CHAPTER- 8

SUMMARY & CONCLUSIONS

(I)

The financial sector has an authoritative role to play in the economic maturation of any field, whether it is agriculture, industry, trade, or business. A financial system in any nation is a mixture of various institutions, market regulations, laws and liabilities. The best financial system limits, quantifies, gathers and negotiates all operational risks and motivates the savers to invest by offering them a proportional payment to the scale of incurred risks.

A major element of any national financial system is its banking sector. It constitutes the main distribution channel of funds in domestic and cross border markets and the major pillar in the development, success/failure of any economy, particularly in developing economies. The level of the functioning of any nation is assured through its banking sector, which indicates the healthiness and the competitiveness level of the national financial system. Banks have three principal activities: taking deposits, making loans and investing securities. A well-developed and well functioning financial sector facilitates the exchange of goods and services, mobilizes savings, allocates resources and helps diversify risks (Kablan, S, 2010). Reforms in the Indian banking sector have significantly affected the efficiency and profitability of banking sector. The main objective of the banking sector reforms was to improve the efficiency of banks and to promote a diversified and competitive financial system.

One of the outcomes of such reforms was the consolidation of the Indian banking industry through mergers and acquisitions (M/As). M/As, represent massive reallocation of resources and change of ownership of the physical and human assets both within and across industries. M/As is not new one in the history of Indian banking sector and started way back in early 1960s when Prabhat Bank Ltd. was merged with National Bank of Lahore Ltd. in 1961. M/As is considered one of the best ways of restructuring and to face global challenges. Technological progress and financial deregulation have played an
important role in accelerating the process of mergers and acquisitions in Indian banking industry. Due to technological progress, the scales at which financial services and products are produced have expanded which provide an opportunity for the banks to increase their size and scale of production. At that time mergers of banking institutions emerged as an important strategy for growing the size of banks. Size of the bank plays a significant role to enter the global financial market. The act of bank mergers and acquisition is based on a logic that gains can realize through expense reduction, increased market power, reduced earnings, volatility and scale and scope economies. Various committees have been constituted for addressing the issue of mergers in Indian banking sector, which include, Sarraiya Committee (1972), Narasimham Committee II (1998). The critical question in the empirical research analysis is whether bank mergers actually achieve the expected performance.

OBJECTIVES OF THE STUDY

Present study aims to:

1. study the legal and regulatory framework behind the process of mergers in Indian banking sector;
2. examine the cost efficiency of Indian commercial banks during the period 1990-2012;
3. examine the impact of mergers on the cost efficiency of Indian commercial banks during the period 1990-2012 and
4. analyze the impact of other environmental variables, on the cost efficiency of Indian commercial banks.

CONTRIBUTION OF THE PRESENT STUDY

The contribution of the present study to the literature on efficiency of commercial banks in India is manyfold. Firstly, most of the studies conducted so far have followed balanced panel data approach and covered a short period. The present study attempts to fulfill this gap and is spanned over longer period of about 23 years and is based on unbalanced panel data. Secondly, very few studies have been conducted to examine the impact of merger on bank performance and are simply based on financial ratio analysis or event study type methodology. This study has used both the non-parametric data
environmental analysis and financial ratio analysis to study the efficiency gains from bank mergers in Indian commercial banks. Thirdly, the existing studies have examined the pre-merger and post-merger performance of only a few banks. The present study is an endeavor in this direction and has analyzed all the bank merger deals in Indian banking sector since 1990s.

**Chapter Scheme**

The study has been organized into eight chapters.

1. Introduction
2. Theoretical Concepts
3. Review of Literature
4. Data Base and Methodology
5. Cost Efficiency of Indian Commercial Banks
6. Bank Mergers and Cost Efficiency Gains in Indian Commercial Banks : An Empirical Analysis
7. Determinants of Cost Efficiency among Indian Commercial Banks
8. Summary and Conclusions

**Plan of the study**

Chapter 1 provides an introduction to the conducted research and highlights the importance of banks in an economy and banking reforms introduced in India. It further sets the objectives and significance of the study and describes the plan of the study.

Chapter 2 elaborates the conceptual aspects of merger, acquisition, takeover and consolidation and presents the legal and regulatory framework of merger and acquisition of banks in India.

Chapter 3 reviews the existing literature to provide a more concrete foundation on the issues regarding cost efficiency and the impact of merger on the cost efficiency of banks.

Chapter 4 describes thoroughly the methodology applied to achieve the research objectives. This chapter also explains the data used for the research, resources of data and the various issues related to the measurement and selection of variables in the banking sector.

