CHAPTER 2

LITERATURE REVIEW
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2.1 Overview
The chapter reviews the published literature upon which the study is based. The empirical findings regarding the financial performance of banks, Camel analysis, efficiency, efficiency and effectiveness of banks through Data Envelopment Analysis, determinants of efficiency and financial performance through statistical multivariate analysis techniques are presented.

2.2 Financial Performance of Banks
Many studies are documented in India with respect to banking operations and profitability of the banks in India. The significant literature review on the financial performance of the banks in India is presented in this section.

Kumar (1975) reviewed the profitability of the commercial banks in India. He found that the private sector banks were more profitable than the public sector banks due to their higher interest on advances and lower cost of salaries, wages and provident fund.

Desai (1976) surveyed the performance of the public sector banks since 1969. There was an improvement in the performance of the public sector banks in the areas of branch expansion, mobilisation of deposits, deployment of credit and credit to the priority sector.

Divatia and Venkatachalam (1978) evaluated the operational efficiency and profitability of the public sector banks in India for the period 1969 – 1976. They cited that a single measure cannot capture the operational efficiency of the banks. They developed an efficiency index that comprised productivity, profitability, social obligations as its components. The banks were then classified into three categories consisting above average, average and below the average index. A small number of three banks found themselves in the category of above average efficiency.
Shetty (1978) analysed the performance of the commercial banks in India after their nationalisation. It was noticed that there was a wider territorial and regional spread of branch banks expansion, larger mobilization of financial savings through bank deposits and reorientation of credit deployment in favour of small producers and the marginalized classes.

Varde and Singh (1979) identified the trends in the profitability and causes of the decline in the profitability of the commercial banks in India. They reported that the profitability of the banks in India had declined during the period 1964 – 1977. Average rate of earnings from deployed funds, the average cost of funds raised and percentage of spread, monetary, credit and interest rate policies, deposit and deployment mix and volume of business per rupee of manpower expense were the prominent factors that led to decline in the profitability of the banks during the study period.

Angadi and Devaraj (1983) assessed the productivity and profitability of the commercial banks in India during the period 1969 – 80. It was revealed that the foreign banks in India had high profitability and productivity ratios than the State Bank of India group and the nationalised banks. Cost of deposits, interest earnings, social banking, funds management, earnings from sources other than interest earnings, geographical expansion in banking business, human resources and retail banking services were the critical factors that led to the disparities in the profitability and productivity in the various groups of banks in India. It was cited that the changes in the interest rates on deposits and advances have the most prominent impact on the profitability of the banks.

Dhananjayan and Selvarajan (1983) reported the trends in the profitability of the 14 nationalised banks in India for the period 1970 – 1979. It was noted that the growth of interest earnings have been lesser than the interest payments, decline in the share of operating earnings and increase in the establishment expenses and salaries of the employees. These factors had an impact on the profitability of the banks.

Vergheese (1983) evaluated the profits and profitability of the commercial banks in India in the Seventies. It was observed that the profits and profitability of the banks
had risen in the mid seventies and declined at the end of the decade due to priority sector financing and rise in interest costs. They were the outcome of the changes in the monetary policy of the Government.

Ojha (1987) evaluated the productivity and profitability of the public sector banks in India. Indicators of total working capital, number of employees, establishment expenses, net profit, establishment expenses as a percentage of net working funds and net profit as a percentage of working funds were used to measure the productivity. It was observed that the productivity of the public sector banks in India had increased for the period 1969 – 1984. It was stated that the profitability of the banks in India was low. He proposed the use of computerization in the Indian banks, deliberate planning, development of human resources and co-operation of the employees to improve the profitability and productivity of the public sector banks in India.

Swami and Subrahmanyam (1994) made a comparative study on the performance of the public sector banks in India for the period 1970 – 1989. It was observed that the public sector banks had exhibited double digit growth rates during the study period on the parameters of total income, total expenses, deposits, deposits plus borrowings and working funds. They also constructed a composite index of performance of banks based on the taxonomic method. None of the banks in the study period had achieved efficiency equal to 50%.

Mohan (2002) studied the performance of the public sector banks in the context of the deregulation for the period 1992 – 2000. It was observed that the foreign banks were better performers than the public sector banks and private sector banks in the areas of earnings, profitability and asset quality.

Pathak (2003) compared the performance of the private sector banks in India during the period 1997 – 2001 with a sample size of 6 banks. The top 2 performers were the HDFC Bank and the ICICI Bank. The others banks had to make an improvement in their performance in the areas of credit quality and cost control.

Madhumathi and Kumar (2004) evaluated the financial performance of the commercial banks in India through the techniques of Factor Analysis and Cluster
Analysis for the period 2000 – 2002. The factor analysis extracted six factors – growth in earnings quality, capital adequacy, operational efficiency, growth in asset quality, growth in investment quality and growth in interest income. It was stated that only 75% of the variance was explained by these factors. Thus qualitative factors should be considered for the analysis of the performance. The cluster analysis proved that growth in investment quality was not significant factor that differentiated between the cluster groups.

Sharma (2005) examined the problem on non performing assets in the banking sector and analysed its impact on the performance of banks during the study period 1993 - 2002. Nonperforming assets had a negative impact on profitability, productivity, achievement of capital adequacy, funds deployment and mobilization policy, credibility of the banking system and overall economy.

Venkatapathy and Priyadarshini (2005) stated that the extent of Human Resource Development practices in an organization influenced the effectiveness of the public sector banks. It was stated that the Human Resource Development could make the public sector banks top performing banks of India.

Bodla and Verma (2006) conducted a study on the performance evaluation of commercial banks is India for the period 1988 – 2004. They considered the areas of total deposits, total advances, deposits and advances per employee, market share, net non performing assets as a percentage of net advances, net profit as a percentage of total assets, non interest income as a percentage of total income, interest income as a percentage to total assets and net interest income as a percentage to total assets. It was observed that private sector banks have performed better in the areas of deposits and advances than public sector and foreign sector banks. Foreign banks have performed better in the areas of deposits per employee, advances per employee, profitability, interest income to total assets and non interest income to total income than the private sector banks and public sector banks in India.

Kamath (2007) analysed the performance of Indian banks from the perspective of intellectual capital. The reasons for poor performance were huge employee costs,
huge non-performing assets, incorrect allocation of resources, unplanned growth and bad investment decisions.

Kunnanatt (2008) stated that the managers of Indian banks possessed achievement orientation attributes in adequate measures and tend to produce better results for their organization.

Rao, Rezvanian and Nyadroh (2008) assessed the profitability of the banks in India for the period 1998 – 2003. They observed that the foreign banks were more profitable than the private sector and public sector banks in India. The public sector banks in India had to achieve control over expenses, efficient use of funds and judicious use of financial leverage to improve their performance.

Kalluru (2009) examined the effect of ownership on performance and risk of 87 Indian commercial banks during the period 1995 – 2007. Their analysis revealed that foreign banks are more profitable than private sector banks and state owned banks due to capitalization and higher low cost funds.

Rakhe (2010) examined the financial performance of the foreign banks in comparison to other bank groups in the Indian Banking Sector for the period 2000 – 2009 with a sample of 59 banks. He stated that the other bank groups such as public sector banks and private banks were less profitable than the foreign banks due to their lack of access to low cost funds and narrow concentration of income generated by them from a few sources.

Uppal (2010) compared the performance of public, private and foreign sector banks for the study period 1997 – 2008. Productivity, profitability and efficiency parameters were selected to study the performance of SBI, ICICI and Standard Chartered Bank. It was found that new private sector and foreign banks were more productive and efficient than public sector banks. It was attributed due to the decline in their interest income and decrease in spread. They have to adopt competitive strategies with the latest technology and change their mindset to solidify their position in the global market.
Prasad and Veena (2011) emphasised that in the scenario of liquidity overhang, the predicament of increased lending led to the outcome non-performing assets and the consequences were the reduced efficiency and profitability of the banks.

Das and Drine (2011) analysed the asset quality, management performance, profitability and concentration of the banks in the Indian banking Sector for the period 1980 – 2007. They found that the Credit-Deposit Ratio was the lowest for the public sector banks than the foreign banks. But the exposure to the losses of default was less and they invested a huge amount in government securities than the foreign banks. The public sector banks were less profitable in terms of the Return on Assets and Return on Equity than the private sector and foreign banks. The share of public sector banks in the areas of assets, deposits and credit had reduced in the study period due to the presence of the private sector banks and foreign banks.

Ibrahim (2011) analysed the operational performance of the Scheduled Commercial Banks in India for the period 2000 – 2009 on the parameters of Aggregate Deposits mobilized by these banks, Loans and Advances, Credit-Deposits Ratios and Investment-Deposits Ratios. Their study revealed that the scheduled commercial banks showed an increasing trend in the performance with respect to Aggregate Deposits, Loans and Advances, Credit-Deposits Ratios and Investment-Deposits Ratios during the study period.

Kheechee (2011) investigated the sources of differences in profitability among the various categories of banks - public sector banks, foreign banks, old and new private sector banks and the scheduled commercial banks in India for the period 2004 – 2010. The analysis was on the basis of Return on Funds, Return on Investment, Return on Advances, Interest Income to Total Income, Other Income to Operating Expenses, Cost of Funds, Cost of Deposits, Cost of Borrowing and Spread. It was revealed that the public sector banks were less efficient in the management of loan portfolio and had a low key profile in foreign exchange transactions and financial services compared to the private sector banks and foreign banks.

