

CHAPTER: 2

REVIEW OF LITERATURE

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The banking industry has undergone rapid and remarkable transformation globally. In particular, the Indian banking industry has witnessed major changes since the phase of nationalization of banks in the country. The theory of banking firm explains the risk transformation process and hence, the performance of banks has been an important subject of research for many years. Banks play a central role in financial intermediation, deposit mobilization, and credit creation. Therefore, it is imperative to examine their growth, progress, and performance. There exists a vast pool of literature on bank performance, banking process, and management issues. The present literature review has been undertaken with the objective of reviewing bank performance studies based on Indian as well as international experience. Over 190 research papers and articles from different refereed journals were reviewed. The survey of literature has been carried out keeping in view the broad aims of the current research.

The study reviews empirical research on bank performance with a focus on the methodology adopted in different studies, so as to be able to identify suitable method for fulfilment of the stated objectives in the study. The review of related literature is presented under *three sections*. The bank performance studies based on the Indian banking industry are discussed in *section 2.1*, while the studies based on international experience are reported in *section 2.2*. The last *section 2.3* presents a brief summary and conclusion from reviewed literature.

2.1 Review of Bank Performance: Indian Experience

Khusro et al. (1971) analysed bank efficiency and growth of fifteen Indian commercial banks for the period 1951 to 1968. They estimated elasticity of bank deposit with respect to advances for comparing relative efficiency of banks. The study also aimed at determining the linkage between bank efficiency and bank growth using regression analysis. The results confirmed that banks with higher efficiency were accompanied with higher growth rate of earning assets.

Bisaliah and Shane (1973) compared the performance of State Bank of India with other commercial banks in India for the period 1955 to 1970. The performance of banks was measured in terms of deposits, supply of loanable funds, branch expansion in urban and rural areas, support to cooperative institutions, priority sector lending, and operational efficiency. Changes in performance variables were examined over time. The study found that State Bank of India had poor deposit mobilization, supply of credit was more towards industry, and the agriculture sector received a constant but small portion of total credit advanced. State Bank of India outperformed other banks in terms of loan-to-deposit ratio, especially during the period 1966 to 1971. Falling profits and high inefficiency in the bank was observed after the implementation of national policy. The policy led strict regulations on reducing bureaucratization and bringing higher transparency in the working of the bank.

Singh (1974) compared bank performance of fourteen nationalized banks in India for the period of 1966 to 1972. The performance of banks was compared between the pre-nationalization and post-nationalization period. Banks were given composite ranks based on profit index, business index, interest margin, manpower expenses, and branch expansion. The study found profit to be one of the important motives that nationalized banks look upon. Variables such as business per branch, business per employee, and manpower expenses were found to be important variables affecting the profitability of nationalized banks.

Angdi and Devaraj (1983) aimed at assessing the productivity and profitability of Indian commercial banks during the period 1969 to 1980. Trends in productivity and profitability ratios were observed for public sector bank group, private sector bank group, and foreign bank group. Ratios like average establishment expense per employee, operating profit per employee, operating profit to assets, operating profit to total expense, operating profit to working funds, operating deposits to deposits, and operating profit to credit were examined. The study revealed that foreign banks' outperformed other bank groups on all the set parameters.

Kamaiah and Date (1987) examined the performance of twenty eight public sector banks and thirty two private sector banks in India for the financial year 1983. The study tried to identify appropriate indicators as a component of an early warning system for an early detection of segments of non-performing banks. Twenty seven ratios based on different parameters were compared, to name a few capital to assets ratios, earning ratios, expenditure ratios, profitability ratios, and others. The technique of multiple discriminant analysis was

applied to identify appropriate financial ratios and the validity of these ratios as a discriminator of bank performance. The study found earning ratios and expenditure ratios to be the most reliable discriminators for distinguishing bank group into performing and non-performing bank groups in India.

Ketkar and Ketkar (1993) evaluated the impact of bank branch expansion, priority sector credit allocation and bank takeovers on saving, investment, and growth performance of the Indian economy for the period 1952 to 1985. A stochastic empirical model using two stage least squares (2SLS) was employed to quantify the impact of public ownership of commercial banks on national savings, investment, and domestic output. The study found that bank nationalization was a mixed blessing with branch expansion leading to an increase in financial savings. However, credit controls discouraged deposit mobilization and capital accumulation.

Keshari and Paul (1994) tried to empirically examine the relative efficiency of foreign banks and domestic banks in India. The study tested the hypothesis that foreign banks operate with higher efficiency and attain a higher level of profitability and productivity. A stochastic frontier production function was employed to assess the technical efficiency of seventy scheduled commercial banks in India for 1991 and 1992. A modified version of the production efficiency approach was used to identify the input and output variables. The output variables taken in the study were aggregate of deposits and advances; and the input variables were capital, labour, and materials. According to this study, foreign banks and domestic banks were not found to be significantly different in their technical efficiency. However, foreign banks had higher labour productivity and profitability as compared to the domestic banks.

Batra (1996) analysed the impact of policy changes on profitability of Indian banks over the pre-nationalization phase (1955 to 1968) and the post-nationalization phase (1969 to 1987). State Bank of India group, nationalized banks, and private sector banks were examined using double log-linear equation under the OLS approach. The variables used to measure profitability of banks were ratio of profit to total current operating earnings. It was found that frequent use of policy instruments like SLR and CRR had a significant impact on the operational efficiency of banks. The relationship between price paid on deposit and bank profitability was found to be statistically significant and negative. The amount spent on borrowings was statistically insignificant. Number of rural area branches influenced bank

profitability negatively. The study concluded that loans and advances were important in the bank asset portfolio, and policy variables like CRR, SLR and branch expansion affect bank profitability.

Bhattacharyya, Lovell and Sahay (1997) examined the productive efficiency of Indian commercial banks during the early stages of liberalization. Productive efficiency of banks was analysed using data envelopment analysis and stochastic frontier analysis for 70 commercial banks for the period 1986 to 1991. The stochastic frontier analysis credited variation in efficiency scores to a temporal component, an ownership component, and a random noise component. The study found that public sector banks were the most efficient banks, followed by foreign banks and private sector banks. Foreign banks witnessed a rising trend in performance, while the public sector banks exhibited a temporal decline in performance. The study found rise in performance of foreign banks was due to better productive efficiency in expanding their business in an increasingly competitive environment.

Das (1999) proposed a framework for profitability analysis of public sector banks using a sequential decomposition model. Inter-bank variability of profits was evaluated for the period 1992 to 1998. The variables taken for profitability analysis were working funds, operating profit, net interest margin, burden, cost per employee, staff productivity, spread on banking business, return on advances, return on investment, cost of deposits, return on advances to working funds, return on investment to working funds, and return on deposits to working funds. The measure of bank profitability was a ratio of operating profit to working funds. It was found that public sector banks recorded a fall in the burden of working funds after the reforms. It indicated a shift from traditional banking to customer-centric service-based banking system. The study concluded that banks with low interest income need to focus on customer service to become efficient and to earn more profits.

Nath, Mukherjee and Pal (2001) explored the association between strategic grouping and bank performance in case of public sector banks in India for two years 1997 and 1998. Principal component analysis was carried out to identify important financial ratios for assessing profitability, efficiency, and asset quality of banks. To study the linkage between bank strategic groups and their performance measures, data envelopment analysis was employed. The results revealed that there was a positive association between efficiency and profitability of banks. It was also found that banks that were exhibiting poor performance

suffered from overstaffing and inefficient training facilities resulted into low employee morale and low productivity.

Chaudhuri (2002) tried to identify the issues of growth and profitability in Indian public sector banks for the period 1995 to 2001. Financial ratios such as return from loans and advances, return on investment, cost of deposits, net interest spread on loan and advances, net interest spread on investment, and net interest spread on total assets were used to analyse growth and bank profitability. Declining trends in return from loans and advances, and return on investment was observed over the analysis period. Cost of deposits, net interest spread on loan and advances, net interest spread on investment, and net interest spread as a ratio of total assets witnessed a falling trend. Diminishing market share in response to entry of private banks, decline in profitability, and weak balance sheet were considered to be the reasons for the falling trends in profitability of public sector banks.

Mohan (2002) evaluated the performance of public sector banks since deregulation for the period 1991-92 to 1999-00; in order to understand the factors underlying their improved performance. Trends in financial performance was observed on the basis of important indicators such as interest spread, intermediation costs, non-performing assets, provisions and contingencies, and net profits for public sector banks. It was observed that efficiency of the banking system as a whole measured by declining spreads has improved. The performance of public sector banks has improved both in absolute as well as relative terms.

Koeva (2003) analysed the impact of financial liberalization on the performance of commercial banks in India for the period 1991-92 to 2000-01. Panel regression analysis was engaged to examine the impact of reforms on performance of commercial banks. The study identified important policy changes that may affect the performance of banks such as changes in industry concentration and competition, changes in bank spread and profitability, ownership, and entry deregulation. The results revealed that industry concentration, bank spread, and profitability had declined during the period of financial liberalization. Factors that were found to be significantly determining intermediation cost and bank profitability were operating costs, non-performing loans, priority sector lending, composition of deposits, and investment in government securities. The empirical results suggest that an increase in competition would negatively affect bank spread and bank profitability.

