks viz., bank credit risk, liquidity issue, management competence, diversification of business, market concentration and economic growth had influence on bank profitability in EU27. *Owoputi et al.(2014)* studied the effect of bank indicators and economic indicators on the profitability of banks in Nigeria during 1998-2012 and disclosed there exist significant and positive consequence of capital adequacy, size of bank, increase in productivity and bank deposits on the bank profitability. Whereas, credit risk and liquidity ratio had statistically significant and negative impact on the bank profitability. *Anber and Alper (2011)* investigated the bank-related and macroeconomic factors on the profitability of banks in Turkey during 2002-2010 by using panel data base and revealed that credit portfolio size and stressed loans had significant negative bearing on the bank profitability. Real interest rate is the sole economic variable found to be influencing the performance of banks favorably. *Parameswar et al. (2016)* examined the several new steps initiated by ICICI bank to get the competitive advantage in the sector. The study discovered the banks new initiatives in India towards ever-lasting business practices through the better usage of latest technologies, innovative banking services and attractive offerings.

Ameur and Mhiri (2013) identified the antecedents explaining the performance of Tunisian bank by retaining the 10 main commercial Tunisian banks during 1998 to 2011 period, and found that private owned banks were more profitable than state owned ones and hence privatizing state-owned Tunisian banks was recommended to improve their performance. *Bukhaari and Quodous (2012)* analyzed the association among the determinants that affects the bank profitability by employing five years data from 2005 to 2009 for 11 different commercial banks operating in Pakistan and recognized that some bank-specific variables had effect on profitability of the banks. On the other hand, economic and other variables had not affected the bank's profit. *Sufian (2011)* explored the banks' profitability in Korea using numerous bank specific factors and macroeconomic factors. The research found that banks with low level of Loan to Total Asset had high level of profitability and greater diversification. *Sing and Chaudhary (2009)* evaluated the Indian's banking sector considering data from 2002 to 2007 in terms of profitability. The outcome revealed that the banks' profitability had remarkably improved during the recent years. The macroeconomic variables such as per capita income (PCI), trade exports and forex reserves influenced the banks' profitability. *Kohlscheen et al. (2018)* analyzed the important factors of bank profitability of 534 banks operating in 19 emerging market economies. The outcome showed that financial cycle appeared to predict the bank profitability in a better way than the business cycle.

Borio et al. (2015) investigated the effect of monetary policy on the bank profit by considering the data from 109 big international banks which are headquartered in 14 large developed economies from 1995 to 2012 and identified that lower interest rates and flat term structure

eroded the profit of the banks. *Claessens et al. (2017)* investigated the impact of less interest rates on the bank net interest margins and profitability. It was discovered that low interest rates had huge effect on NIM (net interest margin) of the banks. Profitability was found to be adversely related to the length of time when interest rate was lesser. *Sheefeni (2015)* scrutinized the macroeconomic determinants for bank profitability in Namibia and explored that macro-economic setting does not play a role of inducing the profits of commercial banks. *Gyamerah and Benjamin (2015)* investigated the relationship between profitability and a bunch of bank-related features and the macroeconomic determinants on both foreign banks and local banks in Ghana during 1999-2010 and exposed that cost management had an opposite connection with bank profitability and bank size. Whereas, Credit risk had a positive association with profitability. It was suggested that the bank has to give attention to cost control and prudent risk management in order to get profitability. *Neha Chhabra Roy & Viswanathan (2018)* studied the effect of disturbance due to technology on the employees of banks in India and suggested an index for measuring workforce challenges in Indian banks. The bank customers today many options as delivery channels are considered and all these are outcome of technology (*Tulsi Rao and Lokeswara Rao, 2015*). Alt and Puschmann (2016) explored that banks' core competencies were moved from quality customer service, advanced products and handling bank transaction smoothly to online bank management, data analytics and technological platforms.

IV. OBJECTIVES OF THE RESEARCH

- To evaluate the performance of technology driven modern banks compared to traditional banks.
- To examine the influence of asset quality on the profitability and credit growth.
- To analyze the effect of financial soundness (CAR) on the profitability and credit risk.
- To study the impact of asset quality review on Non-Performing Assets of Indian banks.
- To identify the performance of different bank groups viz., public, old private, new private and foreign banks on various parameters.

V. METHDOLOGY AND DATA

The empirical research design is employed in this research study. The size of the sample is 55. The sample of traditional banks consists of data from 19 nationalized banks, 12 old generation private sector banks and SBI group. The modern banks sample includes 7 new generation private segment banks and 16 foreign banks operating in India. The data of different banks are obtained from CMIE-Prowess database, RBI database and trading economics. The data on the variables are collected for the last fourteen years i.e., from 2005 to 2018.