Jhamb and Prasad (2012) conducted a comparative study on the profitability and efficiency of the banks in India with special reference to the Oriental Bank of
Commerce and the HDFC Bank Ltd. for the period 2001 – 2011. They suggested that rationalization of staff, increased productivity, increase in the retail business, tie-up with the regional rural banks would improve the performance of the public sector banks in India.

Makkar and Singh (2012) evaluated the financial soundness of 22 public sector banks and 15 private sector banks in India for the period 2007 – 2011 through the ratios of Capital Adequacy Ratio, Capital to Assets, Equity to Total Assets, Non Performing Loans to Loans, Cost to Income and Loans to Assets. The study pronounced that private sector banks were more financially sound than public sector banks. Central Bank of India, Syndicate Bank, UCO Bank and Bank of Maharashtra were the worst public sector banks during the period of the study. They have to improve their performance by focusing on the ratios of Equity to Assets and Assets to Equity.

Kaur (2012) anaylsed the growth of all scheduled commercial banks in India for the period 1969 – 2006 on the parameters of branch expansion, deposit mobilisation and credit deployment. The study claimed that the public sector banks had a wide network of branches, majority market share of deposits and credit.

Vemula and Mahalingam (2012) in their report mentioned that Pranab Mukherjee commented that Non Performing Assets have inclined at a faster rate than the credit growth for the domestic banks in India since 2006. They further added that the non performing assets reduced the profitability and liquidity as the banks have to create a provision of loan losses due to the occurrence of bad debts to the extent of 70% out of current yeas profits.

The studies on the financial performance of banks emphasise on its profitability, deposit mobilisation, credit deployment or productivity. Many comparative studies on the performance between the groups of banks based on ownership are found.

2.3 Camel Analysis
The significance of Camel model as an important measure of performance evaluation of banks has been cited in literature. One of the earliest may be traced to Cole and Gunther (1995). They made a study on the shelf life of Camel Ratings. They
suggested that, if a bank had been examined for less than two quarters, off-site monitoring systems did not offer precise information on survivability than the Camel ratings.

Sahajwala and Bergh (2000) stated that the Camel System was used by all the three US supervisory agencies - the Federal Reserve System, Office of the Comptroller of the Currency (OCC) and the Federal Deposit Insurance Corporation (FDIC) since the 1980’s to rate the performance of the banks.

Padmanabhan Working Group Committee Report (1995) affirmed that in India, banks had to subject to an on-site inspection through the Camel Model. The Board for Financial Supervision (BFS) adopted the Camel Model and stipulated the banks to implement it as a supervisory measure from July 1997 onwards.

Mittal and Dhade (2009) in their study of awareness and perceptions of CAMEL rating across banks provided evidence that the bank employees felt the need for a suitable performance evaluation technique to gauge their banks’ performance periodically on a uniform and acceptable benchmark. They considered the Camel rating an appropriate technique of performance evaluation of their banks.

Dang (2011) confirmed the relevance of Camel rating in the area of banking supervision.

Considering the relevance of the Camel Model, many studies have been conducted in the Indian context to measure the performance of the banks using the Camel methodology. The noted literature review is documented below.

Bhayani (2006) analysed the performance of the Private Sector Banks in India due to the advent of the Economic Reforms in India for the period 2001 – 2005. The banks that formed part of the sample were HDFC Bank Ltd., ICICI Bank Ltd., IDBI Bank Ltd. and UTI Bank Ltd. He reported that IDBI Bank Ltd was top performer of the sample and the next in lead was the UTI Bank Ltd.
Bodla and Verma (2006) evaluated the performance of SBI and ICICI through the Camel model for the period 2001 – 2005. It was found that State Bank of India had an edge over ICICI Bank with respect to capital adequacy. Moreover, ICICI outperformed the State Bank of India on the basis of the parameters of assets quality, earning quality and management quality. Both the banks had better liquidity position and there was no significant difference between their financial performance.

Dash and Das (2009) studied the performance of the public sector, private sector and foreign banks in India for the period 2004 – 2008. It was shown that the performance of the public sector banks was the lowest compared to the private sector banks and foreign banks on the majority of the Camel factors in the study period. The private sector banks and foreign banks had better soundness of management and quality of earnings and profitability than the public sector banks. They suggested that the public sector banks should be flexible to the changing market conditions, to improve their performance. They should make changes in their credit policy, customer service and adoption of IT services in the banking system. They should enhance employee motivation and productivity.

Kaur (2010) evaluated the performance of 28 public sector, 26 private sector and 28 foreign banks through the Camel analysis technique. Andhra Bank and State Bank of Patiala were the top ranking banks in the category of public sector banks. Jammu And Kashmir Bank got the first slot as the top performer followed by HDFC Bank in the category of private sector banks. Antwerp Bank was in the number one position followed by JP Morgan Chase Bank among the foreign banks.

Manoj (2010) made a comparative analysis of the old private sector banks in India for the period 2000 – 2009 through the Camel Approach. The ratios considered were the Capital Adequacy Ratio, Capital Adequacy Ratio Tier I, Primary Sector Advances to Total Advances, Secured Advances to Total Advances, Net Non Performing Assets to Net Advances, Business per Employee, Profit per Employee, Return on Advances, Return on Equity, Net Interest Income to Total Assets, Interest Income to Total Assets, Non Interest Income to Total Assets, Intermediation Cost to Total Assets, Burden to Total Assets, Operating Profits to Total Assets, Return on Assets, Cash Deposit Ratio and the Credit Deposit Ratio. It was remarked that the old private sector
banks in Kerala had to improve their performance in the areas of liquidity, asset quality and earnings.

Rahul and Sabu (2010) examined the relative performance of South Indian Bank Ltd. along with other banks in India for the period of study 2004 – 2009 on the basis of the Camel model. Their findings indicated that the bank had a high Capital Adequacy Ratio, an increasing trend in the Yield of Advances, Business, Liquid Assets to Total Deposits and low levels of Non Interest Income and Return on Assets. They proposed that South Indian Bank Ltd. should promote low cost deposits, increase their capital base, focus on primary sector lending and invest in the training and development programmes of their employees.

Sangmi and Nazir (2010) analysed the financial performance of banks in India on the basis of the Camel model during the study period 2001 – 2005 taking a sample of two banks – Punjab National Bank and Jammu and Kashmir Bank. The ratios considered were the Capital Adequacy Ratio, Leverage Ratio, Net Worth Protection, Net Non Performing Assets to Net Advances, Loan Loss Cover, Expenditure to Income Ratio, Credit Deposit Ratio, Asset Utilisation Ratio, Diversification Ratio, Earnings per Employee, Expenditure per Employee, Return on Equity, Return on Assets, Spread Ratio, Net Interest Margin, Liquid Assets to Total Assets, Government and other Securities to Total Assets, Liquid Assets to Deposits and Investments to Total Deposits. The study showed that both the banks were financially sound and performance satisfactory with respect to their capital adequacy, asset quality, management and liquidity.

Chowdhury (2011) investigated the financial soundness of the commercial banks in India using the Camel Approach for the period 2000 – 2009. The banks selected for the study were traded on the National Stock Exchange and part of the CNX Bank Index. ICICI Bank Ltd., HDFC Bank Ltd., Kotak Mahindra Bank and Axis Bank were the top performers on the basis of the Camel approach. State Bank of India, Union Bank of India and Bank of India were in the last category of banks based on the performance and had to improve their performance in all the areas of capital adequacy, asset quality, management, earnings and liquidity.
Prasad, Reddy and Chari (2011) analysed the performance of the public sector banks in India through the Camel Ratios. It was found that Andhra Bank was ranked first followed by Bank of Baroda and Indian Bank. It was cited that Central Bank of India secured the last rank followed by UCO Bank and Bank of Mysore. State Bank of India was in the number Twentieth position though it is largest Public Sector Bank in India.

Reddy and Prasad (2011) evaluated the performance of the regional rural banks through the application of Camel Model for the period taking a sample size of two regional rural banks. They adopted the ratios of Capital Adequacy Ratio, Debt to Equity, Advances to Assets Ratio, Government Securities to Total Investments, Net Non Performing Assets to Total Assets, Net Non Performing Assets to Net Advances, Total Investments to Total Assets, Percentage change in Net Non Performing Assets, Total Advances to Total Deposits, Business per Employee, Profit per Employee, Operating Profit to Average Working Funds, Spread to Total Assets, Net Profit to Assets, Interest Income to Total Income, Non Interest Income to Total Income, Liquid Assets to Total Deposits, Liquid Assets to Demand Deposits, Liquid Assets to Total Assets and Government Securities to Total Assets. The study revealed that the regional rural banks did not vary significantly with regard to their performance on the basis of the Camel parameters. Andhra Pragathi Grameena Bank was ranked as the number one bank on the basis of the financial performance.

Kumar (2011) analysed the importance of Camel model as a performance measure in the Indian banking industry. He cited that the bankers of the public sector banks considered the ratios of asset quality, management, earnings and liquidity more important than the ratios of capital adequacy unlike the private sector banks. Their responses were consistent with the actual performance statistics wherein the public sector banks outperformed the private sector banks during the study period 2005 – 2009.