Pathak (2003) evaluated and compared the financial performance of selected private sector banks in India over a period of five years from 1996-97 to 2000-01. Five private sector banks were taken for the study, namely IndusInd Bank, Centurion Bank, ICICI Bank, HDFC Bank, and UTI Bank. The selected banks were analysed on the basis of indicators such as financial parameters, operating parameters, profitability, and productivity using financial ratio analysis. HDFC Bank was found to be the top performer followed by ICICI Bank. The performance of IndusInd, Centurion and UTI banks lagged behind. The study recommends that the private sector banks need to focus on improving credit quality by controlling their costs.

Galagedera and Edirisuriya (2004) examined the efficiency of forty commercial banks in India both public and private sector banks, for the period 1995 to 2002. Bank efficiency was analysed using data envelopment analysis while the Malmquist index was used to assess productivity changes. Data envelopment analysis used total deposits and operating expenses as input variables, and loans and other earning assets as output variables. Banks with high equity to assets ratio, and returns on average equity were found to be highly efficient. The results of Malmquist productivity index revealed a modest growth in productivity of public sector banks. However, private sector banks did not show any growth in productivity. This was in conjunction to the fact that public sector banks demonstrated growth in technology while private sector banks experienced negative growth.

Mohan and Ray (2004) assessed the financial performance of Indian commercial banks for the period 1992 to 2000. Public sector banks, private sector banks, and foreign banks were analysed and compared using data envelopment analysis. The study adopted a revenue maximization efficiency approach using physical quantities of inputs and outputs. The results revealed that the performance of public sector banks and foreign banks was significantly better than the private sector banks.

Shanmugam and Das (2004) evaluated the technical efficiency of ninety four Indian banks for the reform period from 1992 to 1997. The efficiency of State Bank group, nationalized banks, private sector banks, and foreign banks in India was examined by a stochastic frontier approach using an unbalanced panel data. The technical efficiency of the banks was measured by considering four output variables such as interest margin, non-interest income, investment, and credit. The input variables were deposits, borrowings, number of employees, and fixed assets. The results revealed that the output variables of the banks were technically inefficient.

Progress in the banking industry was observed in terms of efficiency of raising non-interest income, investments, and credits. Further, it was found that foreign banks and State Bank groups were more efficient than their competitors. The study concludes that reforms lead to high efficiency in augmenting investment with consistent economic growth.

Mohan, Khan and Janjua (2005) reviewed the performance of Indian banking industry during the post reform period. Public sector banks, old private sector banks, new private sector banks, and foreign banks were analysed from 1992 to 2004. Productivity and efficiency of these banks were examined using financial ratios, namely non-interest income to total assets, operating expense to total assets, operating expense to earning assets, labour cost to earning asset, non-labour cost to earning assets, operating expense to total business, labour cost to total business, non-labour cost to total business, burden ratio, cost to income ratio, and spread ratio along with the productivity indicators such as business per employee, profit per employee, and business per branch. Herfindahl's index was used to assess the concentration of banks in India. The study found that after the new economic reforms, many private banks entered the Indian banking space and expanded their business. Rising competition in the banking industry resulted in falling share of public sector banks to the total assets of commercial banks in India. Herfindahl's concentration index demonstrated a declining trend in concentration of public sector banks in terms of deposits and credits. The operating expenses and non-performing loans of domestic banks had declined, and an overall improvement in the productivity of the Indian banking industry was observed over the analysis period. Banks witnessed a decline in their cost to income ratio and spread ratio. Technological improvement and peer pressure were found to be the driving factors in productivity enhancement for banks.

Ataullah and Le (2006) examined the impact of economic reforms on efficiency of Indian banks for the period 1992 to 1998. The study covered all commercial banks in India, including the public sector banks, private sector banks, and foreign banks. Three elements of economic reforms, namely financial reforms, fiscal reforms, and private investment liberalization were identified. Bank efficiency was measured using data envelopment analysis. The efficiency scores obtained from data envelopment analysis were regressed on internal and external factors using OLS and GMM estimations. The input variables included for data envelopment analysis were interest expense and operating expense, while output variables were interest income and operating income. The primary aim of the study was to

examine the impact of fiscal deficit, investment liberalisation, competition, and foreign banks' presence on the efficiency of domestic banks. It was found that there exists a positive impact of economic reforms on efficiency parameters of banks, especially the foreign banks. A positive association was observed between the level of competition and bank efficiency parameters. There exists a negative relationship between fiscal deficit and bank efficiency. The findings also revealed a negative relationship between the presence of foreign banks and bank efficiency. This could be attributed to a short-run increase in costs due to the introduction of new banking technology brought in by foreign banks.

Singh and Kohli (2006) assessed the performance of old and new private sector banks in India for the period 2003 to 2005. The CAMEL rating methodology was engaged to investigate the overall performance of banks. The variables used for analysis were capital adequacy ratio, net NPAs to net advances, total NPAs to total assets, profit per employee, business per employee, return on assets, non-interest income to total assets, and cash to deposit ratio. The private sector banks were ranked on the basis of the overall performance for the years 2003, 2004, and 2005. The top five banks on the CAMEL rating model were Bank of Punjab, HDFC Bank, Jammu & Kashmir Bank, UTI Bank, and Kotak Mahindra Bank. The bottom five banks were United Western Bank, Development Credit Bank, Lord Krishna Bank, South Indian Bank, and ING Vysya Bank.

Das and Das (2007) investigated the extent of scale economies, cost complementarities, and technical progress of the Indian banking industry for the period 1992 to 2003 using asset approach. The study also made an attempt to find the impact of asset quality and risk exposure of banks on their scale economies. Multiple output cost functions and fourier flexible cost functions were estimated for analysis. The input variables taken were physical capital, total available funds, and labour; and the output variables considered were advances, borrowings, and contingent liabilities. The results highlighted significant economies of scale for all the banks irrespective of the size. It was found that small and medium-sized banks had more opportunities to increase output by expanding their business or by merging with another bank. Significant technical progress was witnessed during the analysis period that indicates the possible contribution of technological advancement in reducing average costs for banks.

Kumar and Sreeramulu (2007) compared employees' productivity and cost parameters of traditional banks (public sector banks and old private sector banks) and modern banks (new private sector banks and foreign banks) in India. Financial ratio analysis was used to assess

these banks for the period 1997 to 2008. Two indicators of employees' productivity, business per employee and profit per employee were examined. Employees' cost was measured by employee cost to operating expenses, employee cost to total assets, and employee cost to total business. To examine gaps between modern and traditional banks and to examine if the efforts of conventional banks to compete with modern banks reduce these gaps, the gap index was constructed. The study found that the performance of modern banks was much better than traditional banks. The gap index for all parameters showed a decreasing trend indicating a significant fall in performance gap between the traditional banks and modern banks.

Kalita (2008) explored the impact of banking sector reforms and introduction of new policy measures on the Indian banking sector. The study emphasized that the major objective of reforms was to make the Indian banking industry more versatile, efficient, productive, and competitive. It focused on the credit delivery mechanism, the share of banks in the banking industry, profitability and prudential norms. The banking sector responded positively to the introduction of prudential norms. A fall in non-performing assets was observed after the initiation of technology in the banking space. In addition to the prudential norms, CAMELS supervisory rating system was introduced as a reform measure to rank and compare banks. The study concluded that despite positive impact of reforms on banking sector, the Indian banking system was yet to match the international standards.

Kaur and Gill (2009) assessed the relative profitability of public sector banks, private sector banks, and foreign banks in India. Seventy two banks were selected for the purpose and the period of analysis was from 1998 to 2009. The efficiency of banks was estimated with the help of Data Envelopment Analysis approach. The results indicated higher efficiency of public sector banks as compared to other banks in the sector.

Pal and Bishnoi (2009) examined the performance of commercial banks in India for the period 1996 to 2006. The productivity growth of sixty three commercial banks was analysed using data envelopment analysis and malmquist productivity index. The productivity of banks was measured using three approaches, namely assets approach, income approach, and value-added approach. Under the value-added approach, banks' productivity grew by 5.7% while in case of asset approach and income approach the productivity growth was 2.5% and 0.6%, respectively. The efficiency scores from data envelopment analysis revealed ICICI bank to be the top bank in managerial efficiency. Foreign banks exhibited an overall good performance

in productivity. Productivity growth and efficiency in commercial banks was found to be the result of technical progress through substantial investment in new technology.

Rakhe (2010) compared the profitability of foreign bank groups with public sector and private sector bank groups in India for the period 2000 to 2009. Bank profitability was analysed using panel regression analysis for fourteen foreign banks, twenty six public sector banks, and five new private sector banks. Net profit to total asset ratio was taken as the dependent variable representing bank profitability. Variables like efficiency of fund management, operating expenses to total assets, other income to total assets, credit risk, cyclical output, and inflation were taken as explanatory variables of profitability. The study found that efficiency of fund management, operating expenses to total assets, other income to total assets, credit risk, and inflation had a significant and negative impact on profitability of banks, while cyclical output had a positive and significant influence on bank profitability. It was also found that foreign banks had diversified and mobilized their funds at low cost and were well ahead of their domestic counterparts with higher profitability.

Ibrahim (2011) assessed the operational performance of scheduled commercial banks in India for the period 2000 to 2009. Bank specific variables such as deposits, loans and advances, credit-deposit ratio, and investment-deposit ratio were assessed for operational efficiency using descriptive statistics, t-test, and correlation. It was found that scheduled commercial banks exhibited a constant rise in aggregate deposits. A positive correlation was seen between demand deposits and time deposits. Loans and advances showed a significant performance over the period. The credit-deposit ratio of scheduled commercial banks exhibited an increasing trend. Improvement in investment-deposit ratio of scheduled commercial banks further improved operational efficiency as well as the profitability of banks. Overall, the operational performance of scheduled commercial banks was found to have improved significantly over the analysis period.