H₀: Asset quality and financial soundness have negative impact on profitability

| | Variable name | Proxy |
|--|---------------|-------|
|--|---------------|-------|



| | | |
|---------------------|------------------------|---|
| Predicted variable | ROA (Return on Assets) | (NP/TA) Net Profit to Total Assets |
| Predictor variables | Financial Soundness | Capital adequacy ratio (Ln CRAR) |
| | Asset Quality | Gross non-performing assets ratio (Gross NPA/ Total Advances) |

H₀: Asset quality and Financial Soundness have negative impact on Credit Growth

| | Variable name | Proxy |
|-----------------------|---------------------|---|
| Dependent variable | Credit Growth | Ln First difference of advances |
| Independent variables | Financial Soundness | Capital adequacy ratio (Ln CRAR) |
| | Asset Quality | Gross non-performing assets ratio (Gross NPA/ Total Advances) |

The quantitative data collected are then analysed using econometric packages such as E views and Stata. Analysis viz., descriptive statistics and Bivariate OLS regression and Panel regression are applied to examine the effect of independent variables on dependent variables used in the study. Higher CAR implies higher financial soundness and, higher GNPA ratio reflects poor asset quality.

VI. THEORETICAL FRAMEWORK

Descriptive statistics quantitatively explains the main features of the data series. The normality test has been conducted for all the variables. The study applies Jarque-Bera test to inspect whether or not the chosen variables are distributed normally. The standard deviation is used as a measure of risk and volatility. It is a quantitative measure that is used to determine how the values of the data series differ from the mean value of the series. Higher the standard deviations, higher will be the volatility and risk and vice versa.

Pooled data analysis, pools all observations together without considering the time series and cross section nature of data. It can be represented as;

$$C_{it} = \beta_1 + \beta_2 Q_{it} + \beta_3 R_{it} + \beta_4 S_{it} + u_{it}$$

Where, C represents dependent variable, Q,R and S represent independent variables, i represents ith subject, t represents the time period for the variables Q, R and S, β represents the coefficients and u represents the error term distributed with zero mean and constant variance.

The regression equation is modelled and analysis is performed to observe the impact of explanatory variables on explained variables. The panel data regression is carried out to capture the impact of explanatory variables on explained variables which are not able to be observed directly but correlated with other observed variables.

VII. ANALYSIS AND DISCUSSION

A. Descriptive Statistics

Table-I: Descriptive Statistics of Profitability (ROA)

| Bank Group / Variables | Traditional banks | | | Modern banks | |
|------------------------|--------------------|--------------------------|-----------|--------------------------|---------------|
| | Nationalised banks | Old private sector banks | SBI group | New private sector banks | Foreign banks |
| Mean | 0.006695 | 0.013107 | 0.010379 | 0.017997 | 0.028723 |
| Median | 0.010474 | 0.014117 | 0.013040 | 0.018125 | 0.028154 |
| Maximum | 0.013961 | 0.019169 | 0.015040 | 0.024553 | 0.037249 |
| Minimum | -0.015658 | 0.005889 | -0.002175 | 0.011881 | 0.021777 |
| Std. Dev. | 0.008676 | 0.004266 | 0.004717 | 0.004172 | 0.004657 |
| Skewness | -1.462178 | -0.387406 | -1.501279 | 0.157165 | 0.259039 |
| Kurtosis | 4.188068 | 2.198024 | 4.519560 | 1.780738 | 2.040664 |
| Jarque-Bera | 5.811961 | 0.725375 | 6.605912 | 0.924818 | 0.693427 |
| Probability | 0.054695 | 0.695804 | 0.036774 | 0.629765 | 0.707008 |
| Observations | 14 | 14 | 14 | 14 | 14 |

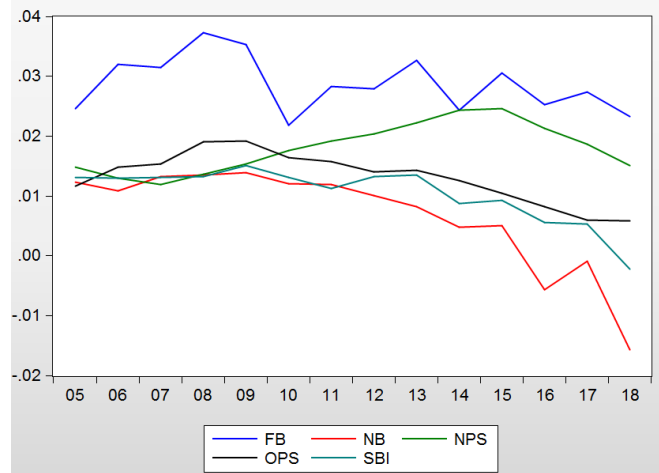


Fig.1. Descriptive Statistics of Profitability (ROA)