Kumar, Harsha, Anand and Dhruva (2012) analysed the performance of the commercial banks in the Indian banking industry for the period 2000 – 2011 through the Camel Model. The banks considered were the components of the CNX Bank Index. They considered the ratios of Capital Adequacy Ratio, Net Performing Assets
to Net Advances, Market Value to Equity Capital and Total Advances to Total Deposits. Business per Employee, Profit per Employee, Operating profit by Average Working Funds, Net profit to Average Assets, Interest Income to Total Income, Non Interest Income to Total Income, Liquid Assets to Total Assets and Liquid assets to Total Deposits as the parameters to evaluate the performance of the banks. They observed that the private sector banks were sounder than the public sector banks. The public sector banks had not achieved the convergence that the private sector banks had.

Mishra and Aspal (2012) evaluated the performance of the State Bank of India and its Associate Banks for the period 2009 – 2011. Their study showed that there was no significant relationship of the Camel ratios on the performance of the banks. State Banks of India was ranked the lowest on the parameters of capital adequacy and asset quality. State Bank of Bikaner and Jaipur were poor performers in the area of management efficiency. State Bank of Patiala was ranked the lowest in the parameter of earnings quality.

Prasad and Ravinder (2012) evaluated the performance of the 20 Nationalised banks in India for the period 2005-06 to 2009-10 on the basis of the parameters of the capital adequacy, asset quality, management, earnings and liquidity. They considered the ratios of Capital Adequacy Ratio, Debt to Equity, Advances to Assets Ratio, Government Securities to Total Investments, Net Non Performing Assets to Total Assets, Net Non Performing Assets to Net Advances, Total Investments to Total Assets, Percentage change in Net Non Performing Assets, Total Advances to Total Deposits, Business per Employee, Profit per Employee, Return on Net Worth, Operating Profits to Average Working Funds, Net Profits to Average Assets, Liquid Assets to Total Deposits, Liquid Assets to Demand Deposits, Liquid Assets to Total Assets, Government Securities to Total Assets and Approved Securities to Total Assets. It was observed that Canara Bank was at the top position for capital adequacy, Andhra Bank and Bank of Baroda for asset quality, Punjab and Sind Bank for management, Indian Bank for earnings and Bank of Baroda for liquidity. Andhra Bank was the top bank in the overall rankings and Central Bank of India in the last rank.
Prasad (2012) analysed the financial performance of the banks in India for the period 2006 – 2010. He selected the sample size of 39 banks to conduct the study. The ratios considered were Capital Adequacy Ratio, Debt to Equity, Advances to Assets Ratio, Government Securities to Total Investments, Net Non Performing Assets to Total Assets, Net Non Performing Assets to Net Advances, Total Investments to Total Assets, Percentage change in Net Non Performing Assets, Total Advances to Total Deposits, Business per Employee, Profit per Employee, Return on Net Worth, Operating Profits to Average Working Funds, Net Profits to Average Assets, Liquid Assets to Total Deposits, Liquid Assets to Demand Deposits, Liquid Assets to Total Assets, Government Securities to Total Assets and Approved Securities to Total Assets. Their study proved that there was a significant difference between the performance of the public sector banks and private sector banks on the basis of the parameters of capital adequacy and earnings. The parameters – asset quality, management and liquidity did not play a significant role in differentiating the performance of the public sector and private sector banks.

Reddy (2012) supervised the performance of the Commercial Banks in India for the period 1999 – 2009 on the basis of the Camel model for the 26 public sector banks, 19 domestic private sector banks and 16 foreign banks. The ratios considered were the Capital Adequacy ratio, Debt-Equity ratio, Coverage ratio, Non-Performing Assets to Net advances, Government Securities to investments, Standard advances to Total advances, Total advances to Total Deposits, Business per Employee, Profits per Employee, Return on Assets, Income Spread to Total assets, Operating Profit to Total assets, Cost to Income ratio, Liquid Assets to Total Deposits, Cash Assets to Total Assets and Government Securities to Total Assets. They observed that the public sector banks had significantly improved their performance on all the parameters during the study period. Indian Bank, United Bank of India, UCO Bank and Punjab and Sind Bank were the highly progressive banks with high progressive ratios during the study period. None of the public sector banks were in the low progressive position compared to the domestic private sector banks and the foreign banks on the basis of the Camel parameters.

Vijayakumar (2012) categorized the banks of the State Bank of India and its Associate Banks on the basis of the camel parameters for the 14 year study period
1996-97 to 2009-10. They considered the ratios of Capital Adequacy Ratio, Debt to Equity Ratio, Advances to Total Assets Ratio, Government Securities to Total Investments Ratio, Gross Non Performing Assets to Net Advances Ratio, Net Non Performing Assets to Net Advances Ratio, Net Non Performing Assets to Total Assets Ratio, Total Investment to Total Assets Ratio, Loan loss provisions to Net interest Revenue Ratio, Total Advances to Total Deposits Ratio, Business per Employee, Profit per Employee, Operating Profits to Average Working Funds ratio, Net Profits to Average Assets Ratio, Spread or Net Interest Margin to Total Assets Ratio, Interest Income to Total Income Ratio, Non-Interest Income to Total Income Ratio, Liquid Assets to Total Assets Ratio, Government Securities to Total Assets Ratio, Liquid Assets to Demand Deposits Ratio, Liquid Assets to Total Deposits ratio and the Inter Bank Ratio. It was observed that the group has performed well in the parameters of the capital adequacy, management, earnings and liquidity by portraying an increasing trend in the ratios during the study period. They did not perform well in the asset quality parameter as they showed a declining trend during the study period.

Aspal and Malhotra (2013) rated the performance of the public sector banks in India excluding the State Bank of India group for the period 2007 – 2011 on the basis of the Camel model. They considered the ratios of Capital to Risk-weighted Assets Ratio, Debt-Equity Ratio, Advances to Assets Ratio, Government Securities to Total Investments Ratio, Net Non Performing Assets to Net Advances Ratio, Total Investments to Total Assets Ratio, Net N Non Performing Assets to Total Assets Ratio, Percentage Change in Net Non Performing Assets Ratio, Total Advances to Total Deposits, Profit per Employee, Business per Employee, Return on Equity, Operating Profit to Total Assets, Net Profit to Total Asset, Interest Income to Total Income, Spread or Net Interest Margin (NIM) to Total Assets, Liquid Assets to Total Deposits, Liquid Assets to Demand Deposits, Liquid Assets to Total Assets, Government Securities to Total Assets and Approved Securities to Total Assets. It was found that Bank of Baroda and Andhra Bank were the top two performing banks during the study period because of high capital adequacy and asset quality. The worst performing bank was United Bank of India because of management inefficiency, low capital adequacy and poor assets and earning quality.
The applicability of the Camel Model has been witnessed in the studies conducted on banks in foreign countries too.

Gilber, Meyer and Vaughan (2000) examined the role of the Camel Model to predict bank downgrades during surveillance. It was concluded that not only Camel model but other models too should be used simultaneously to identify the causes of bank downgrades at all times to prevent bank failure in the future period.

Baral (2005) conducted a health check up of the commercial banks in Nepal on the basis of the Camel model for the study period 2001 – 2004. He found that the capital base was not adequately maintained according to the stipulations, decline in the asset quality and satisfactory performance with respect to management and earnings and better liquidity position.

Nuzari and Evans (2005) examined the use of Camel Ratios to predict bank failure in Indonesia. They used the statistical techniques of Discriminant Analysis and Logistic Regression Analysis to conduct the study. It was discovered that the ratios of Capital Adequacy Ratio, Earnings before Income Tax to Productive Assets, Return on Assets, Operating Expense to Operating Income, Cash and Bank Balances to Total Deposits were the significant ratios that have the ability to predict bank failures.

Sarker (2006) applied the Camel model in the context of Islamic Banking and assessed its role. It was proposed that Camel model should be used as a mechanism for enforcement and supervision so that the Islamic Banks may not experience systemic Shariah distress.

Babar and Zeb (2011) conducted an exploratory study for the 17 commercial banks in Pakistan for the year 2010. They observed that the banks in Pakistan have complied with the capital adequacy norms, have net nonperforming assets greater than their provisions, good management talent, negative earnings and better liquidity position for the year 2010.

Teker, Teker and Kent (2011) scrutinized the financial performance of the commercial banks in Turkey for the period 2003 – 2010. They suggested that apart
from the financial ratios of the Camel Model, other factors such as customer satisfaction, management and leadership and usage of sophisticated technology in the operations of banks should be incorporated to evaluate the performance of the banks.

Shar, Shah and Jamali (2011) studied the performance of banks in Pakistan during the pre-nationalisation and post-nationalisation for the period 1982 – 2002. They stated that improved capital adequacy and earning assets improved the financial performance of the banks during the study period. Their study confirmed that the implementation of financial reforms had a positive impact on the financial performance of the banks.

Soltani, Esmaili, Hassan and Hossein (2013) studied the financial performance of the public and private sector banks in Qom with a sample size of four banks. They took into account the ratios of Capital Adequacy, Loan Loss Provision, Portfolio in Arrears, Loan Loss Reserve per Currency unit Cost of Loans, Return on Assets, Return on Equity, Interest Spread on Assets, Earnings Spread Ratio, Intermediation Cost Ratio, Loan by Deposits, Loan by General and Long Term Deposits. The results showed that there was significant difference between the public sector banks and the private sector banks on the basis of the parameters of management, earnings and liquidity. They shared the similar performance with respect to capital adequacy and asset quality.

The Camel model is not without its drawbacks. They are cited by Olugbenga and Olakunle (1998) that the Camel model has been unable to rank banks by the degree of deterioration in health during the specific point of time and period of study. The second limitation is that the Camel Model should be used along with other early warning models to predict deterioration in health.