Malhotra, Poteau and Singh (2011) analysed the performance of twenty public and fifteen private sector banks in India for the period 2005 to 2009. The analysis period ranges over the pre-global financial crisis and the crisis period. Profitability, intermediation cost, efficiency, and soundness of the banks in the study were examined using a two-tailed t-test and panel regression analysis. The panel regression analysis was used to analyse the impact of ownership of banks on bank profitability and intermediation costs of public and private sector banks. The results of two-tailed t-test indicated significant difference between public sector

banks and private sector banks on majority of the parameters. The study revealed that profitability (net interest margin) of banks and competition between the banks was intensified during the analysis period. On the contrary, intermediation cost increased but banks were able to respond to increasing cost with higher efficiency levels. The study concluded that Indian banking system stayed relatively healthy and was only moderately affected by the global crisis.

Thiagarajan et al. (2011) tried to identify the determinants of bank profitability for public and private sector banks in India for the period 2000 to 2010. Twenty two public sector banks and fifteen private sector banks were examined using correlation analysis, multiple regression analysis, and factor analysis. Return on assets was taken as a dependent variable for bank profitability and twenty three bank-specific variables were identified as explanatory variables that could affect bank profitability. The study highlighted that non-performing asset had a significant and negative impact on the profitability of both public and private sector banks in India.

Bapat (2012) examined the impact of the global financial crisis on efficiency of public and private sector banks in India. Data envelopment analysis was employed to measure production efficiency of banks for the period 2007-08 to 2009-10. Production efficiency was measured with two input-output variables. Input variables were interest cost and operating cost; and output variables were interest income and non-interest income. It was observed that the efficiency of banks declined in response to the crisis but later by the end of the analysis period, production efficiency of private sector banks revived.

Bhandari (2012) examined the overall factor productivity of Indian commercial banks for the period 1998-99 to 2006-07. Sixty eight individual banks were analysed from among the public sector, private sector, and foreign banks. Total factor productivity was decomposed into three components – technical change, technical efficiency change, and scale efficiency change factors. Data envelopment analysis was engaged with the intermediation approach. The output variables were loan and investment, the input variables were deposits, borrowings and other liabilities; and the physical variable taken was labour. The study found private sector banks and foreign banks to have better factor productivity. On the other hand, public sector banks were trying to adjust to the changing environment but failed to match the pace of its competitors.

Bhatia, Mahajan and Chander (2012) studied the profitability of private sector banks in India for the period 2006-07 to 2009-10. Backward stepwise regression analysis was used to analyse the impact of explanatory variables on bank profitability. Return on asset was taken as a dependent variable for profitability of banks. The explanatory variables were capital adequacy ratio, spread ratio, credit-deposit ratio, provision and contingency, non-interest income, business per employee, profit per employee, operating expense ratio, investment-deposit ratio, non-performing assets ratio, and a dummy variable representing the ownership of banks. The study found a positive relationship of bank profitability with spread ratio, credit-deposit ratio, business per employee, profit per employee, and non-interest income. Investment-deposit ratio, non-performing assets, provision and contingency, and operating expenses were found to share a negative relationship with bank profitability. Capital adequacy ratio and ownership of banks had an insignificant impact on profitability of banks.

Prasad and Reddy (2012) analysed the profitability of Indian banks for the period 2006-07 to 2010-11. The study examined three public sector banks such as State Bank of India, Punjab National Bank, and Canara Bank; and two private sector banks were ICICI Bank and HDFC Bank. The variables identified for assessing the profitability of banks were operating profit margin, gross profit margin, net profit margin, earning per share, return on equity, return on assets, price earnings ratio, and dividend pay-out ratio. The profitability parameters were analysed using the arithmetic mean, one way ANOVA, and Tukey HSD test for multiple comparisons. It was found that Punjab National Bank ranked first in terms of overall performance, followed by HDFC bank, State Bank of India, ICICI bank, and Canara bank.

Sinha (2012) reviewed the performance of public sector banks and new private sector banks in India for the period 2005-06 to 2010-11. Performance of banks was evaluated on the basis of financial ratio and physical indicators. The physical indicators taken were number of employees and composition of employees; and the financial ratios were return on assets, other income to net interest margin, non-performing assets, capital adequacy ratio, price-earnings ratio, business per employee, and profit per employee. The study revealed that although in the first few years of the analysis period, the performance of public and private sector banks appeared to be similar, the gap in performance of these banks gradually widened during the latter part of the period of global financial crisis with private sector banks outperforming the public sector banks.

Bansal and Mohanty (2013) evaluated the financial performance of selected commercial banks in India by applying the CAMEL model. Five banks were selected, namely State Bank of India, HDFC Bank, ICICI Bank, Axis Bank, and Kotak Mahindra Bank; and were examined for the period 2007 to 2011. Fifteen financial ratios were computed such as capital-to-risk (weighted) assets ratio, debt to equity ratio, total advance to total asset ratio, net non-performing assets to total advances, gross non-performing assets to total advances, business per employee, profit per employee, asset turnover ratio, return on equity, net interest margin, net interest income to total funds, non-interest income to total funds, credit-deposit ratio, investment deposit ratio, and cash deposit ratio. Weights were given to each indicator of the CAMEL model and banks were ranked according to their performance. The results revealed that HDFC Bank ranked first with an overall high performance as compared to other selected banks. The second bank to top the list was State Bank of India followed by Kotak Mahindra Bank, ICICI Bank, and Axis Bank.

Kapoor and Kaur (2013) analysed the impact of the global economic and financial crisis on the Indian banking sector for the period 1999-00 to 2011-12. The study compared profitability trends of nationalized bank group, State Bank of India & associates, public sector bank group, and new private sector bank group. The factors determining the profitability of banks were examined using correlation coefficient matrix and univariate regression analysis. The new private sector bank group was found to be more profitable and had a lower burden of loss loans and advances as compared to its competitors. Correlation analysis revealed that burden to total assets, priority sector advances to total assets, and net non-performing assets to net advances had a negative correlation with net profits. Whereas, spread to total assets had a positive relationship with bank profitability. Univariate regression analysis found that burden as percentage of total assets had a negative and significant effect on bank profitability, while spread as percentage of total assets had a positive effect on profitability among all the bank groups.

Kumar (2013) evaluated total factor productivity of fifty eight Indian commercial banks from public, private, and foreign bank groups for the period 2004 to 2012. The total factor productivity was estimated using the data envelopment analysis by employing the Malmquist productivity index approach. The study also examined the impact of information technology on the productivity of banks using multiple regression analysis. The input variables used were deposits, borrowings and fixed assets; and the output variables were investment and net

interest income. As per the Malmquist productivity index, the banks experienced growth in productivity over the period of 2008 to 2010, followed by a diminishing trend in productivity for the remaining period. The multiple regression analysis suggested an increase in productivity due to an increase in electronic banking transactions. Further, it was found that intermediation cost representing technology investment also had a significant impact on productivity of banks.

Rao (2013) examined the overall performance of scheduled commercial banks in India for the period 2005 to 2011. Banks were classified based on their ownership as State Bank of India group, nationalized banks, old private sector banks, new private sector banks, and foreign banks. These banks were further categorized into traditional banks (SBI group, nationalized banks, and old private sector banks) and modern banks (new private sector banks and foreign banks). Financial ratio analysis and gap index were engaged to assess the productivity, profitability, and cost efficiency of banks. Productivity ratios taken were business per employee, profit per employee, net income per employee, business per branch, and profit per branch. Profitability ratios used were return on assets, interest income to total income, spread to total assets, and credit-deposit ratio. The cost efficiency ratios included staff cost to operational expenses, staff cost to net income, and staff cost to total business. The results revealed that modern banks had outperformed traditional banks in terms of productivity performance. Traditional banks displayed significant improvement in all profitability indicators. The modern banks exhibited better cost efficiency in terms of staff cost to operational expenses and staff cost to net income. Against this, traditional banks registered improvement in staff cost to total business. The results also indicate that the performance gap between modern and traditional banks have significantly reduced during the analysis period.

Aspal and Dhawan (2014) assessed the performance of thirteen old private sector banks in India for the period 2007 to 2012, using the CAMELS rating model. Eighteen ratios were computed to analyse the financial performance of selected banks and the banks were ranked on the basis of CAMELS ranking criteria on a scale of excellent to worst. The study found that Tamilnad Mercantile Bank, Federal Bank, and Nainital Bank had performed excellently on the CAMELS rating model, while Dhanalakshmi Bank, ING Vysya Bank, and Catholic Syrian Bank performed worst during the analysis period.

Gupta (2014) evaluated the financial position and performance of public sector banks in India for the period 2009 to 2013. Twenty six public sector banks were analysed using the CAMEL ranking approach. Financial ratios such as capital adequacy ratio, debt-equity ratio, coverage ratio, loans to assets ratio, and government securities to total investments ratio were taken as variables of capital adequacy of banks. Asset quality of the banks was measured using ratios like net non-performing assets to net advance, net non-performing assets to total assets, total investments to total assets, and standard advances to total advances. The ratios like business per employee, profit per employee, credit-deposit ratio, and return on net worth were taken as variables to assess management efficiency. Earning quality of the public sector banks was measured on the basis of return on assets, spread to total assets, operating profit to total assets, and interest income to total income. The liquidity of banks was measured in terms of liquid assets to total assets, government securities to total assets, liquid assets to total deposits, and liquid assets to demand deposits. Statistical tools like arithmetic mean, F-test, and one way ANOVA were used to analyse the performance of banks. The results revealed a statistically significant difference between the overall performance of individual public sector banks. As per the CAMEL ratings, Andhra Bank topped the list followed by Bank of Baroda and State Bank of Hyderabad, while United Bank of India was in bottom of the list.