Foreign banks are having the highest ROA mean value which indicates that the profitability of Foreign banks are higher than any other bank group. Nationalised banks are having the lowest ROA and moreover their standard deviation is higher among all the bank groups which reflects that their profitability is highly unstable.

SBI group's profitability is the second lowest after Nationalised banks. It is observed that all the banks' profitability have declined during the recent years.

Table 2: Descriptive Statistics of Credit Growth

| Bank Group / Variables | Traditional bank | | | Modern bank | |
|------------------------|--------------------|--------------------------|-----------|--------------------------|---------------|
| | Nationalised banks | Old private sector banks | SBI group | New private sector banks | Foreign banks |
| Mean | 1.011823 | 1.016524 | 1.012452 | 1.020873 | 1.030936 |
| Median | 1.013143 | 1.018021 | 1.012400 | 1.016642 | 1.032520 |
| Maximum | 1.022135 | 1.026685 | 1.026713 | 1.039674 | 1.344857 |
| Minimum | 0.998165 | 1.007592 | 1.000684 | 1.011979 | 0.719650 |
| Std. Dev. | 0.008281 | 0.006642 | 0.007977 | 0.008967 | 0.126043 |
| Skewness | -0.383130 | -0.008012 | 0.380893 | 1.002019 | 0.032894 |
| Kurtosis | 1.816470 | 1.619729 | 2.272231 | 2.711851 | 6.279443 |
| Jarque-Bera | 1.159607 | 1.111486 | 0.647481 | 2.391200 | 6.276128 |
| Probability | 0.560008 | 0.573646 | 0.723438 | 0.302522 | 0.043367 |
| Sum | 14.16553 | 14.23134 | 14.17433 | 14.29222 | 14.43310 |
| Sum Sq. Dev. | 0.000892 | 0.000574 | 0.000827 | 0.001045 | 0.206529 |
| Observations | 14 | 14 | 14 | 14 | 14 |

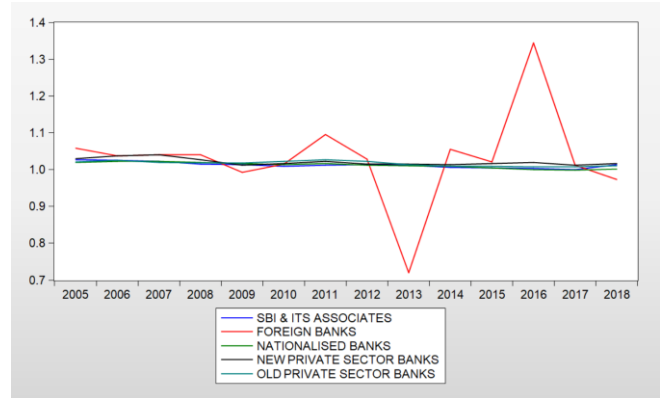


Fig.2. Credit growth of Banking Groups

B. Regression Analysis

Table 3: Regression analysis based on bank groups (2005 to 2018)

| Bank Group | Independent Variable | Coefficient | t-statistic | Prob. |
|---|----------------------|-------------|-------------|-----------|
| Dependent Variable: Profitability (ROA) | | | | |
| Nationalised Banks | GNPA | -0.140431 | -6.397915 | 0.0001** |
| | CRAR | 0.001982 | 1.552159 | 0.1489 |
| Old Private Sector | GNPA | -0.123868 | -1.834817 | 0.0937*** |
| | CRAR | 0.001902 | 1.519902 | 0.1567 |
| SBI Group | GNPA | -0.168844 | -9.505907 | 0.0000** |
| | CRAR | 0.000053 | 0.078219 | 0.9391 |
| New Private Sector | GNPA | -0.313997 | -3.131441 | 0.0096** |
| | CRAR | 0.001044 | 2.310572 | 0.0413** |
| Foreign bank | GNPA | -0.000598 | -1.149953 | 0.2746 |
| | CRAR | 0.000284 | 1.337623 | 0.2080 |
| Dependent Variable: Credit Growth | | | | |
| Nationalised Banks | GNPA | -0.099933 | -2.590088 | 0.0251** |
| | CRAR | 0.002387 | 1.063791 | 0.3102 |
| Old Private Sector | GNPA | -0.020751 | -0.162690 | 0.8737 |
| | CRAR | 0.001217 | 0.514572 | 0.6170 |
| SBI Group | GNPA | -0.086252 | -0.958763 | 0.3583 |
| | CRAR | 0.001641 | 0.470747 | 0.6470 |
| New Private Sector | GNPA | 0.101682 | 0.399679 | 0.6970 |
| | CRAR | -0.003363 | 0.001146 | 0.0136** |
| Foreign bank | GNPA | -0.006473 | -0.405638 | 0.6928 |
| | CRAR | 0.000016 | 0.002526 | 0.9980 |