Gaytán and Johnson (2002) mentioned that the camel model revealed the state of the bank under study during the time of the examination, and were highly influenced by the changes in bank decisions or economic conditions. Moreover, the risk assessment was an ex-post measure of financial problems. Thus, the rating results did not help in taking preventive action. Another limitation that can be stated is ratings neither offer information concerning the potential sources and sections of fragility of the bank.
operation, nor the significance of the specific decisions taken by banks from the overall institutions fragility perspective.

Dang (2011) too added that the Camel model ignored the risks in the market and interaction with the top management of the banks.

### 2.4 Efficiency of Banks

The limitations of the ratio analysis have given rise to the popularity of the non-parametric techniques such as Data Envelopment Analysis techniques to measure the financial performance of the banks through the efficiency scores. Efficiency of banks as a measure has been associated with the financial performance (Divatia and Venkatachalam, 1978; Angadi, 1983; Bhattacharya et. al, 1997; Sathye, 2005). Data Envelopment Analysis, a non-parametric technique has envisaged importance in recent times to identify the benchmark firm comparing all the units with it, analysing the inefficiency in the input combinations and relatively assigning the efficiency scores to all the DMU’s (Das, 1997; Saha and Ravishankar, 2000; Mohan and Ray, 2003).

Berger and Humphrey (1997) notified that 5% of 130 efficiency analyses of depository financial institutions, spread across 21 countries, were concerning the banking sectors of developing countries. They remarked that 75% of the research focused on the banks operating in well-developed countries especially the United States of America. There is a paucity of literature on the efficiency of banks in emerging markets like India that examine the effect of ownership and assets size on the efficiency of banks.

The literature review on the efficiency of banks in India through Data Envelopment Analysis is discussed. The earliest study in the Indian context dates to the work of Noulas and Ketkar (1996). They measured the technical efficiency of the public sector banks in India for the year 1993 using the intermediation approach for the selection of inputs and outputs. The outcome of the study was that the technical efficiency of the public sector banks was 96.25% on an average and the diminishing returns to scale was not observed in the operations of the banks in the year 1993.
Bhattacharya, Lovell and Sahay (1997) analysed the efficiency of commercial banks in India for the period 1986 – 1991 for a sample of 70 banks. They employed the technique of Data Envelopment Analysis to measure efficiency and cited that the public sector banks were the most efficient than the private sector banks and foreign banks.

Das (2000) estimated the efficiency of the public sector banks in India for the year 1998. They found that nationalised banks were less efficient than the State Bank of India group. They had to improve their performance by focusing upon asset quality, management and congestion of labour.

Mukherjee, Nath and Pal (2002) explored the linkage of performance benchmarking and strategic homogeneity of 68 Indian commercial banks for the period 1996 – 1999. They employed the data envelopment analysis technique to derive efficiency scores and multi correlation clustering to identify banks having homogenous operational efficiencies. Their study revealed that public sector banks were more efficient in India than private sector or foreign banks. They have to manage their resources better and to be cost competitive.

Kumar and Verma (2003) computed the technical efficiency scores of the Indian public sector banks for the year 2001. The technical efficiency of the banks in India on an average was 87%. The nationalised banks in India had lower efficiency levels than the State Bank of India group in the year 2001. The efficient banks were the State Bank of Bikaner and Jaipur, State Bank of Hyderabad, State Bank of Indore, State Bank of Mysore, State Bank of Patiala, Corporation Bank and Oriental Bank of Commerce. The inefficient banks were the United Bank of India, Indian Bank and Indian Overseas Bank.

Sathye (2003) measured the production efficiency score of 94 Indian banks for the year 1997-98 using the non-parametric technique of Data Envelopment Analysis. The study has shown that through intermediation approach with interest expenses and non-interest expenses as inputs and net-interest income and non-interest income as outputs, the public sector banks have a higher mean efficiency score as compared to the private sector and foreign commercial banks in India. With deposits and staff
members as inputs and net loans and non-interest income as outputs, they have lower mean efficiency score than the foreign banks but still higher than private sector commercial banks. He proposed the reduction of non-performing assets and rationalization of staff and branches to make the banks competitive in the international landscape.

Ataullah, Cockerill and Le (2004) measured the technical efficiency of the commercial banks in India and Pakistan for the period 1988 – 1998. They found that technical efficiency had increased for the banks in both the countries during the study period. They discovered that the banks were deficient in generating income and gained efficiency in generating assets. The reason was the existence of high non-performing assets.

Choudhari and Tripathy (2004) measured the efficiency of the banks in India for the years 1999 and 2000. Corporation Banks is the efficient bank on the basis of all the parameters of profitability, financial management, productivity and liquidity. They found that banks have not been paying detailed attention to productivity, growth and liquidity.

Das, Nag and Ray (2005) estimated the efficiency scores of the banks in India for the period 1997 – 2003. They adopted the intermediation approach for the choice of inputs and outputs to conduct the study. Their findings stated that there was no differentiation with respect to the banks in India on the basis of input efficiency, output efficiency and cost efficiency. Differentiation was observed for the revenue and profit efficiency of the banks in India during the study period. In addition, the large banks had outperformed with better efficiency scores than the small banks. The economic reforms had a positive impact on the performance of the banks as their efficiency scores improved during the post-reform phase. The factors that had a positive and significant impact on the profit efficiency were the bank size, ownership and its listing on the stock exchange.

Das and Ghosh (2006) investigated the efficiency of the commercial banks in India after the implementation of the financial reforms for the period 1992 – 2002. They chose all the three approaches – production, intermediation and value added to
identify the variations in changes of the efficiency levels over the study period. They found that the commercial banks in India were scale inefficient to the extent of 10% and they would lose the output if performance was not improved upon.

Sinha and Chatterjee (2006) assessed the efficiency of the commercial banks in India for the period 1997 – 2003. State Bank of India and Global Trust Bank were the efficient banks with non interest income as the output indicator. State Bank of India, IDBI Bank and Indusind Bank were the efficient banks with loan as the output indicator.

Varadi, Mavaluri and Boppanna (2006) measured the efficiency of the banks in India for the period 2000 – 2003. They adopted the intermediation approach to select the inputs and outputs for the study. Their analysis proved that the public sector banks were more efficient than the private sector and foreign banks in India on the parameters of productivity, profitability, financial management and asset quality. It was suggested that private banks and foreign banks had to comply with the financial standards and requirements to improve their performance and to be on par with the public sector banks in India. It was mentioned that the economic reforms had benefitted the public sector banks in India the most than the private sector and foreign banks and they were in an advantageous position to increase their outputs.

Kumar and Gulati (2008) examined the convergence of efficiency levels among 27 Indian public sector banks (PSBs) during the post-reforms period spanning from 1992 - 1993 to 2005 - 2006. Most of the banks have an incline in their technical efficiency scores during the post-reforms period. Low efficiency banks at the beginning of the period were growing at a rapid rate than the banks with high efficiency. The study has verified that convergence phenomenon existed in the Indian public sector banking industry.

Gupta, Doshit and Chinubhai (2008) analysed the efficiency of the commercial banks in India for the period 1999 – 2003 for a sample of 57 banks. They used the Data Envelopment Analysis technique with interest expended and operating expenses as the inputs with interest income, fee based income and investment income as the outputs of the study. It was revealed that the efficiency of all the banks on an average
had increased by 2.4% during the study period. The nationalised banks in India were the least efficient compared to the most efficient State Bank of India group followed by the private sector banks.

Ketkar and Ketkar (2008) used the Data Envelopment Analysis technique to study the efficiency of the banks in India due to the impact of the Financial Sector Reforms for the period 1997 to 2004 through a sample study of 62 banks. Their study found that the foreign banks were the most efficient than the private banks, nationalised banks and the state-owned banks due to the better use of their resources. Nationalised Banks and the state-owned banks had low levels of efficiency as they operate in the semi-urban and rural areas with low income levels.

Kumar (2008) computed the technical efficiency of the public sector banks in India for the year 2005. The intermediation approach was adopted to select the inputs and outputs of the study. It was found that the technical inefficiency of the banks in India on an average was 11.5%. State Bank of Bikaner and Jaipur, State Bank of Mysore, State Bank of Patiala, State Bank of Travancore, Andhra Bank, Corporation Bank and Punjab and Sind Bank were the efficient banks in the year 2005. Moreover, the banks in the State Bank of India group were more efficient on operational parameters than the nationalised banks.

Prabhakara, Sheriff and Devara (2008) measured the relative efficiency of 80 banks in India from various groups of public sector, private sector and foreign banks for the period 2008 – 2010. They observed that an increase in net non perfuming assets and decrease in return on investments adjusted to cost of funds, decrease in cost of deposits have an impact on the efficiency scores of the banks in India. They observed that the foreign banks were more efficient than the public sector and private sector banks in India during the study period.

Subramanyam and Reddy (2008) measured the risk efficiency of the commercial banks in India taking a sample size of 63 public sector, private sector and foreign banks. They found that State Bank of India, State Bank of Patiala, Andhra Bank, IDBI Ltd. and Oriental Bank of Commerce were the efficient public sector banks whose internal risk control system was high. Axis Bank and ICICI Bank were the efficient
private sector banks whose internal risk control system was high. ABN Amro Bank, Bank of Tokyo-Mitsubishi UFJ, China trust commercial Bank, City Bank, Deutsche Bank and JB Morgan Chase Bank were the efficient foreign banks whose internal risk control system was high. They stated that private sector banks lost more inputs than the public sector and foreign banks in India in the risky environment.