Reddy (2014) analysed the growth of public and private sector banks in India for a long time period right from 1969 to 2012. Public and private sector banks were examined and compared in terms of branch expansion, deposit mobilization, and growth in priority sector advances. The study found public sector banks to play a vital role in the Indian banking sector. Public sector banks covered 88 percent of the branch network in India, mobilized nearly 95 percent of total deposits, and extended more than 37 percent of total credit to priority sectors during the analysis period.

Nagarkar (2015) reviewed the performance of scheduled commercial banks in India for the period 2004 to 2013. The study examined fifteen banks, five major banks from each of public sector, private sector, and foreign bank groups. The financial performance of sampled banks was compared between two time periods – high growth years and low growth years, using financial ratio analysis and t-test. Fifty-five financial ratios were computed based on eleven parameters such as deposits, advances, interest income, other income, profit, total funds, total assets, net worth, gross NPAs, and net NPAs. It was found that for giving advances many of the banks depends on borrowings, rather than deposits. The results also revealed that even

though the overall deposits and credit of commercial banks were slow following the crisis, large banks were able to withstand fluctuations in business cycles and continued to earn profits.

Seenaiah, Rath and Samantaraya (2015) attempted to identify the determinants of profitability of scheduled commercial banks in India for the period 1995 to 2012. The study was conducted for four bank groups – the SBI group, nationalized banks, private sector banks, and foreign banks using panel regression analysis. The dependent variables identified for bank profitability were return on assets and return on equity, while the explanatory variables were operating profit, cost of deposits, wage bill, net interest margin, provisions for NPAs, and proportion of priority sector lending to total advances. The results highlight that operating profit and wage bill had a positive significant impact on bank profitability. Priority sector lending, cost of deposits, provision for NPAs, and net interest margin were statistically insignificant in explaining bank profitability.

Kumar, Charles and Mishra (2016) analysed the performance of the Indian banking sector. The analysis was carried out by measuring the efficiency, returns to scale, and total factor productivity of banks for the period 1995-96 to 2009-10. To measure the efficiency of nineteen public sector banks and fourteen private sector banks, data envelopment analysis was used. The efficiency of public sector banks was found to be at par with the private sector banks. The banks witnessed an increasing returns to scale and achieved significant cost savings. However, the public sector banks performed better than their private counterparts in terms of total factor productivity. The study also concluded that after the occurrence of the global financial crisis, the shrinkage in market resulted in increasing returns to scale and negative growth in total factor productivity for both public and private sector banks.

Sinha and Sharma (2016) examined the factors determining bank profitability of scheduled commercial banks in India. They analysed the impact of bank-specific factors, industry-specific factors, and macroeconomic factors on the profitability of forty two banks in India for the period 2000 to 2013. The generalized method of moments was applied to dynamic panel data for the study. The model was estimated with return on assets as a measure of bank profitability (dependent variable). Independent variables taken were provision for non-performing assets to total assets, capital to asset ratio, annual growth of deposits, bank size, non-interest income to asset ratio, operating expenses to total assets, lag of return on assets, GDP growth rate, and inflation rate. Herfindahl-Hirschman Index was calculated to measure

market concentration of banks. It was found that bank-specific variables like lag of return on assets, capital to asset ratio, growth of deposits, non-interest income to asset ratio, and operating expenses to total assets ratio were found to be positively and significantly influencing profitability of banks. Non-performing assets to total asset ratio was found to be highly significant yet negatively influencing bank profitability, indicating that banks with higher credit risk earned less profit. As for the macroeconomic variables – GDP growth rate had a positive impact on bank profitability, while inflation rate had a negative effect. Herfindahl-Hirschman index indicated that Indian banks responded positively to market concentration.

Pinto et al. (2017) assessed the impact of capital structure on the financial performance of twenty scheduled commercial banks in India from 2011 to 2015. The capital structure of banks was measured using debt to total assets ratio, and debt to equity ratio. The financial performance of banks was computed using the return on capital employed, net profit ratio, and net interest margin. Multiple regression analysis results indicated a significant impact of capital structure on the financial performance of banks. The study concluded that banks need to be cautious while planning the capital structure by selecting an appropriate mix of debt and equity as it affects profitability consequently.

Mohanty and Krishnankutty (2018) tried to identify the parameters that drive the profitability of forty six Indian banks during the period 1999 to 2015. The study analysed bank-specific, industry-specific, and economy-specific variables that determine profitability using a generalized method of movement estimation on a panel dataset. Return on assets was taken as a dependent variable for bank profitability. On the side of independent variables, the bank-specific variables were bank size, capital adequacy ratio, expense ratio (interest expense and non-interest expense ratios), productivity per employee, loan to deposit ratio, and solvency ratio. Industry-specific dummy variables were ownership type, and the time period (pre and post-subprime crisis); and the economy-specific variable was GDP growth rate. The results revealed that one year lag of return on assets, solvency ratio, capital adequacy ratio, and non-interest expenses had a positive influence on bank profitability. However, bank size, two- and three-year lags of return on assets, GDP growth rate, productivity per employee, loan to deposit ratio, and expense ratio had a significant negative effect on return on asset. It was also found that the subprime crisis had no impact on the profitability of banks, and that privately owned banks were more cost efficient than the government-owned banks.

Mohanty and Mehrotra (2018) studied the effect of liquidity management on profitability of public and private sector banks in India for the time period 2011-12 to 2015-16. The study analysed twenty seven public sector banks and twenty private sector banks. The association between liquidity and profitability was analysed using correlation analysis. Regression analysis was used to measure the effect of liquidity on profitability of banks. Banks' liquidity was examined using financial ratios such as cash-deposit ratio, credit-deposit ratio, and investment-deposit ratio. Profitability of banks was assessed using two ratios, return on assets and return on equity. The regression results point out a negative impact of liquidity ratios on return on equity of banks, but lack of any significant relationship between return on assets and liquidity. The study suggests that commercial banks need to increase their profitability without disturbing their liquidity levels.

Al-Homaidi et al. (2019) examined the factors determining the liquidity of Indian commercial banks for the period 2008 to 2017. The study used a panel data of thirty seven banks for estimating the generalized method of movement model. Banks' liquidity (liquid assets to total asset ratio) was taken as dependent variable, while independent variables were classified into bank-specific and macroeconomic factors. The bank-specific variables include asset size (log of total assets), assets quality (loans to total assets), capital adequacy (equity to total assets), deposits (deposits to total assets), assets management (operating income to total assets), profitability (return on assets, return on equity, net interest margin), operation efficiency (operating expense to total assets), and non-interest income (net-interest income to total assets). In addition, the macroeconomic variables were GDP growth rate, inflation rate, exchange rate, and interest rate. The results revealed that bank-specific variables like asset size, return on assets, capital adequacy ratio, deposits, and operation efficiency had a positive and significant effect on liquidity. In contrast, return on equity, assets quality, assets management, and net interest margin had a significant negative influence on liquidity of banks. As for the macroeconomic variables, only GDP growth rate had a positive and significant effect on bank liquidity, while inflation rate, interest rate, and exchange rate had an insignificant influence on liquidity.

Banu and Santhiyavali (2019) assessed the financial performance of Indian commercial banks from 1999-00 to 2014-15. The financial soundness of forty scheduled commercial banks was assessed using a multiple criteria decision approach (TOPSIS) based on five parameters – capital adequacy, asset quality, earning efficiency, management ability, and

liquidity. The result of TOPSIS analysis revealed that Citibank, South Indian Bank, Deutsche Bank, State Bank of Travancore, and Bank of Baroda were the five top-ranked banks in the bank sample. Jammu and Kashmir Bank, United Bank of India, HDFC Bank, Standard Chartered Bank, and Axis Bank were the five bottom-ranked banks. The study concluded that the banks were efficiently managed and their risks had reduced to a large extent during the analysis period. Also, the banks were earning higher profits and upholds consistency to their banking business.

Goyal et al. (2019) employed cross-section data of sixty six banks to assess the inter-sector efficiency in the Indian banking sector for the year 2015-16. A directional distance function was employed based meta-frontier data envelopment analysis approach for public sector banks, private sector banks, and foreign banks. The inputs used for data envelopment analysis were total loanable funds of a bank (deposits and borrowings), personnel and operating expenses, and physical capital (fixed assets less depreciation). The output variables used for the study were net interest income and non-interest income. The Indian banking sector was found to be quite efficient. The results confirmed that the group frontier of foreign banks coincide with the meta-frontier of private sector banks. The group frontier of public sector banks lagged behind the meta-frontier of the overall banking industry. The study suggests that the Reserve Bank of India should consolidate public sector banks and retain a few healthy public sector banks in the banking sector.

Mishra and Pradhan (2019) assessed the impact of liquidity management on the profitability of ten Indian private sector banks for the period 2013 to 2017. Regression analysis was carried out for the purpose. Return on assets and return on equity were taken as dependent variables for bank profitability, while independent variables representing liquidity were cash-deposit ratio, credit-deposit ratio, and investment-deposit ratio. The results indicate that liquidity management had a significant negative impact on return on assets, but not on return on equity.