Chapter 5 reports the analysis and presentation of empirical findings on temporal and ownership wise measures of cost efficiency and their decompositions among commercial banks in India for the period 1990-91 to 2011-12
Chapter 6 illustrates the empirical results on bank merger and cost efficiency gains among commercial banks in India for the period 1990-91 to 2011-12. It further outlines the efficiency differences between pre-merger (3-years prior to merger) and post-merger (3-years after merger) periods and examines the efficiency differences between acquirers and targets or anchor banks.

Chapter 7 outlines the theoretical and empirical issues regarding the determinants of efficiency, methodological framework for the estimation of the determinants of efficiency and the empirical findings relating to the impact of bank specific and environmental factors on the cost efficiency of banks for the study period.

Chapter 8 provides summary of the entire study with major findings and concludes with some policy implications, which are useful and practicable for the banking industry.

**DATA BASE**

The sample data for this study include the public sector banks (PSBs) and private sector (PVT) banks that have been operating in India since 1989-90 to 2011-12. The present study is mainly based on secondary data and required data have been culled from ‘Statistical Tables Relating to Banks in India’, ‘Annual Accounts of Banks’, ‘Profile of Banks’, ‘Report on Currency and Finance’, ‘Report on Trends and Progress of Banking in India’, ‘Reserve Bank of India Bulletin’- annual publications of Reserve Bank of India and ‘IBA Bulletin’, ‘Performance Highlights of Banks’- annual publications of Indian Banks Association. In addition required data have been collected from ‘National Income Statistics’ published by the Centre for Monitoring Indian Economy (CMIE). The number of banks varied across time due to merger of banks in the banking industry. Therefore, the study comprised an unbalanced panel data of 1204 observations with minimum 46 observations in 2012 and maximum 60 in 1998. The present study has considered only post reform period and two years before the post reform period. The selection of this period is due to the fact that one of the objectives of the present study is to examine the impact of merger activity on the efficiency of Indian commercial banks. Following Attullah (2006), Zhao et.al (2008), Barman (2007), Roland (2008) and Kumar and Gulati (2010), the entire study period has been divided into two post reform phases.
Phase I – 1992-1999: In this phase of reforms, there is increase in the importance of merger strategies. Total 8 merger deals of Indian banks happened during this period.

Phase II - 2000 -2012: This phase saw the re-emergence of merger and acquisition incidence wherein a total of 18 M/As took place among the commercial banks in India.

Methodology

As mentioned earlier, the main objective of the study is to examine the impact of merger on the cost efficiency of Indian commercial banks over the entire study period (1990-2012). So, non-parametric data envelopment analysis (DEA) has been used for estimating different measures of efficiency of Indian commercial banks.

Charnes, Cooper, and Rhodes proposed DEA, sometimes also refereed as frontier analysis in the operation research in 1978 under the assumption of constant returns to scale (CRS). This model is also known as CCR model. DEA is based on a concept of efficiency very similar to the micro economic one; the main difference is that the DEA production approach is not determined by some functional form, but it is generated from the actual data for the evaluated firms (Casu, Barbara, and Molyneux, Philip 1999). Later Banker, Charnes, and Cooper (1984) extended CCR model to allow variable returns to scale (VRS). DEA is a linear programming (LP) based mathematical model that measures the efficiency of DMUs in multiple inputs and multiple outputs setting. Using the actual observed values for the inputs and outputs for each DMU, DEA constructs a piecewise linear production surface, which in economic terms represents the revealed best–practice production frontier the maximum output empirically obtainable for any DMU in the observed population given its level inputs. DEA is a methodology based on the relative efficiency concept since it only calculates efficiencies for any given unit against other units in the sample. Therefore, the DEA efficiency measures are relative, not absolute measures. The cost efficiency of any institution is measured by its performance relative to an estimated performance of the best firm characterized by minimum costs (Berger and Humphrey (1997). DEA decompose the cost efficiency into two components: Technical Efficiency (TE) and Allocative Efficiency (AE). A firm is said to be technically efficient if an increase in any output requires a reduction in at least
one another output or an increase in at least one input, and if reduction in any input requires an increase in at least, one output (Koopmans, 1951). Allocative inefficiency exists when the firm’s marginal rate of technical substitution between any two of its inputs is not equal to the ratio of corresponding input prices (Kopp and Diewert, 1982).