Debasish (2008) assessed the efficiency and performance of the banks in India for the period 1997 – 2004. The study revealed that the foreign banks were more efficient than the public sector banks. The old banks were less efficient than the new banks due to the existence of nonperforming assets.

Dash and Charles (2009) measured the technical efficiency of banks in India for the period 2004 – 2008. They used five input variables - borrowings, deposits, fixed assets, net worth and operating expenses and four output variables - advances and loans, investments, net interest income and non-interest income. It was found that the foreign banks were more efficient than the private sector and public sector banks in India. The public sector banks in India were advised to rationalise the staff, reduction in the operating expenses, up gradation of technology to improve their efficiency scores.

Sanjeev (2009) evaluated the technical efficiency of 27 public sector banks in India for the 2002-03 to 2006-07. He chose the intermediation approach to select the inputs of interest expense and non interest expense and the outputs of interest income and the non interest income. It was observed that there was no evidence of improvement in the efficiency levels of the public sector banks over the period. Though banks were not operating at the best of their efficiency, they were prepared to face competition from the private banks.

Tandon, Ahuja and Tandon (2009) measured the relative efficiency of the banks in India. The best practicing bank was the Corporation Bank that had a low input slack percentage of 4.36% for interest expenses and 15.29% for operating expenses. Punjab and Sind Bank was the least efficient bank.
Bodla and Verma (2010) analysed the efficiency of 29 private sector banks for the period 1998 – 99 to 2005 – 06 through the production approach of Data Envelopment Analysis technique. The study indicated that the private sector banks should improve their output parameters, such as deposits, advances and investments and take steps to decrease their level of non-performing assets.

Kumar and Gulati (2010) assessed the effect of ownership on the efficiency of Indian domestic banks for the period 2005 – 07. They used a modified version of the intermediation approach for the choice of inputs and outputs of the study. They found 13 banks to be efficient in year 2006 and 9 banks efficient in the year 2007. The new private sector banks were more efficient than other banks in both the years. There was an evidence of weak ownership effect on the efficiency scores of the banks. Public sector banks were more scale efficient than the private sector banks due to their first mover advantage.

Dwivedi and Charyulu (2011) computed the efficiency of the Indian banking industry in the post reforms phase for the period 2006 – 2010. Their findings confirmed that the national banks, new private banks and foreign banks have increased their efficiency over the study period.

Gokarn (2011) estimated the levels of efficiency of the banks in India for the period 2001 – 2010. It was observed that allocative efficiency was the highest than cost, technical and scale efficiencies for the banks in India and the technical efficiency was the least. The performance of the State Bank of India group had surpassed the performance of the public sector, foreign and private sector banks in India during the study period.

Gulati (2011) measured the technical, pure technical and scale efficiencies of the domestic banks in India for the period 2006 – 07. The intermediation approach for the selection of inputs and outputs was utilized for the study. State Bank of Bikaner and Jaipur, Andhra Bank, Nainital Bank, Tamilnad Mercantile Bank, Centurion Bank of Punjab, HDFC Bank, ICICI Bank, Kotak Mahindra Bank, and Yes Bank were the technical efficient banks in the year 2007. It was observed that the average technical inefficiency, pure technical inefficiency and scale inefficiency was 20.8%, 16.6% and 

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4.9% respectively. It was observed that managerial inefficiency was more dominant in the technical inefficiency scores of the domestic banks in India.

Sahoo and Mandal (2011) examined the performance of the banks in the post transition period 1997 – 2005. They computed the technical, cost, allocative and profit efficiencies. The nationalised banks have performed better than the private sector and foreign banks in India due to the capacity utilisation of its resources.

Sekhri and Varshney (2011) expressed the linkage between the efficiency and profitability relationship of the banks in India for the period 2007 – 08 to 2008 – 09. It was revealed that the public sector banks were highly efficient than the private sector and foreign banks in India during the study period. Private sector banks gained an edge over the public sector banks and foreign banks as they sported higher levels of profitability.

Wanniarachchige and Suzuki (2011) focused on the performance of 50 Indian commercial banks under various ownership groups during the period 2002 – 08. Performance was computed with the aid of data envelopment analysis and also supplemented by three measures of Return on Assets, Non Performing Assets ratio and extent of branch network. Their findings have suggested that the state owned and nationalised banks have higher operating expenses, higher Net Performing Assets ratio and technological backwardness compared to foreign banks and their performance has not yet reached the level of foreign banks in terms of cost and revenue efficiencies.

Dhanapal and Ganesan (2012) appraised the efficiency of the banks in India for the period 2007 – 11. Andhra Bank, Indian Bank, Oriental Bank of Commerce, Punjab and Sind Bank, Vijaya Bank and IDBI Bank Ltd. were the small sized efficient banks during the period. Bank of Baroda, Indian Overseas Bank, Punjab National Bank, Syndicate Bank, Union Bank of India and composition of the State Bank of India and its Associate Banks were the large sized efficient banks during the period.

Karimzadeh (2012) analysed the efficiency of the banks in India for the period 2000 – 2010. They selected the intermediation approach for the choice of inputs and outputs
of the study. They found that the average technical inefficiency of the banks during the study period was 1%. It was cited that Central Bank of India and Axis Bank were the least efficient banks. The banks had to be oriented towards sophisticated technology, reduce their non performing assets and enhance their financial services to compete with the international banks.

Sharma, Sharma and Barua (2012) assessed the efficiency of the commercial banks in India for the period 2000 – 2010 with a sample size of 64 banks. They found that on an average public sector banks were more efficient than the private sector and foreign banks in India. In addition, the number of the efficient foreign banks was more than the number of the efficient public sector banks during the study period.

Singh, Ali and Magesh (2012) computed the efficiency of the public sector banks in India for the period 2007 – 2009. Their results declared that the efficiency scores of the public sector banks in India improved during the study period. There was an evidence of negative scope efficiency that connotes the need for the banks to diversify their income generating activities.

Sangeetha and Matthew (2013) measured the efficiency of the public sector banks in India for the period 2009 – 11 with interest expenses and operating expenses as the inputs and interest income and other income as the outputs of the study. Their analysis revealed that in the range, 40% - 50% of the public sector banks in India had efficiency levels below the average efficiency score. Corporation bank, State bank of India and IDBI Ltd were the best practicing banks in India during the study period.

Vinod (2013) gauged the technical efficiency of the old private sector banks in India for the period 2008 – 12. He cited that 25% of the banks were efficiently consistent during the study period. The Catholic Syrian Bank Ltd. was the least efficient bank for the period 2008 – 11.

The literature review on the efficiency of banks through Data Envelopment Analysis conducted abroad is discussed.
Ayadi, Adebayo and Omolehinwa (1998) appraised the performance of the banks in the developing country of Nigeria through Data Envelopment Analysis for the period 1991 – 1994 taking a sample of 10 banks. Only three of the banks were on the efficient frontier. The reasons for the poor performance of the banks were the credit risk, liquidity risk, non performing assets and lack of internal capital.

Chen and Yeah (2000) measured the efficiency of the banks in Taiwan for a sample size of 34 commercial banks. They adopted the intermediation approach for the selection of the inputs and the outputs of the study. They chose loan services, portfolio investment and non interest income as the outputs while the inputs were bank staff, assets and deposits. The banks had an efficiency score of 92.9% on an average.

Akthar (2002) analysed the efficiency of the banks in Pakistan for a sample of 40 banks for the year 1998. They used the intermediation approach to specify the inputs and the outputs of the study. The inputs were the deposits and capital and the outputs were the portfolio investment and loans and advances. The study found that the technical efficiency concerning the productivity of the inputs was low and the allocative efficiency was high.

Barr, Killgo, Siems and Zimmel (2002) evaluated the efficiency of the commercial banks in the United States for the period 1984 – 1998. The inputs selected were the salary expenses, premises and fixed assets, non interest expense, interest expense and purchased funds. The outputs were the earning assets, interest income and the non interest income. Their results stated that there was a significant difference between the efficient and the inefficient banks. The efficient banks had considerably lower fixed assets, less reliability on purchased funds and high amount of earning assets. The inefficient banks relied on the non-interest income to improve their position.

Sathye (2005) investigated the efficiency of the commercial banks in Asia and the Pacific region for the year 2000 taking a sample of 458 banks. He adopted the intermediation approach for the selection of inputs and outputs of the study. The inputs were deposits and financial capital and the outputs were loans and net interest
income. The results showed that Swedish banks were the most efficient compared to the banks in India and other countries.

Qayyum (2007) evaluated the efficiency of the banks in Pakistan due to the implementation of the financial sector reforms for the study period 1991 – 2005 for 20 banks. The outcome of the study was the efficiency of the banks had improved due to the financial sector reforms. Diversification of the core business operations, increase of the core and supplementary capital, better asset quality and profitability were the reasons for the improvement of efficiency of the banking sector in Pakistan.

Ramanathan (2007) studied the performance of the banks in the countries of the Gulf Cooperation Council for the year 2004 with a sample size of 55 banks. The results had shown that 15 banks were efficient in the study period. Bahrain, Kuwait, Saudi Arabia and the UAE had banks that registered the maximum growth in efficiency productivity during the period 2000 – 2004.