Wijesiri, Campillo and Wanke (2019) measured the social and financial efficiency of public sector banks in India and also analysed the presence of a potential trade-off (or synergy) effect between social and financial efficiency of banks for the period 2011 to 2014. Twenty six public sector banks were analysed using a multi-activity data envelopment analysis (MDEA) model for shared inputs, desirable, and undesirable outputs. The study also tried to examine the possibility of conflict or trade-off between socially responsible and

profit-making practices of banks. The intermediation approach was used to define shared inputs and desirable outputs. Deposits, assets, and labour were the shared inputs between the social and financial banking activities. Desirable outputs for social activity were loans to priority sectors, and number of female accounts; desirable outputs for financial operation were loans to priority sectors and other incomes. The undesirable output for social and financial activity was non-performing loans to priority sectors. It was found that Indian public sector banks had managed their dual missions of financing the vulnerable sections of society as well as providing mainstream financial services well, but more emphasis was given to social banking as compared to conventional banking. A significant trade-off was revealed between social and financial performance of banks. However, the trade-off effect was confined to those public banks alone that were located in less developed Indian states. In terms of regional differences, the study lacks evidence of synergy between social and financial efficiency.

Allamy et al. (2020) aimed at identifying the determinants of financial performance of Indian commercial banks for the period 2008 to 2017. Regression analysis was employed to find the factors determining financial performance of banks. The dependent variable of financial performance was return on assets, while the independent variables were bank size (log of total assets), capital adequacy ratio, deposit ratio, GDP growth rate, and inflation rate. The study found that bank size, capital adequacy, and deposits had a negative yet significant influence on financial performance of banks. In case of macroeconomic variables, inflation rate had a significant positive impact on return on assets while GDP growth rate had insignificant impact on financial performance of banks.

Nandi et al. (2020) tried to understand the impact of total risk management on the financial health of public sector banks in India for the period 2010 to 2014. Ten public sector banks were examined using the Hierarchical linear regression model and the Pearson product moment correlation model. Return on assets and return on equity were taken as dependent variables for bank performance. The independent variables were total risk management, intellectual capital, and financial leverage. The results of regression analysis revealed that intellectual capital had a significant positive impact on bank profitability (return on assets and return on equity), while total risk management had a significant positive impact on return on equity alone. In contrast, leverage had a negative relationship with dependent variables. A significant positive association was found between intellectual capital and integrated risk

management, whereas leverage had a negative association with total risk management. There exists a significant relationship between total risk management and return on assets of public sector banks in India.

Das and Uppal (2021) examined the non-performing assets and profitability relationship for thirty nine public and private sector banks in India for the period 2005 to 2019. The study identified determinants of bank profitability by employing panel regression analysis. Return on assets was taken as dependent variable of bank profitability. Independent variables were net non-performing advances, deposits, non-interest income, net interest margin, capital adequacy ratio, operating costs, GDP growth rate, inflation rate, and interest rates. The results revealed that non-performing advances and operating costs had a negative impact on bank profitability while non-interest income, net-interest margin, capital adequacy and GDP growth rate had significant positive influence on profitability of banks. Deposits, inflation rate, and interest rates had no effect on bank profitability. The study suggests that banks must reduce their non-performing advances and operating costs to improve their profitability.

Kanoujiya, Bhimavarapu and Rastogi (2021) examined bank performance in a holistic manner. An attempt was made to explore the effect of regulation on banks and non-performing assets on banks' profitability. Panel regression analysis was employed to assess the performance of thirty nine commercial banks in India from public, private, and foreign bank groups for the period 2016 to 2019. Profitability of banks was captured by two variables namely net interest margin and return on assets. Regulation in banks was represented by capital to risk asset ratio and leverage ratio. Indian banks were found to exhibit an overall poor performance. Profitability was adversely affected by NPA and regulation. Non-performing assets and profitability did not sensitize the regulatory mechanism, and the regulatory initiatives had no impact on NPA levels.

2.2 Review of Bank Performance: *International Experience*

Haslem (1968) examined the effect of management efficiency and operating efficiency on bank profitability in the United States for the years 1963 and 1964 by employing 64 financial ratios categorized under management effects, size effects, location effects, and time effects. Regression analysis was carried out to arrive at determinants of bank profitability. The results revealed that management of bank, size of bank, location of bank, and time period significantly influence bank profitability.

Ware (1972) assessed the relationship between bank structure and bank performance in fifty seven counties in Ohio for the years 1969 and 1970. The financial ratios examined were concentration ratio, percent change in population, percent change in income, retail sales per capita, industrialization ratio, number of savings and loan association, consumer loans to gross loans, average bank size, and cost ratio. The bank structure - performance relationship was examined using multiple regression analysis. The determinants of bank performance taken were operating performance of banks, economic activity in the individual markets, existing and potential competition, and banks' internal operations. The study found that only bank cost ratio had a consistent impact on bank performance for all the equations for both the years (1969 and 1970) indicating bank efficiency to be an important determinant of bank performance in Ohio.

Mittleider and Helgeson (1978) examined the financial performance of commercial banks in North Dakota for the years 1969 and 1973. Financial performance of affiliated banks and independent banks were compared using financial ratios and significance tests. The financial performance of banks was measured on the basis of asset management, liquidity management, and profitability. The results indicated that affiliated banks had a higher return on loans and securities compared to independent banks. There was no significant difference in the liquidity management approach adopted by affiliated banks and independent banks. Affiliated banks had better return on equity as compared to the independent banks.

Goldberg and Saunders (1981) aimed at determining the factors that influence the growth of foreign banks in the United States for the period 1972 to 1979. Linear regression model was estimated to determine the factors responsible for the entry and growth of foreign banks. The difference of interest rates in deposits and loans, falling price-earnings ratio of domestic bank stocks, an inflow of FDI, depreciation in dollar, and expectations of restrictive policies that were implemented on foreign banks were found to influence the share of foreign banks to the domestic and industrial loan market of United States.

Smirlock (1985) suggested that there is no relationship between bank concentration and profitability of banks. However, bank's market share did affect bank profitability. A cross-sectional profit equation model was estimated to examine the relationship between profits, market share, and bank concentration for 2,700 unit state banks in Kansas City for the years 1973 and 1978. The results indicate that bank concentration did not affect bank profitability, while market share did have a positive significant impact on the profitability of bank.

Bourke (1989) examined the determinants of bank profitability for ninety banks in twelve countries – Canada, California, New York, Ireland, England, Belgium, Spain, Australia, Norway, Denmark, Massachusetts, and Holland for the time period 1972 to 1981. Pooled time-series cross-sectional data was engaged to estimate linear regression model. Dependent variables used for bank profitability were return on capital, return on assets, and value-added return on total assets. The possible determinants of bank profitability taken were staff expenses, capital ratios, liquidity ratio, bank concentration ratio, interest rates, and inflation. Capital ratio, liquidity ratio, and interest rates were found to be positively influencing bank profitability, while staff expense shared a weak inverse relationship with bank profitability. Bank concentration ratio had a weak positive effect on bank profitability. Inflation was found to be insignificant determinant for bank profitability.

Agu (1992) analysed the economic performance of Nigerian banking system as a function of the market structure, policy and demand variables for the period 1970 to 1981. The study reviewed the growth trends in various profitability measures of the banks. It also estimated the four bank concentration ratio as an index for testing the profitability-concentration relationship. Evidence from the analysis indicates that market structure has no significant and statistical association with profitability of banks. Rather, the policy and demand factors were found to be more important determinants of profitability in case of Nigerian banks.

Hasan and Hunter (1996) compared the operating and productive efficiency of minority and women owned banks with non-minority owned banks. One hundred twenty seven banks were analysed using a stochastic cost frontier approach for the financial year 1992. The outputs assessed were money market assets, commercial and industrial loans, and other loans. Other bank outputs included were – non-interest income, service charges excluding gains and losses on foreign exchange transactions. Input variables were labour, physical capital, and funds (including deposits). Results revealed that women owned banks were the most efficient of banks. The study concluded that the level of market concentration plays a vital role in bank's productive efficiency. The more competitive and less concentrated the bank's local market, the higher would be their level of efficiency.

Claessens, Demirgii-Kunt and Huizinga (1998) studied the impact of presence of foreign banks in the banking sector on the performance of domestic banks. Performance of 7900 banks from 80 countries was examined on the basis of bank efficiency, bank profitability and overhead expenses for the period 1988 to 1995. Financial ratios like net interest income to

total assets, profit before tax to total assets, and overhead to total assets were estimated. Panel regression analysis was engaged to determine the factors influencing bank performance. The entry of foreign banks were found to affect competition in the domestic market. The results revealed that foreign banks were more efficient and generated higher profits as compared to domestic banks.

Jackson and Fethi (2000) investigated performance of forty eight Turkish commercial banks for the year 1998. The technical efficiency of individual Turkish banks was assessed using data envelopment analysis. The input variables were number of employees, and the sum of non-labour operating expense. The output variables taken for analysis were loans, demand deposits, and time deposits. Tobit model was employed to explain the variation in calculated efficiencies to the set of explanatory variables. The explanatory variables were bank size, number of branches, profitability, ownership, and capital adequacy ratio. The results of the efficiency scores revealed that bigger bank size measured by log of total assets lead to higher efficiency in banks. Also, banks with high profitability had achieved higher technical efficiency. Capital adequacy ratio shared a negative relationship with bank efficiency. The ownership of banks and the number of branches had a negative but insignificant influence on efficiency.