Bivariate regression analysis is performed to investigate the effect of asset quality (GNPA) and financial soundness on the profitability and credit growth for different bank groups. For Nationalised banks, the negative GNPA coefficient for the dependent variable profitability, reveals that poor asset quality deteriorated the profitability (ROA) and the impact is significant. Similarly, GNPA (asset quality) is also adversely influencing the Credit growth of the nationalised banks. As for as the Old Private Sector banks are concerned, asset quality is weakly (at 10% level) significant in affecting the profitability. However, none of the independent variables – Asset quality and financial soundness – are having a significant bearing on the credit growth.

For New Private sector bank, both asset quality and financial soundness had significantly affected the profitability in a negative and positive ways respectively. Whereas, only financial soundness had statistical significance on credit

growth of the new private sector banks. The asset quality of the SBI significantly disturbs the profitability in a contrary manner. Foreign banks profitability and credit growth is not expressively affected by both the independent variables.

C. Panel Regression Effect on Credit Growth

Table 5: Effect of Asset quality and Financial Soundness on Credit growth (2005 to 2014)

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. regress CreditGrowth CRAR GNPA

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| Source | SS | df | MS | Number of obs | = | 50 |
|----------|------------|----|------------|---------------|---|---------|
| Model | .003875566 | 2 | .001937783 | F(2, 47) | = | 0.93 |
| Residual | .0981612 | 47 | .002088536 | Prob > F | = | 0.4025 |
| | | | | R-squared | = | 0.0380 |
| | | | | Adj R-squared | = | -0.0030 |
| Total | .102036766 | 49 | .002082383 | Root MSE | = | .0457 |

| CreditGrowth | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] |
|--------------|-----------|-----------|-------|-------|----------------------|
| CRAR | -.0006913 | .0009057 | -0.76 | 0.449 | -.0025134 .0011307 |
| GNPA | -.0592897 | .043627 | 1.36 | 0.181 | -.0284765 .1470559 |
| _cons | 1.024065 | .0154347 | 66.35 | 0.000 | .9930139 1.055115 |

It is observed from table.5 that the result of panel regression shows that both independent variables viz., CRAR and GNPA are not significant in determining the explained variable i.e. Credit growth during pre-asset quality review period (2005 to 2014). Throughout this period, the asset quality of the banks was found to be good as disclosed by the financial statements and credit growth also in stable during this period.

Table 6: Effect of Asset quality and Financial Soundness on Credit growth (2015 to 2018)

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. reg CreditGrowth CRAR GNPA

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| Source | SS | df | MS | Number of obs | = | 20 |
|----------|------------|----|------------|---------------|---|--------|
| Model | .031803472 | 2 | .015901736 | F(2, 17) | = | 3.44 |
| Residual | .078685553 | 17 | .004628562 | Prob > F | = | 0.0558 |
| | | | | R-squared | = | 0.2878 |
| | | | | Adj R-squared | = | 0.2041 |
| Total | .110489026 | 19 | .005815212 | Root MSE | = | .06803 |

| CreditGrowth | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] |
|--------------|-----------|-----------|-------|-------|----------------------|
| CRAR | .0068214 | .0027227 | 2.51 | 0.023 | .0010771 .0125657 |
| GNPA | -.0165433 | .0088729 | -1.86 | 0.080 | -.0352634 .0021768 |
| _cons | .9227532 | .0444235 | 20.77 | 0.000 | .8290279 1.016479 |

Table 6. portrays the impact of asset quality and financial soundness on the credit growth during 2015- 2018 (asset quality period & aftermath). The independent variables were found to have high influence on credit growth during the asset quality review period & aftermath. i.e., 2015-18. This represents that effect of independent variables on the credit growth changed drastically once the asset quality review started by the Reserve Bank of India. The positive and significant co-efficient of CRAR implies that the financial soundness had favourable impact on the credit growth of the banks i.e. adhering to the higher capital adequacy resulted in better credit growth. This findings is in-line with the research outcome of Gaurav Seth (2016). The negative coefficient and the significance (at 10% level) specifies that higher GNPA (poor asset quality) is having a negative influence on profitability during the AQR period i.e. 2015-18.