Hu, Chu, Hu and Lee (2009) studied the operational environment-adjusted efficiency of eleven nationwide banks in China from 1995 to 2004 with a sample of 11 banks using the four stage process of Data Envelopment Analysis. The inputs were the deposits and loans, number of employees and the net fixed assets. The outputs were the investments and loans. The results confirmed that the banks in India have to reduce their inputs by 41.6% to be the top performing banks.

Saad and Moussawi (2009) estimated the productive efficiency of Lebanese commercial banks for the study period 1992 – 2005 for a sample of 43 commercial banks. They used the intermediation approach to select the inputs and the outputs. The results declared that the average inefficiency of the banks was 19%.

Sufian, Noor and Noor (2009) estimated the efficiency scores of the Islamic banks in 16 Middle East and North Africa and Asian countries through the Data Envelopment Analysis technique. They adopted the intermediation approach for the selection of inputs and outputs of the study. The inputs selected were the deposits and capital and the outputs are the financing, investments and income. They cited that the banks from
the Middle East and North Africa region had superior efficiencies over the other banks during the period of the study.

Ajao and Ogunniyi (2010) estimated the productive efficiency of 13 commercial banks in Nigeria through the input-oriented model of data envelopment analysis. It was found that 25% of the banks were inefficient due to the excessive use of inputs like number of employees, fixed assets and deposits.

Akhtar (2010) assessed the efficiency of 35 commercial banks in Pakistan for the period 2001 – 06 using Data Envelopment Analysis. Efficiency scores for the local banks in Pakistan were low than the foreign banks due to concentration of services in the retail markets, intense competition in the banking industry, increase in interest rates, high non-interest and administrative expenses, low investment in sophisticated investment, and offering less competitive managerial services to the clients. The efficiency scores of the Indian Banks are higher than the banks in Pakistan.

Nazir and Alam (2010) assessed the operative efficiency of the commercial banks in Pakistan for the period 2003 – 2007 through the technique of Data Envelopment Analysis on the basis of the sample size of 28 banks. The outcome was that the privatization did not help the commercial banks in increasing their efficiencies. Public sector banks were the most efficient than the private sector banks. The reasons for the decline in the operating efficiency were the non performing assets, high administrative expenses to comply with the prudential requirements and the high capital requirement.

Tahir, Bakar and Haron (2010) examined the relative efficiency levels of domestic and foreign commercial banks in Malaysia between 2000 and 2006, using accounting-based ratio, stochastic cost and profit frontier approach. Using accounting-based ratio, the results suggested that interest margin and operating cost were slightly higher for domestic banks than for foreign banks. It was also suggested that profit ratios are slightly higher for foreign banks relative to domestic banks. Using the stochastic frontier approach, the results indicated that domestic banks were found to be more cost-efficient but less profit - efficient relative to foreign banks.
Westhuizen (2010) estimated the technical, allocative and cost efficiency of the 37 regions of a large South African bank for a two year period with two input output specifications that pertained to the traditional and nontraditional functions of the banks. It was suggested that the banks should start to render more services than concentrate on the process of financial intermediation alone. They should look towards the non interest income as the main source of income too.

The technique of Data Envelopment Analysis though noted for its worthy contribution in measuring the efficiency of banks has its own drawbacks. Vinod (2013) has affirmed the view of Avkiran (1999) that the Data Envelopment Analysis does not guide the banks in the choice of ‘ways’ to improve their performance.

Dash and Charles (2009) have stated that the efficiency scores are sensitive to changes in the data and rely upon the number and type of inputs and output factors taken into consideration for the study.

2.5 Efficiency and Effectiveness of Banks through Data Envelopment Analysis

Numerous studies exist in literature about the efficiency of the banks. Very few are present regarding the efficiency and effectiveness of banks. The literature review on the efficiency and effectiveness of banks in India and abroad through Data Envelopment Analysis are discussed in this section.

Ho and Zhu (2004) measured the performance of Taiwan’s commercial banks through a two stage process of efficiency and effectiveness for the 41 banks. The inputs of the efficiency stage are the capital stocks, assets, branches and employees. The outputs of the efficiency stage are the sales and deposits. The inputs of the effectiveness stage are the sales and deposits. The outputs of the effectiveness stage are the net income, interest income and the non interest income. Performance is computed as the product of the efficiency and effectiveness scores of the commercial banks. They noted that there was no correlation between the indicators of efficiency and effectiveness scores of the commercial banks. They proposed that the inefficient banks had to efficiently and effectively utilise their labour and capital resources to improve their performance.
Lim and Randhwa (2005) utilized the two stage process of Data Envelopment Analysis on 19 listed banks to measure the performance of the banks in Hong Kong and Singapore for the period 1995 – 1999. They adopted the production approach for the first stage and intermediation approach for the second stage of the Data Envelopment Analysis. The inputs of the production stage were the total personnel expense, shareholder equity and the total interest expense. The outputs of the production stage were the total deposits and the total fee income. The inputs of the intermediation stage were the total deposits and the total noninterest expenses less the total personnel expenses. The outputs of the intermediation stage were the total loans and the total interest income. Their findings revealed that the improvement in efficiency would enable the banks to achieve cost savings. They found that Singapore banks are more efficient than Hong Kong banks in the production stage and Hong Kong banks are more efficient than Singapore banks in the intermediation stage. Their study too proved that size had no effect on the efficiency scores on the production process and intermediation process.

Kumar and Gulati (2010) appraised the performance of the public sector banks in India through the two stage process of efficiency and effectiveness through Data Envelopment Analysis for the period of 2006 – 07. They adopted the intermediation approach for the selection of inputs and outputs for the study. The inputs of the efficiency stage were physical capital, labour and loanable funds. The outputs of the efficiency stage were the advances and investments. The inputs of the effectiveness stage were the advances and investments. The outputs of the effectiveness stage were the net interest income and noninterest income. Performance scores were computed as the product of the efficiency and effectiveness scores of the public sector banks in India. They found that State Bank of Patiala, State Bank of Travancore, Andhra Bank and Oriental Bank of Commerce were the efficient banks for the year 2007. State Bank of Bikaner and Jaipur, State Bank of Mysore, Dena Bank, Indian Bank, Punjab and Sind Bank and Punjab National Bank were the effective banks for the year 2007. None of the public sector banks attained a performance score of 1 in the year 2007. Their study too revealed that effectiveness was linked to the performance of the public sector banks in India. They suggested that the banks ought to enhance their income generating abilities. Their findings revealed that the size of the banks does not
have any impact on the efficiency, effectiveness and performance of the public sector banks.

Sultan, Bilal and Abbas (2011) analysed the performance of the banking sector in Pakistan through the Data Envelopment Analysis Approach for the period 2005 – 2009 with a sample of 10 commercial banks in Pakistan. They employed the two stage process of efficiency and effectiveness to measure the performance of the commercial banks. The inputs of the efficiency stage were the capital, assets, employees and branches. The outputs of the efficiency stage were the advances and deposits. The inputs of the effectiveness stage were the advances and deposits. The outputs of the effectiveness stage were the interest income, net interest income and the non interest income. The results indicated that the efficient banks that did not qualify on the effectiveness front should improve on the quality of the advances and the cost of deposits should be reduced.

2.6 Determinants of Efficiency

The literature review on the determinants of efficiency of banks in India is presented in this section.

Kumar and Verma (2003) conducted a Tobit Regression Analysis to highlight the sources of efficiency of the banks in India. It was found that technical efficiency scores were positively related to profitability, branch network expansion and staff productivity.

Das and Ghosh (2006) used Tobit Regression Analysis to determine the sources of inefficiency of the commercial banks in India for the period 1992 – 2002. Ownership and Capital Adequacy Ratio had a negative and significant relationship with the efficiency scores of the commercial banks in India. Size and management had a positive and significant impact on the efficiency scores of the commercial banks in India.

Ketkar and Ketkar (2008) identified the sources of efficiency of the banks in India for the period 1997 to 2004 through a sample study of 62 banks. They used the multiple regression model with the efficiency scores of the banks as the dependent variable and
the independent variables were the percentage of rural and semi-urban branches, the number of officers as percent of its total employees, the level of fixed assets as percent of its total assets, priority sector loans as percent of total loans, investment as percent of total assets, number of ATMS relative to bank branches and each bank’s market size index. The study revealed that the level of fixed assets as percent of its total assets, priority sector loans as percent of total loans, investment as percent of total assets and each bank’s market size index had an inverse and significant relationship with the efficiency scores of the banks.

Gupta, Doshit and Chinubhai (2008) analysed the determinants of efficiency of the commercial banks in India for the period 1999 – 2003 on a sample of 57 banks. They used the Tobit Regression analysis with Business per Employee, Capital Adequacy Ratio, Net Non Performing Assets to Net Advances, Operating Profits to Total Assets and Size as the independent variables and the efficiency scores of the banks as the dependent variables. The most independent significant variables influencing the efficiency scores were the Operating Profits to Total Assets and the Capital Adequacy Ratio.

Rao and Tiwari (2008) studied the factors affecting the efficiency of the public sector banks in India during the period 2001 – 2005 taking a sample of 5 public sector banks. The dependent variables were the efficiency factors relating to the employees, per branch, operations, liquidity and the ultimate profits. The independent variables were the deposits, advances and the assets. It was revealed that the operating profits and the cost of deposits were the most important factors influencing the efficiency of the banks in India. The employees, liquidity and the ultimate profits did not affect the efficiency of the banks.