Barr et al. (2002) assessed the productive efficiency and performance of commercial banks in the United States for the period 1984 to 1998 using data envelopment analysis model. All commercial banks in the United States were included, except for institutions less than three years old. Five input variables such as salary expense, premises and fixed assets, other non-interest expense, interest expense, and purchased funds; and three output variables namely earning assets, interest income, and non-interest income were taken for efficiency analysis. The results revealed that non-interest income, salary expense, premises and fixed assets, and purchased funds shared an inverse relationship with productive efficiency whereas earning assets positively influenced productive efficiency of banks. The relationship between productive efficiency and interest income was positive while the impact of interest expense was negative. A strong negative relationship was observed between productive efficiency of banks and their fixed assets.

Lacewell, White and Rogers (2002) evaluated the performance of banks in United States for the period 1996 to 1999 involving multi-stage process. First, alternative profit efficiency scores were calculated using a stochastic frontier approach. In the second stage, financial

ratios were calculated using the CAMELS model. Finally, the study focused on determining the relationship between financial ratios and profit efficiency scores, their strength, and the direction of relationship. The results revealed that profit efficiency measure added to the financial ratio analysis used by regulators had been found to be more beneficial to large banks than small banks. Further, the findings indicated that large and small banks were not fundamentally the same as they vary in input and output mix.

Staikouras and Wood (2004) examined bank performance and tried to identify determinants of bank profitability for the European Union banking industry for the period 1994 to 1998. Pooled panel regression model was estimated for 685 European banks, of which 138 were large banks and 547 were small banks from different countries of Europe. Return on assets was taken as a variable for bank profitability; bank-specific risk variables were loan to assets ratio, equity to assets ratio, provisions for loan losses to total loans, gap-to-asset ratio (gap) and concentration ratio; and macroeconomic variables were GDP growth rate and gross personal income. Banks with more equity funds were found to be relatively more profitable. Loans to assets ratio and provisions for loan losses to total loans shared a significant and inverse relationship with bank profitability. Gap ratio had a significant and positive impact on profitability of banks, while GDP growth rate had a negative effect on profitability.

Craigwell and Maxwell (2006) studied the trends in non-interest income of commercial banks in Barbados for the period 1985 to 2001. The study also examined the factors determining non-interest income and its impact on financial performance of banks. An unbalanced panel of quarterly observations for seven commercial banks in Barbados were examined using panel regression analysis. The dependent variables were non-interest income as a percentage of total assets, bank profitability measured as return on assets, and the variability of bank earnings. Independent variables were categorized under broad parameters such as bank efficiency, technological change, bank strategy, bank size and organization, and bank environment. The selected banks in Barbados reported a declining trend in non-interest income during the study period. The results revealed that bank environment, technological changes, and bank strategy were the most influential factors determining non-interest income and financial performance of banks in Barbados.

Nimalathan (2008) employed the CAMELS rating system to compare the financial performance of forty eight banks in Bangladesh for the period 1999 to 2006. The variables identified under the CAMELS model were capital adequacy ratio, non-performing loans to

total advances, expenditure to income ratio, return on asset, return on equity, net interest income, and liquidity ratio. The results showed that out of forty eight banks only three banks were strong banks, thirty one banks had satisfactory performance, seven banks had fair performance, five banks had marginal performance, and two banks performed unsatisfactory on CAMELS rating system.

Dietrich and Wanzanried (2009) analysed bank profitability of 453 commercial banks in Switzerland for the period 1999 to 2006. Linear regression model was estimated to examine the effect of internal and external independent variables on bank profitability. Dependent variables for bank profitability were return on asset and return on equity. Explanatory variables that could affect bank profitability were divided into three categories, namely bank-specific factors, industry-specific factors, and macroeconomic factors. Results revealed significant difference in bank profitability between the commercial banks. It was found that capitalized banks were more profitable than others. An increase in bank's loan volume increases bank profitability. Banks with high-interest income were less profitable; bank age had no significant impact on the profitability of banks, while region-specific variables did play an important role in determining bank profitability. Privately-owned banks were found to be more profitable as compared to Swiss-owned banks, followed by foreign banks. GDP growth rate had a positive and significant influence on bank profitability.

Mathuva (2009) examined the relationship of bank profitability with capital adequacy ratio and cost to income ratio for forty one licensed commercial banks of Kenya for the period 1998 to 2007. Return on assets and return on equity were taken as dependent variables for bank profitability. Pearson correlation analysis and ordinary least square regression model were used to analyse the performance of banks. It was found that non-risk weighted capital adequacy measure had a negative impact on bank profitability, while risk-adjusted capital adequacy shared a positive relationship. The cost to income ratio turned out to have a negative influence on bank profitability.

Alper and Anbar (2011) assessed the impact of bank-specific and macroeconomic variables on bank profitability for ten Turkish banks for the period 2002 to 2010, using Panel regression analysis fixed-effect model. Return on assets and return on equity were taken as dependent variables; bank-specific independent variables were asset size (log of assets), capital adequacy (equity to total assets), asset quality (loans to total assets and loans under follow-up to total loans), deposits to asset ratio, liquidity (liquid assets to total assets), and

income structure (net interest margin and non-interest income ratio); and macroeconomic variables taken were real GDP growth rate, inflation rate, and interest rate. The study found that asset size and non-interest income ratio had a positive significant effect on bank profitability. The ratio of loans to assets, and loans under follow-up had a negative but significant impact on return on assets. Interest rate had a positively influenced bank profitability. Factors such as capital adequacy, liquidity, deposit to asset ratio, net interest margin, GDP growth rate and inflation rate turned out to be insignificant determinants of bank profitability.

Alkhatib and Harsheh (2012) evaluated the financial performance of five Palestinian commercial banks for the period 2005 to 2010. Financial performance of banks was assessed on the basis of three indicators, namely internal-based performance measured by return on assets, market-based performance measured by Tobin's Q model, and economic-based performance measured by economic value added. The study employed multiple regression and correlation analysis to capture the impact of bank size, credit risk, operational efficiency and asset management on financial performance. The results revealed that economic-based performance model was the best-fit model amongst the three performance indicators. It was also found that bank size, credit risk, operational efficiency and asset management had a statistically significant impact on financial performance of banks.

Sufian (2012) examined the determinants of bank profitability for South Asian banks for the period 1997 to 2008. Thirty four Bangladeshi banks, thirty one Pakistani banks, and twelve Sri Lankan banks were evaluated using correlation and regression analysis. The dependent variables for bank profitability were return on assets and return on equity. The explanatory variables or determinants of bank profitability taken were grouped into two categories – bank-specific attributes and economic conditions. Bank-specific variables were total loan by total assets (liquidity), loan loss provisions by total loans (credit risk), non-interest income by total assets (diversification), non-interest expenses by total assets (operating expense), book value of stockholders' equity by total assets (capitalization), total deposits by total assets (network embeddedness), and log of total assets (size). The economic condition was measured by the log of GDP growth rate and inflation rate. Empirical results highlighted that capitalization, diversification, credit risk, liquidity, and size had a significant positive influence on bank profitability, but operating expense negatively impacted the profitability of

banks. The impact of network embeddedness was positive and significant on bank profitability of Bangladeshi and Pakistani banks, but not on Sri Lankan banks.

Tarus, Chekol and Mutwol (2012) tried to determine the factors influencing net interest margin for commercial banks in Kenya for the time period 2000 to 2009. Forty four banks were examined by employing pooled regression analysis and panel regression analysis using the fixed effects model. The variables found to be affecting net interest margin of these banks were operating expenses, credit risk, market concentration, economic growth rate, and inflation rate. Operating expenses and credit risk had a positive and significant impact on net interest margin, while economic growth rate and market concentration had a negative influence. The study also found that higher inflation rate led to higher net interest margins.

Ongore and Kusa (2013) identified the determinants of financial performance for thirty seven commercial banks in Kenya for the period 2001 to 2010. The impact of bank-specific factors and macroeconomic variables on financial performance of commercial banks was evaluated using multiple regression analysis. The financial performance of banks was measured as return on assets, return on equity, and net interest margin. The bank-specific independent variables were capital adequacy, asset quality, management efficiency and liquidity, while macroeconomic variables were GDP growth rate and annual rate of inflation. The study found bank-specific factors to influence the financial performance of banks significantly. Capital adequacy and management efficiency had a positive impact on financial performance of banks, but asset quality had a negative effect. Liquidity had no significant effect on bank performance. GDP growth rate had a negative influence on return on assets and net interest margin, but its effect on return on equity was positive. Inflation rate had a relatively strong negative impact on return on assets, return on equity, and net interest margin as well.

Akter and Mahmud (2014) examined the relationship between liquidity and bank profitability for the Bangladesh banking industry for the period 2006 to 2011. The study was confined to twelve Bangladeshi banks from four sectors – government banks, Islamic banks, multinational banks, and private commercial banks. Current ratio measured liquidity of banks while return on assets measured bank profitability. To determine the nature and extent of relationship between liquidity and bank profitability, regression analysis was employed. No significant relationship was found between liquidity and profitability for banks in Bangladesh.

Amin et al. (2014) tried to assess the impact of financial risk on performance of banks in Tanzania over the period 2003 to 2012. Unbalanced panel data was taken for twenty one commercial banks. The study employed instrumental variable regression of fixed effect to estimate simultaneous equations by two-stage least squares. For the first equation, the dependent variables for financial performance were return on assets and return on equity while the independent variables were financial risk, off-balance sheet items, inflation rate, and interest rates. For the second equation, financial risk was taken as a dependent variable; and bank performance, capital and GDP growth were independent variables. The results revealed that financial risk, off-balance sheet items and interest rates influenced the financial performance of banks (return on assets and return on equity) positively and significantly but inflation rate had a positive significant impact on return on assets only. In case of financial risk, bank performance and capital had a positive significant impact while GDP growth rate had insignificant effect on financial risk.