Effect on Profitability

Table.7: Effect of Asset quality and Financial Soundness on Profitability (2005 to 2014)

```

. regress ROA CRAR GNPA

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| Source | SS | df | MS | Number of obs | = | 50 |
|----------|------------|----|------------|---------------|---|--------|
| Model | .002115703 | 2 | .001057851 | F(2, 47) | = | 89.57 |
| Residual | .000555079 | 47 | .00001181 | Prob > F | = | 0.0000 |
| | | | | R-squared | = | 0.7922 |
| | | | | Adj R-squared | = | 0.7833 |
| Total | .002670782 | 49 | .000054506 | Root MSE | = | .00344 |

| ROA | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] |
|-------|-----------|-----------|-------|-------|----------------------|
| CRAR | .0008213 | .0000681 | 12.06 | 0.000 | .0006843 .0009583 |
| GNPA | -.0093512 | .0032807 | -2.85 | 0.006 | -.0159511 -.0027513 |
| _cons | .003577 | .0011607 | 3.08 | 0.003 | .001242 .0059119 |

Return on Assets (ROA) is a proxy variable for the profitability measure. The panel regression for all the banks

from 2005 to 2014 (pre-AQR period) reveals that both financial soundness (CRAR) and asset quality (GNPA ratio) have significant effect on the profitability (ROA) of the banks. The positive coefficient of CRAR reflects that financial soundness of the banks had favourable impact on banks' profitability. Similarly, the negative co-efficient of asset quality reflects that poor asset quality i.e. high GNPA ratio had adverse effect on the banks' profitability.

Table.8: Effect of Asset quality and Financial Soundness on Profitability (2015 to 2018)

```

. regress ROA CRAR GNPA

```

| Source | SS | df | MS | Number of obs | = | 20 |
|----------|------------|----|------------|---------------|---|--------|
| Model | .001845264 | 2 | .000922632 | F(2, 17) | = | 15.82 |
| Residual | .000991574 | 17 | .000058328 | Prob > F | = | 0.0001 |
| | | | | R-squared | = | 0.6505 |
| | | | | Adj R-squared | = | 0.6093 |
| Total | .002836838 | 19 | .000149307 | Root MSE | = | .00764 |

| ROA | Coef. | Std. Err. | t | P> t | [95% Conf. Interval] |
|-------|-----------|-----------|-------|-------|----------------------|
| CRAR | .0016519 | .0003056 | 5.40 | 0.000 | .001007 .0022967 |
| GNPA | -.0011806 | .000996 | -1.19 | 0.252 | -.003282 .0009209 |
| _cons | -.0150416 | .0049869 | -3.02 | 0.008 | -.0255629 -.0045202 |

During the AQR and aftermath period i.e. 2015 to 2018, the financial soundness (CRAR) is indeed found to be positively influencing the profitability (ROA). On the other hand, though the poor asset quality (Higher GNPA) had negative effect on profitability, the impact was not a significant one.

VIII. CONCLUSION

This empirical research study found that the adoption of Capital adequacy ratio (CAR) as per the global regulatory requirement has not hampered the credit growth as many presumed but also helped in enhancing the credit growth by improving the banks' credit quality. Similarly the poor asset quality (higher GNPA to Total Asset) had a deteriorating effect on credit growth. Other than foreign banks, all other bank groups' profitability is unfavourably influenced by the poor asset quality i.e. high GNPA ratio. Credit Growth of nationalised banks are positively influenced by the financial soundness. It was also identified that though both asset quality (GNPA) and financial soundness (CRAR) were significant determinant of profitability during pre-AQR period, the study revealed that only financial soundness has positive and significant effect on profitability during and after-math AQR (2015-18). Credit-growth significantly affected by both independent variables only during the AQR period (2015-18). Thus the study revealed that RBI's AQR had played a major role in determining the effect of quality of assets and financial soundness on the profitability and credit growth of the Indian banks. The outcome revealed that modern banks viz., foreign banks and new generation private banks are performing better than traditional banks.

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