Rajesh and Mahesh (2008) assessed the impact of the bank-specific and other related variables on the efficiencies of the 94 banks in India for the period of 20 years from 1985 to 2004. The variable that had a positive and significant impact on the efficiency scores was the interest margin. Size had a negative and significant impact on the efficiency scores of the banks.
Sharma, Sharma and Barua (2012) assessed the determinants of efficiency of the commercial banks in India for the period 2000 – 2010 with a sample size of 64 banks through the technique of Tobit Regression Analysis. Their results indicated that the age of the banks and profitability of the banks had a positive and significant impact on the efficiency levels of the banks in India. Bank diversification had a negative and a significant impact on the efficient levels of the banks in India.

Raina and Sharma (2013) scrutinised the efficiency of the commercial banks in India for the period 2006 – 11. Their findings revealed that the regulatory environment was the reason for the low efficiencies than the managerial problems. Competitive practices adopted by the banks and the implementation of technology in banking led to the growth of efficiency levels of the banks during the study period.

The literature review on the determinants of efficiency of banks in India is presented in this section.

Sathye (2005) examined the determinants of efficiency of the commercial banks in Asia and the Pacific region for the year 2000 taking a sample of 377 banks. The independent variables of profitability, market power and the per capita income had the most significant positive relationship with the efficiency scores. Size had a negative and a significant effect on the efficiency scores of the commercial banks under study.

Grigorian and Manole (2006) performed a Tobit Regression Analysis to identify the determinants of the efficiency scores of the 1074 banks in 17 transition economies for the period 1995 – 2008. The significant factors affecting the efficiency scores were the capital, large market share, foreign ownership, new establishments and the gross domestic product.

Brown and Skully (2006) determined the impact of the environmental variables on the efficiency scores of 322 banks in the twelve largest economies of the Asia Pacific region during the year 2004. The variables included concentration, financial development index, bank regulation, density of population and the income per capita. The financial development index and the concentration played a very important role
in the efficiency of the banks. The most efficient banks were in the countries of Singapore, New Zealand, Hong Kong and Australia.

Hu, Chu, Hu and Lee (2009) studied the determinants of efficiency for the banks in China during the period of 1995 to 2004 with a sample of 11 banks using the Tobit Regression Analysis. The results provided that the Banks in China were affected by the ownership type and policy regime of the operational environment.

Sufian, Noor and Noor (2009) estimated the determinants of the efficiency scores of the Islamic banks in 16 Middle East and North Africa and Asian countries during the study period 2001 – 2006 through the regression analysis technique. There was a positive and a significant relationship between efficiency and intensity of the loans, size, capitalization, and profitability. It is apparent that banks with a smaller market share and a low ratio of nonperforming loans exhibit higher efficiency scores.

Hasan, Wang and Zhou (2009) investigated the influences of institutional developments such as market economy, financial deepening, private sector, property rights and rule of law on the bank efficiency in China for the period 1993 – 2006. The outcome of the study was that the cost efficiency had an inverse relationship with the financial deepening and financing in the private sector. They also stated that the profit and cost efficiency had a positive significant relationship with the presence of the private sector and property rights.

Saad and Moussawi (2009) determined the sources of productive efficiency of Lebanese Commercial Banks for the study period 1992 – 2005 taking a sample of 43 commercial banks. The independent variables were the Gross Domestic Product, Inflation measured by the Consumer Price Index, Ratio of Capital, Size, Credit Risk and Return on Assets. The study proved that the variables of Gross Domestic Product, Ratio of Capital, Size, Credit Risk and Return on Assets explained 81% of the variations in the efficiency scores of the banks.

Ajao and Ogunniyi (2010) used Tobit Regression to identify the factors that influence the efficiency differential of 13 commercial banks in Nigeria. The independent variables were the Total Assets, Market Power, Intermediation Ratio and the Number
of Employees. It was found that environmental variables like market power and intermediation ratio positively and number of employees negatively and significantly affect the efficiency the banks.

To summarise, the bank-specific factors and the concentration of the banks have an impact on the efficiency of the banks.

2.7 Determinants of Financial Performance of the Banks

The literature review on the determinants of financial performance of banks in India is discussed in this section. Majority of the studies have associated the profitability with financial performance of banks.

Bhatia and Verma (1999) unearthed the factors determining the profitability of the public sector banks in India with the application of the Multiple Regression model for the period 1971 – 1995. It was observed that priority sector advances and establishment expenses had an inverse and significant impact on the profitability of the public sector banks in India. Net spread, cost of deposits and cash deposit ratio had a significant and a positive impact on the profitability of the public sector banks in India.

Shirai (2001) assessed the performance Indian banking sector due to the impact of the Reforms on all the state-owned, domestic and foreign banks during the period 1993 – 2000 through the regression model. The performance was represented by the Return on Assets. The independent variables were the diversification, investment in government securities or assets, lending to priority sector advances, lending to public sector, age and size of the bank. The results declared that the diversification activity of the banks had a positive and significant impact on the profitability of the banks due to the implementation of the reforms. The investment in government bonds had a significant and negative impact on the profitability of the banks. The other factors of lending to the priority sector advances, lending to the public sector, age and size of the bank did not have any significant impact on the performance of the banks in India.

Bodla and Verma (2006) identified the key determinants of profitability of public sector banks in India based on stepwise multivariate regression for the period 1991-92 to 2003-04 for a sample of 27 public sector banks. The independent variables were
the Spread, Non-Interest Income, Credit to Deposit Ratio, Non Performing Assets as percentage to Net Advances, Provision and Contingencies, Operating Expenses, Business per Employee, Profit per Employee, and Net Profit. The dependent variable was the Profits after Tax. Non-interest income and spread have a positive and operating expenses and provisions and contingencies have a negative significant relationship with profit. The management of public sector banks has to control operating expenses, provisions and contingencies and non performing assets to improve their profitability.

Ketkar and Ketkar (2008) studied the impact of the Financial Sector Reforms on the profitability of the banks In India for the period 1997 to 2004 through a sample study of 62 banks through the help of the regression technique. The Return on Assets was the dependent variable and Efficiency scores, Net interest spread, Non-performing loans as percent of total loans, Priority sector loans, Total compensation per worker, and Herfindahl-Hirschman index based on each bank’s market share in total loans and deposits were the independent variables. Their study revealed that the priority sector lending and the compensation per worker had a significant negative impact on the profitability of the banks.

Kalluru (2009) examined the effect of ownership on performance and risk of 87 Indian Commercial banks during the period 1995 – 2007. It was unearthed that bank capital and demand deposits were positively associated and loans were negatively associated with bank profitability. Increased size of the banks and higher growth rate of the economy reduced the non-performing loans.

Ramachandran and Kavitha (2009) identified the determinants of profitability of the scheduled commercial banks in India for the period 1997 – 2006. They used the step wise multiple regression analysis to conduct the study. They cited that the banks should focus on the ratios of Nonperforming Assets to Advances, Rural Branches to Total branches, Cost of Deposits to Total Expenses, Cost of Borrowings to Total Expenses, Establishment Expenses to Total Expenses, Other Operating Expenses to Total Expenses, Provisions and Contingencies to Total Expenses, Interest Earned on Advances to Total Income, Income from Investments to Total Income, Demand
Deposits to Total Deposits, Time Deposits to Total Deposits and Credit Deposit ratio to improve the profitability of the banks in India.

Bikker (2010) assessed the predictive capacity of the measures available to determine the performance of banks. It was cited that the Return on Assets, Cost to Income Ratio, Net Interest Margin, Cost Margin, Number of Banks, Cost Efficiency were the significant factors affecting the performance of the banks.

Rakhe (2010) examined the determinants of profitability in the Indian banking sector for the period 2000 – 2009 with a sample of 59 banks. They used the panel regression analysis with net profits to total assets ratio was the dependent variable. The efficiency of fund management, operating expenses to total assets, other income to total assets, credit risk, cyclical output and inflation were the independent variables. All the independent variables had a significant relationship with the profitability of the banks at 1% level of significance.

Nayak and Nayak (2011) analysed the performance of the public sector banks in India after the implementation of the liberalization reforms. They stated that State Bank of India was leading in the parameters of capital adequacy, return on assets, net worth, funds efficiency management, operating expenditure, other income to average working funds, low cost deposits and operating expenditure to total expenditure for the period 2000 – 09. They used the Principal Component Analysis to construct the performance index of the banks. It extracted four components that explained 90% of the variations in the factors affecting the performance of the banks. In addition to it, with the aid of logistic regression they classified the nationalised banks on the basis of their financial health. The logit model proved that Corporation Bank and State Bank of Patiala were the two banks that had the status of Good Health for all the years of the years of the study period.

Sinha and Dutta (2011) predicted the profitability of all the scheduled commercial banks in India. The independent variables were the Net Interest Income Ratio, Cost to Income Ratio, Capital Adequacy Ratio and the ratio of Net Non Performing Assets. The ratio of Net Interest Income had a positive and significant impact and the ratio of
Cost to Income Ratio had a negative and significant impact on the profitability of the Indian banks.

Viswanathan, Ranganathan and Balasubramanian (2011) determined the relative importance of profitability of banks in India through a decomposition approach for the period 1995 – 2009. Their findings revealed that the majority of the public sector banks, private sector banks and State Bank of India group gave relative importance to other income. It represents that diversification in the banks activities has been rampant during the study period.

Dhanapal and Ganesan (2012) identified the determinants of the operational efficiency of the public sector banks in India for the period 2006 – 11 through the technique of Multiple Regression Analysis. They determined that the cost to income factor is the only dominant and significant factor in determining the profitability of the banks.