Alshatti (2015) examined the impact of credit risk on financial performance of commercial banks in Jordan using panel regression analysis for the time period 2005 to 2013. Credit risk management was measured by capital adequacy, credit interest to credit facilities, facilities loss to net facilities, leverage ratio, and non-performing loans to gross loans. Financial performance of banks was measured by return on assets and return on equity. A statistically significant relationship was found to exist between credit risk management and financial performance for selected commercial banks in Jordan. Non-performing loans to gross loans ratio had a positive effect on the financial performance of banks, whereas, provision for facilities loss to net facilities ratio had a negative impact. Capital adequacy ratio and the credit interest to credit facilities ratio had no significant impact on financial performance of banks.

Petria, Capraru and Ihnatov (2015) assessed the factors determining bank profitability in the European Union and 27 member states for the time period 2004 to 2011. The factors influencing bank profitability were classified into internal factors and external factors. Bank profitability was measured by return on average assets and return on average equity. Internal variables taken were bank size, capital adequacy, credit risk, management efficiency, liquidity risk, and business mix. External variables were bank concentration, inflation rate, and economic growth rate. The results of panel regression analysis revealed that credit risk, liquidity risk, management efficiency, bank market concentration had a negative yet

significant impact on bank profitability, while business mix, and economic growth influenced bank profitability positively.

Romana and Sargu (2015) determined the impact of bank-specific variables on liquidity risk of eighty six banks of Central and Eastern European (CEE) countries for the period 2004 to 2011. Bank-specific indicators taken were capital adequacy, asset quality (impaired loans to total loans), management quality (interest expenses to total deposits), profitability (return on average equity and return on average assets), and bank size (total assets to total sector assets). The dependent variable, liquidity of banks was measured as loans to total assets ratio. Ordinary least square regression and Pearson correlation were carried out for the analysis. Capital adequacy ratio, asset quality, and return on average equity were found to significantly influence bank liquidity. Nonetheless, the impact of these independent variables on the overall liquidity of banks was positive in some cases and negative for others, subject to the local macroeconomic environment.

Ahsan (2016) analysed the financial performance of the banks in Bangladesh using CAMEL rating for the period 2007 to 2014. The CAMEL parameters were assessed based on six ratios, namely equity to assets ratio, investment loss reserve, cost to income ratio, net profit to total asset ratio, net profit to total equity, and net loan to total assets. All the three banks were found to be strong and sound on their composite rating system.

Ghebreorgis and Atewebhrhan (2016) assessed the financial position of three banks in Eritrea on the basis of profitability, risk, and efficiency. Financial ratio analysis was employed to analyse two Eritrean banks for the period 1997 to 2007. The variables used to measure profitability were return on assets, return on equity, yield on earning assets, rate paid on funds, and net interest margin. Risk was measured on the basis of provision for loan losses and debt to asset ratio. Bank efficiency was measured using variables such as non-interest income ratio, expense to income ratio, and non-interest expense ratio. It was found that the selected banks did not show any significant improvement in financial position over the analysis period.

Aguentaou, Lahrach and Bounakaya (2017) evaluated the financial performance of banks in Morocco for the period 2004 to 2014 using panel data. Panel regression analysis was engaged to identify the determinants of bank efficiency. The dependent variable taken for bank efficiency was non-interest expense to net income. CAMEL indicators (capital

adequacy, asset quality, management efficiency, earning performance, and liquidity) were taken as independent variables. The results indicate that capital adequacy had the most significant impact on bank efficiency influencing it positively. Asset quality, earning performance, and liquidity also had a positive effect on bank efficiency, but management efficiency impacted the efficiency of banks negatively.

Antoun, Coskun and Georgievski (2018) investigated the factors determining the financial performance of banks in Central and Eastern European countries for the period 2009 to 2014. 128 banks were examined from nine countries, namely Belarus, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Moldova, Ukraine, and Estonia. The dependent variables of financial performance were identified on the basis of CAMEL indicators, while the independent variables taken were bank's size, deposits, business mix, operating efficiency, bank concentration, GDP growth rate, inflation rate and lag value of dependent variable. The methodology adopted was fixed effect panel regression analysis. The study revealed that bank size influenced bank's financial performance negatively yet significantly. It was found that banks with more diversified income had better asset quality and earning efficiency. In addition, banks with high operating expenses maintained higher capital adequacy and liquidity. Bank concentration had a positive and significant impact on capital adequacy and liquidity of banks. The inflation rate had a positive effect on asset quality and earnings, while economic growth had a positive influence on capital adequacy and liquidity.

Assfaw (2018) identified the bank-specific factors that might influence the financial performance of banks in Ethiopia for the period 2011 to 2017. The financial performance of six private commercial banks was analysed using multiple linear regression and Pearson correlation coefficient. The bank-specific variables taken were bank size, capital adequacy, asset quality, management efficiency, and liquidity management. The dependent variables representing financial performance of banks were return on assets, return on equity, and net interest margin. The study found that bank size, capital adequacy, and management efficiency had a positive and significant effect on bank's financial performance. Liquidity had a negative yet significant impact on return on equity, while asset quality was found to be statistical insignificant determinant of financial performance.

Kohlscheen, Murcia and Contreras (2018) analysed the effects of essential micro and macro variables on bank profitability. The study assessed 534 banks from nineteen emerging economies for the period starting from 2004 to 2014. The dependent variables identified were

return on assets, net interest margin, non-interest income, loan loss provision, and return on equity. Independent variables taken were loan growth, log of total value of loan, capital to total assets, bank holdings of securities and total assets (liquidity), share of funding, operational expenses and gross revenues (cost efficiency), GDP growth rate, short-term as well as long-term interest rate, 10 year bond yield rate, spread of the sovereign 5 year credit default swaps (aggregate risk), and inflation rate. A generalized method of moment (GMM) estimator was used to study the model. The results revealed that higher long-term interest rates had led to an improvement in bank profitability while short-term interest rates increased funding costs and led to falling profitability for banks. It was found that credit growth in normal times tend to be more important for bank profitability than GDP growth. Thus, financial cycle predicts bank profitability better than the business cycle. It was also found that sovereign risk premia reduced bank profitability and the credible fiscal framework supported the overall financial stability of banks.

Marjanović, Stanković and Popović (2018) used data envelopment analysis to assess the operational efficiency of banks in Serbia for the period 2014 to 2016. The input variables taken in the study were total assets, operating expenditure, interest expenditure, and the number of employees; and the output variables were interest income, and profit before tax. 75 percent of the banks operating in Serbia were found to be inefficient, and the primary reason identified was inefficient operations or faulty management in these banks.

Abel, Bara and Roux (2019) investigated the cost efficiency of banks in Zimbabwe for the period 2009 to 2016. Fourteen commercial banks were examined using the stochastic frontier analysis. It was found that banks in Zimbabwe experienced 17 percent cost inefficiency. The efficiency levels of banks had declined over the years. It reflected increase in resource wastage in the banking system. The study suggests that if the problem of cost inefficiency is resolved, banks can pass on the benefits of reduced cost to their customers in the form of reduced interest rates and bank charges. It recommends the role of innovation for reducing cost inefficiencies of banks.

Chukwunulu, Ezeabasili and Igbodika (2019) assessed the impact of risk management on bank performance of Nigeria for the period 1994 to 2016. Bank performance was measured by return on assets and return on equity. Unsystematic risk management was analysed by computing variables such as capital adequacy risk, operational risk, credit risk, and liquidity risk. Ordinary least square regression analysis was applied to measure the effectiveness of

risk management on bank performance. It was found that operational risk and liquidity risk had no significant impact on performance of Nigerian banks. Credit risk had a significant negative impact on return on equity, while it had an insignificant negative influence on return on assets. Capital adequacy risk was found to have a significant and positive effect on return on equity but an insignificant negative impact on return on assets.

Gadzo, Kportobrgbi and Gatsi (2019) examined the effect of credit and operational risk on the profitability of universal banks in Ghana. The study used partial least squared structural equation model to analyse twenty four universal banks from 2007 to 2016. The dependent variables for bank profitability were net interest margin and return on average equity. The independent variables were operational risk and credit risk. The moderating variables (bank-specific variables) were liquidity ratio, equity ratio, cost to net income ratio, and asset quality. The estimates of the structural equation model revealed that credit risk and operational risk had a significant negative impact on bank profitability. Moderating variables like asset quality, bank leverage, liquidity, and cost to income ratio had a positive significant influence on credit risk, operational risk and financial performance of the universal banks.

Abusharbeh (2020) assessed the financial soundness of Palestine commercial banks for the period 2007 to 2017. Six local Palestinian banks were examined using the CAMEL rating system and t-test. The results for CAMEL rating system reveal that Palestinian banks display stability in terms of profitability and liquidity. The banks adhere to the standard norms of capital adequacy. The results of t-test show that the selected banks differ significantly in their financial performance.

Bashatweh and Ahmed (2020) aimed to evaluate the financial performance of thirteen banks in Jordan using CAMELS rating framework for the period 2014 to 2018. The financial ratios taken in the study were the components of the CAMELS model such as capital adequacy ratio, non-performing loans to total loans, operating expense to gross income, net profit after tax to total assets, liquid assets to total assets, and total securities to total assets. It was found that the index of capital adequacy, earnings, and sensitivity to market risks were strong. In contrast, the index of quality of assets, quality of management, and liquidity were weak for the banks assessed.