In addition financial ratio analysis approach is also used to study the behavior of banks during pre and post-merger periods. Further, parametric (ANOVA) and non-parametric test (Median, Kruskial Wallis) have been applied to examine whether the efficiency differences between separate and pooled frontier are significant or not. At the second stage Tobit regression model has been utilized to determine the impact of various environmental factors on the efficiency of Indian commercial banks.

**Measurement of Input and Output variables**

The first and the most important step in measuring and conducting efficiency analysis of an organization or banking sector is to accurately determine its input and output variables. The selection of input and output variables in a service industry is fundamental and is often a debatable issue because of the fact that choice of input and output variables significantly affects the efficiency of banking or service industry. The production approach views banks as producers of loans, deposits, and various categories of assets with the use of labor and capital. The production approach considers deposits as output variable because it is viewed as a part of the banking services offered. Under this framework, deposits and various categories of assets are defined in terms of the number of accounts rather than in monetary terms. This approach includes only the operating cost as a part of the total costs and ignores the interest cost. Contrary to the production approach, the intermediation approach originally propounded by Sealy and Lindley (1977), views banks as financial intermediaries that collect funds from units in surplus and then transform these resources into loans and other investments. This approach considers banks as intermediaries of financial services rather than the producer of loans and deposit accounts. For the purpose of the present study, modified version of intermediation approach originally developed by Sealy and Lindley (1977) has been used for the specification of input and output variables.
By adopting intermediation approach, the selected input variables are (1) Labor (measured in terms of number of full time employees) (2) Loanable Funds (measured as the sum of deposits and borrowings) and (3) Physical Capital comprises fixed assets and book value of premises at the end of the year. The output variables used for the present study are (1) Non-Interest Income (2) Net-Income and (3) Advances. Further, all the input and output variables except labor are measured in crore of rupees. All the nominal input and output variables except (labor) have been converted into real variables by using GDP price deflator (Base 1999-2000=100) whereas establishment expenses incurred on staff has been deflated by consumer price index (Base 1999-2000) for non-manual employees. Following Denier et al. (2007) and Kumar and Gulati (2009) all the input and output variables have been normalized by dividing each of them except labor by number of branches of individual banks for the given year. The main reason for adopting the procedure of normalization is that it reduces the effects of random noise due to measurement error in the inputs and outputs and the possibility of colinearity and confines the input and output variables to the same order of magnitude.

(II)

Empirical Results

Chapter V: Cost Efficiency of Indian Commercial Banks

This chapter shows the empirical results of input-oriented DEA efficiency scores based on two DEA models—CCR (Charnes, Cooper & Rhodes) and BCC (Banker, Charnes &Cooper) and mean cost efficiency scores and its components among Indian commercial banks over the entire study period and relating to various sub-periods. Apart from this, an attempt has been made to highlight the causes of inefficiency among Indian commercial banks over the entire study period (1990-2012).

Empirical Findings:

5.1 Commercial banks (CBs) in India are found to be relatively cost inefficient (CIE) with a reported average inefficiency score of 27.6 percent and standard deviation measure of 0.09 for the period 1990-2012. This means that the banks in India
could potentially reduce their input costs by approximately 27.6 percent by using its inputs more efficiently with the help of best practice technology and maintaining the same level of output. The cost efficiency fell from its value of 0.801 in 1990 to 0.495 in 1996.

5.2 Looking at the components of CE findings indicate that TE scores for the sample banks turned out to be 0.869 and mean TE ranged from the lowest figure of 0.679 in 2011-12 to the highest figure of 0.939 in 2006-07. The findings suggest that with the help of best practices, banks on an average could have saved their expenditure on labor, physical capital and loanable funds annually by 13 percent. On the other hand mean AE for the entire study period has turned out to be 0.829, ranging from 0.618 in 1995-96 to 0.920 in 2000-01. The findings imply that Indian CBs are incurring 8 percent to 38.2 percent higher cost than what is indicated by their efficient cost frontier. This suggests that, banks can increase AE through the use of correct input combinations to produce a given level of output at the given prices.

5.3 The findings indicate that AE (82.9 percent) of banks contributed more towards Cost inefficiency (CIE) among Indian CBs rather than TE (86.9 percent). This implies that the choice of the wrong mix of input combination rather than under utilization of resources exerts a greater impact on CE of the commercial banks in India.