The literature review on the determinants of financial performance of banks in the foreign countries is discussed in this section.

Hassan and Bashir (2003) identified the determinants of profitability of the Islamic banks operating in 21 countries during the period 1994 – 2001. The study had the profits before tax margin as the dependent variable and the bank variables, country variables, financial structure variables and the country dummy variables were the independent variables. They found out that capital, loan ratios, consumer and short term funding, non-interest assets, overhead to promote bank profits, regulatory tax factors, gross domestic product and the per capita gross domestic product had a significant impact on the profitability of the banks.

Naceur (2003) determined the impact of banks characteristics, financial structure and macroeconomic variables on net interest margins and profitability of banks in the Tunisian banking industry for the period 1980 – 2000 involving a sample of 10 banks. The capital of the banks, overheads, loans and assets were the bank variables that had a significant impact on the performance of the banks. Inflation, growth rates and concentration did not have any impact on the financial performance of the banks.
Gerlach, Peng and Shu (2004) probed into the determinants of the performance of banks in Hong Kong for the period 1994 – 2002. Performance of the banks was denoted by the Net Interest Margin and the Asset Quality. Their analysis suggested that the profitability had reduced due to the macroeconomic conditions of decline in the Gross Domestic Product, property prices and the rise in interest rates.

Chotigeat, Kramer, and Pyun (2004) conducted a study on the determinants of the performance of banks in France for the period 1993 – 1999 on the basis of a sample of 3 banks. A regression analysis was performed with Return on Equity as the dependent variable and the independent variables were the Capital Adequacy Ratio Tier I, Size, Efficiency Ratio and the Loan Loss provisions and the non-interest income. The results showed that the Size, Capital Adequacy Ratio Tier I and the Efficiency Ratio had an inverse relationship with the performance of the banks.

Clair (2004) explored the influences of the macroeconomic determinants on the financial performance of the banks in Singapore during the period 1990 – 2003. The study revealed that the macroeconomic determinants of Nominal Gross Domestic Product Growth, Changes in the Unemployment Rate, Changes in the Interest Rate and the Exchange Rate had a significant impact on the financial performance of the banks in Singapore.

Athanasoglou, Brissimis, and Delis (2005) studied the effect of the bank-specific, industry-specific and the macroeconomic variables on the performance of the Banks in Greece for the period of the study 1985 – 2001. The performance of the bank was represented by the profitability measures of Return on Assets and Return on Equity. The Bank-specific determinants were the Credit Risk measured by the loan-loss provisions to loans, Capital by the ratio of equity to assets, Productivity by real gross total revenue over the number of employees, Expenses Management by the ratio of expenses to total assets and Size by the logarithm of the assets and their square. The Industry-specific determinants were the ownership and the concentration measure of the Herfindahl-Hirschman (H-H) index. The macro-economic determinants were the Inflation measured by the Consumer Price Index and the cyclical output. The study found that the Capital, Productivity, Inflation, Cyclical output had a positive and
significant impact on the performance of the Greece Banks. The Credit Risk and the Expenses Management had a negative and significant impact on the performance of the Greece Banks.

Chantapong (2006) appraised the performance of the domestic and foreign banks in Thailand for the period 1995 – 2000. The foreign banks were more profitable than the domestic banks. They used the Generalised Least Squares method to determine the determinants of profitability. The loan loss reserves to total assets had a negative significant relationship on the profitability of the banks and the loan to total assets had a positive influence on the profitability of the banks.

Wu, Chen and Shiu (2007) assessed the impact of financial development and bank characteristics on the operational performance of commercial banks in China over the period 1996 – 2004 with a sample size of 14 Chinese Banks. The dependent variable was the Return on Assets. The independent variables were the Size, Age, Non Interest Income, Gross Domestic Product per capita and changes in the property rights. Age, Non Interest Income, Assets and the per capita Gross Domestic Product were the significant factors affecting the profitability of the banks as revealed by the Regression Analysis.

Chiorazza, Milani and Salvani (2008) examined the extent of income diversification and bank performance of the banks in Italy during the period 1993 – 2003. The dependent variable was the risk adjusted return and the independent variables were the bank assets, net non performing assets, equity, growth, type of holding, net interest income and the non interest income. Their study found an empirical relationship between the risk adjusted return and the non interest income for the large banks. Small banks had better financial performance in terms of increasing non interest income.

Flamini, McDonald and Schumacher (2009) studied the determinants of bank profitability for a sample of 389 banks in 41 Sub-Saharan Countries through the application of General Linear Model with Return on Assets as the dependent variable and bank-specific and macro-economic determinants as the independent variables.
Credit risk measured by ratio of loans to deposits and short-term funding, activity mix measured by ratio of net interest revenues over other operating income, capital represented by the ratio of equity to total assets, size represented by logarithm of total assets and their square and market power by market concentration were the bank-specific determinants. The Gross Domestic Product Growth Rate, Consumer Price Index for Inflation and the Gross Domestic Product per capita were the Macroeconomic determinants. The findings revealed that credit risk, activity risk and size positively significantly influenced the profitability of the banks. Inflation had a significant positive impact on the profitability of the banks. The study showed that Gross Domestic Product Growth Rate and Gross Domestic Product Per Capita did not have an impact on the profitability of the banks.

Vong and Chan (2009) examined the effect of bank Determinants and macro-economic determinants on the financial performance of the banks in Macao for a sample of 5 banks during the 15 year period 1993 – 2007. The dependent variable was the Return on Assets. Capital measured by the total equity by total assets, asset composition by total loans divided by total assets ratio, effect of fund source by deposits to total assets ratio, effect of asset quality by loan loss provisions over total loans, expense management variable by the ratio of non interest expenses to total assets, diversification by the ratio of non interest income to gross income, tax by taxes over profits before tax, market share by logarithms of the deposits were the bank determinants. The Real Gross Domestic Product growth rate, Real Interest Rate, Inflation and Market Power were the macro-economic determinants. The capital had a positive significant impact on the financial performance and the asset composition and effect of asset quality had a significant negative impact. Among the macro-economic determinants, Inflation had a strong positive impact on the performance of the banks.

Sufian and Habibullah (2010) performed an analysis on the determinants of the profitability of the banks in Indonesia for the period 1990 – 2005. The dependent variable was the Return on Assets. The independent variables were the total assets, risk measured by the ratio of total loan loss provisions divided by total loans, bank diversification measured by the total non-interest income divided by total assets,
management quality calculated as personnel expenses divided by total assets, branch networks, capitalisation calculated as book value of shareholders equity as a fraction of total assets and the natural log of gross domestic products. The empirical findings have suggested that the income diversification and capitalization have a positive relationship with profitability. Size and overhead costs have an inverse relationship with the profitability of the banks.

Tamini (2010) investigated the factors affecting the performance of the UAE Islamic and Conventional National Banks for the period 1996 – 2008. The return on equity and return on assets were the representative measures of profitability. The independent variables were the economic conditions represented by the gross domestic product per capita, bank size measured by total assets, financial development measured by the ratio of assets to the gross domestic product, banks liquidity by the ratio of the total loans to total deposits, concentration, salaries to total assets and the number of branches. The study indicated a significant and positive impact of the liquidity levels and the concentration on the performance of the banks.

Alper and Anbar (2011) investigated the bank-specific and macro-economic determinants of the profitability of banks for a sample of 10 banks in Turkey during the period 2002 – 2010 through the Regression Model. The dependent variables were the Return on Assets and the Return on Equity. The bank-specific variables were the ratios related to Assets Size represented by natural logarithm of total assets, Capital Adequacy by the ratio of equity to total assets, Asset Quality by loans to total assets and loans under follow-up (net) to total loans, Deposits, Liquidity by the ratio of liquid assets to total assets and the Income Expenditure Structure through the ratios of Net Interest Margin and Non Interest Income. The Macro Economic Variables were the Annual Real Gross Domestic Growth Rate, Inflation measured by Consumer Price Index and the Real Interest Rate. Their study revealed that none of the variables affected the Return on Assets as a measure of profitability. But the Assets Size and the Real Interest Rate had a significant and positive effect on the profitability with Return on Equity as the measure.

To summarise, the bank-specific factors, industry specific factors and macro economic variables influence the financial performance of the banks.
2.8 Research Gap and Significance of the Study

The studies carried out on the financial performance of banks are either on the group of public sector banks, private sector banks and foreign banks in India. Very few studies are undertaken on the nationalised banks during the decade 2001 – 2010.

The parameters of capital adequacy, asset quality, management, earnings, liquidity, efficiency and effectiveness have rarely been analysed together for the nationalised banks in the Indian context in one study.

As noticed from the literature review, the performance of the nationalised banks is either associated with profitability or efficiency. The study has sought to identify the determinants of a financial performance index that comprises all the aspects of financial performance - capital adequacy, asset quality, management, earnings, liquidity, efficiency and effectiveness.

The uniqueness of the study lies in its synchronisation of the parameters to evaluate the financial performance of the nationalised banks in India. The differentiating features of the categories of banks classified on the basis of performance have also been listed.

2.9 Summary

The chapter has reviewed the published literature upon which the study is based. The empirical findings regarding the financial performance of banks, Camel analysis, Efficiency, Efficiency and Effectiveness of banks through Data Envelopment Analysis, determinants of Efficiency and financial performance through statistical multivariate analysis techniques were presented.
References


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