Fadun and Oye (2020) analysed the effect of operational risk management on the financial performance of six Nigerian commercial banks for the period 2008 to 2017. The study used

panel data to engage multiple regression analysis and correlation analysis. Return on assets was taken as a measure of financial performance, and the independent variables were cost to income ratio, loan to deposit ratio, net interest margin, non-performing loan ratio, and liquidity ratio. The results revealed that comprehensive operational risk management practices influenced the financial performance of banks positively. The cost to income ratio and non-performing loan ratio had a significant but negative impact on return on assets, while net interest margin, loan to deposit ratio, and liquidity ratio had a positive and significant impact on return on assets.

Siddique, Khan and Khan (2021) captured the effect of credit risk management and bank-specific factors on the financial performance of nineteen South Asian commercial banks. Ten Pakistani banks and nine Indian commercial banks were examined for the period 2009 to 2018. The inter-relationship between credit risk, bank-specific factors and financial performance of banks was assessed by employing generalized method of moment. Return on equity and return on asset were taken as dependent variables. Non-performing loans and capital adequacy represented credit risk, and bank-specific variables were cost-efficiency ratio, average lending rate, and liquidity ratio. In addition to these independent variables, three control variables were used in the study, namely bank size (log of total assets), inflation rate and age of commercial banks. The results revealed that non-performing loans, cost-efficiency ratio, and liquidity ratio had a significant negative association with return on assets as well as return on equity. Capital adequacy and average lending rate had a significant and positive impact on financial performance of South Asian commercial banks. Except for age of commercial banks, the other two control variables, that is bank size and inflation rate had a significant effect on financial performance of banks.

Singh, Basuki and Setiawan (2021) tried to identify the factors influencing non-performing loans for seventy four Nepalese conventional banks for the period 2015 to 2019. Multiple regression analysis was employed to examine the determinants of non-performing loans. Independent variables taken were return on asset, capital adequacy ratio, bank size measured as log of total assets, GDP growth rate, and inflation rate. The study found that bank size had a negative yet significant effect on non-performing loans, while return on assets had a positive and significant relationship with non-performing loans. Macroeconomic variables such as GDP growth rate and inflation rate had a positive and significant impact on non-

performing loans whereas capital adequacy ratio had no significant effect on non-performing loans.

2.3 Brief Summary of Literature Review

An extensive review of related literature on performance of commercial banks reveals that there is a wide array of empirical research being carried out on bank performance across the globe. Although these studies differ in their specific objectives, researchers have attempted to evaluate bank performance for different countries, for bank groups and individual banks, over different time periods, using diverse methodologies and techniques. Two broad approaches are followed to evaluate bank performance, namely the structural approach and non-structural approach. Structural approach is based on theoretical models of banking firm such as profit frontier, efficiency frontier and productivity frontier, while non-structural approach uses different performance measures like return on assets, return on equity, net interest margin, Tobin Q ratio, and the ratio of fixed cost to total cost for bank performance analysis. Majority of the performance studies reviewed have focused on the financial performance and efficiency of banks considering the non-structural approach. Researchers have largely investigated bank performance on basis of broad parameters such as profitability, productivity, liquidity, efficiency, competition, capital structure, and capital adequacy.

Besides the studies discussed earlier in the chapter, there are many more that contribute to the vast pool of literature on bank performance and are worth mentioning here. Although varied methodologies have been employed by Indian and international studies to assess bank performance, there exists a gap between them.

A review of Indian studies highlights that the research on bank performance has been widely engaged using financial ratio analysis. To mention some of them, Prashanta (2000), Ganesan (2001), Mohan (2002), Ramasastri and Samual (2006), Jha and Sarangi (2011), Koundal (2012), Goel and Rekhi (2013), Kumar and Prabhakar (2013), Sai and Sultana (2013), Bansal (2014), Kumar and Kumar (2016), Sharma and Singhal (2016), Srinivasan and Britto (2017), Jha (2018), and Jha and Subburaj (2020).

Many Indian studies have also assessed the performance of banks using CAMEL/S methodology such as Chakrabarti and Chawla (2005), Rao (2006), Gupta and Verma (2008), Dash and Das (2010), Sangmi and Nazir (2010), Nandi (2013), Kumar and Sharma (2014),

Kaur (2015), Meena (2016), Srinivasan and Saminathan (2016), Singh and Das (2018), Koley (2019), Mayakkannan and Jayasankar (2020), and Singh and Milan (2020). Few foreign studies have also employed CAMEL/S model like Gasbarro, Sadguna and Zumwalt (2002), Dincer et al. (2011), Kabir and Dey (2012), Rozzani and Rahman (2013), Altan, Yusufazari and Bedük (2014), Yuksel, Dincer and Hacıoglu (2015), Doumpos, Hasan and Pasiouras (2017), Lelissa and Kuhil (2018), Nguyen, Nguyen and Pham (2020), and Kumarasinghe and Jahfer (2021).

A good number of studies have employed Data Envelopment Analysis for examining efficiency in banks. Saha and Ravishanker (2000), Ketkar, Noulas and Agarwal (2003), Sathya (2003), Mohan (2005), Debasish (2006), Debnath and Shankar (2008), Kumar and Vincent (2011), Sharma, Sharma and Barua (2012), Puri and Yadav (2013), Jayaraman and Srinivasan (2014), and Ray (2016) are some of the Indian studies, while the international studies are Yeh (1996), Chen and Yeh (1998), Shammari and Salimi (1998), Pastor (1999), Halkos and Salamouris (2004), Johnes, Izzeldin and Pappas (2009), Avkiran (2010), Mobarek and Kalonov (2014), Liang et al. (2016), Batir, Volkman and Gungor (2017), Musah (2018), and Antunes et al. (2021).

There are a sizable number of studies that have carried out determinant analysis for bank performance by estimating multivariate regressions. These are Athanasoglou, Brissimis and Delis (2005), Chantapong (2005), Bakar and Tahir (2009), Shen et al. (2009), Ćurak, Poposki and Pepur (2012), Mondal and Ghosh (2012), Abduh and Alias (2014), Ferrouhi (2014), Terraza (2015), Rashid and Jabeen (2016), Nuhiu, Hoti and Bektashi (2017), Tarawneh, Khalaf and Assaf (2017), Quaranta, Raffoni and Visani (2018), Jepchumba and Simiyu (2019), Xu, Hu and Das (2019), Siddique et al. (2020), and Raci et al. (2021).

Many researchers have been observed to employ the Stochastic Frontier Analysis in bank performance studies. Some of which are Kraft and Tirtirog˘lu (1998), Chen (2002), Sensarma (2005), Mohamad, Hassan and Bader (2008), Manlagn˘it (2010), Bhattacharyya and Pal (2013), Dong, Hamilton and Tippett (2014), Lensink and Meesters (2014), Khalil, Mehmood and Ahmad (2015), Zuhroh, Ismail and Maskie (2015), Dong et al. (2016), Akinkunmi (2017), Anwar (2018), Sadalia et al. (2018), Wardhani and Mongid (2019), and Okuda and Aiba (2020).

The review reveals that Indian studies have largely analysed bank performance by employing financial ratio analysis, CAMEL/S methodology, and data envelopment analysis. Among the international studies, developing nations have been found to focus on ratio analysis and CAMEL/S model. The developed countries, on the other hand, have adopted multiple regression analysis, data envelopment analysis, and stochastic frontier analysis for examining bank performance. Few Indian and international studies have also assessed bank performance with the help of DuPont analysis and sequential decomposition models.

A bouquet of variables has been identified and estimated for analysing the performance of banks. The financial variables commonly examined by studies are return on assets, return on equity, net interest margin, business per employee, profit per employee, credit-deposit ratio, total deposit to total assets, total advances to total assets, NPAs to advances, NPAs to assets, interest income to total assets, non-interest income to total assets, earning per share, and market concentration. The macroeconomic variables like inflation rate, exchange rate, interest rate, and GDP growth have also been considered by some studies. In few cases, physical parameters like number of bank branches and number of ATMs have also been assessed.

Despite many similarities, the studies reviewed are either aggregative, case studies, or the coverage is too small in terms of the number of banks and the time period covered. The studies have focused on limited variables either in combination or as singular parameters. The outcomes of the studies are bound to differ as they relate to different countries, different banks, different time periods, and use different methodologies.

After an elaborative coverage of literature review on bank performance, the present study identified few research gaps. Majority of the studies have focused upon financial ratio analysis for examining performance of banks. Many studies have assessed bank performance using CAMEL/S methodology. Quite a few researchers have approached the subject of bank performance from efficiency perspective. They have explored productive or operational efficiency of banks by employing data envelopment analysis. Some studies have tried to identify the factors influencing bank performance by estimating multivariate regressions. Indian studies have largely used multiple regression analysis with either time-series or cross-section dataset but very few have engaged panel regression analysis to identify the important determinants of bank performance or profitability.

In view of the above, the present research attempts to make a sincere effort to study, examine, and evaluate the performance of commercial banks in India over time. The empirical analysis in the study covers an extended time period spanning over nearly two decades. An attempt is made to analyse the performance of banks by examining a number of financial ratios based on financial parameters. The study also tries to explore the factors that influence bank profitability and the magnitude of their relationship. Finally, the study endeavours to undertake an assessment of financial stability of scheduled commercial banks in India, so as to draw effective policy inferences and recommendations.

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