5.4 As for the sources of TE are concerned , the mean PTE scores of CBs has turned out to be 0.914 , which implies that average PTIE (pure technical inefficiency) exists to the tune of about 8.6 percent. On the other hand SE (Scale Efficiency) of banks has turned out to be 0.948 for the entire study period which ranged between the lowest figure of 0.840 in 2011-12 to the highest figure of 0.993 in 1992-93. The findings show that SE dominates PTE of Indian CBs. The findings of the study reveal that major portion of TIE among Indian commercial banks comes from adopting inappropriate management practices and remaining part is due to the fact that banks are either operating at above or below the optimum level.
5.5 The comparative analysis of first-phase of reforms and second-phase of reforms indicates that average CE scores of Indian CBs worked out to be 72.8 percent during second phase of liberalization as against 69.9 percent during 1992-1999. So the Indian CBs are found to be more efficient in the second phase of liberalization which may possibly be attributed to the fact that during this period a number of PVT were merged with PSBs which resulted in the overall improvement of cost efficiency of Indian banks.

5.6 The ownership-wise analysis of CE scores highlight that the cost efficiency of PSBs over the period 1990-2012 is 0.715 which indicates that PSBs in India incurred only 71 percent of what it actually outlaid to yield the same level of output. In other words findings indicate that on an average PSBs have cut their costs without reducing its output level by 29 percent over the entire study period. On the other hand cost efficiency of PVT banks over the study period is found to be 0.743 with standard deviation measure of 0.12. It reflects that on an average PVT banks have used only 25 percent of what it actually outlaid to produce the given level of output over the entire study period. The findings indicate that PVT banks have performed better than PSBs in cost savings with the given state of technology.

5.7 Looking at the sources of CE, the findings conclude that among PSBs, considerable amount of CIE is due to the choice of wrong mix of input combinations (19.9 percent) rather than wastage of resources (11.1 percent). On the other hand among PVT banks’ technical inefficiency (14.3 percent) contributed more as a source of CIE rather than allocative inefficiency (14 percent).

5.8 The comparative analysis of efficiency estimates of first phase of reforms and second phase of reforms indicates that average CE scores of PSBs has accelerated to 73.1 percent during 2000-2012 in comparison to 67.1 percent in 1992-1999. The findings indicate that banks are found to be more efficient in second phase of reforms which may be attributed to the incidence of mergers. The PVT banks
have shown a slight improvement in CE i.e 73 percent in first phase of reforms to 74 percent in the second phase of reforms.

5.9 The period wise analysis shows that average AE score of PSBs has turned out to be (77.9 percent) during 1992-1999 and shows marginal increase at the level of 80 percent during 2000-2012. On the other hand PVT banks have shown notable improvement in AE score (0.872) during 2000-12 as against (0.829) during 1992-1999.

5.10 As for as minimum level of average CE, AE and TE scores are concerned for the period 1990 and 1991 New Bank of India registered minimum level of CE while United Bank of India has been noted with minimum CE score in three consecutive years i.e from 1991-92 to 1993-94.

5.11 Furthermore, the empirical findings reveal that Nanital Bank has emerged to be the worst efficient bank in many a times ( i.e 4 times in case of TE , 4 times in case of CE and 2 times in case of AE) over the study period. In addition Sangli Bank also reported minimum level of CE score in three consecutive years starting from 2003-04 to 2005-06.

5.12 As for best practice banks, the empirical findings highlight that State Bank of India (SBI) occupied the position on TE frontier during the entire study period except for the year 2007-08. On the other hand Bank of Baroda occupied the position on CE frontier as many as 10 times.

5.13 Furthermore, United Bank of India and the Bank of Rajasthan are found to be the banks with minimum levels of PTE for 5 times and 4 times respectively during the entire study period and Sangli Bank is found to be the bank with minimum scale efficiency score in 2001 and further for consecutive years i.e from 2003 to 2006. Moreover, our findings suggest that banks with minimum PTE and SE were merged during the study period (Sangli Bank merged with ICICI Bank in 2004).

5.14 As for the returns to scale, results indicate that majority of banks (56 percent) for the year 1990 and 1991 are found to be operating below their optimum scale size.
and experiencing increasing returns to scale. The percentage of banks experiencing increasing returns to scale has declined in the year 1995 (22 percent) and further it increased in the subsequent years and during 2008-09 approximately 69 percent banks have exhibited increasing returns to scale which implies that these banks could have greatly benefited by expanding their operations.

5.15 The findings related with the DEA separate and common frontier analysis indicate that for most of the years the efficiency scores of separate and common frontiers are not different at any appropriate level of significance, so the pooling of data in each cross section is appropriate. Separate frontier is constructed by applying the DEA technique to all the inputs and outputs of banks in that group i.e group of public sector banks and private sector banks separately while pooled frontier is constructed by applying the DEA method to all the inputs and outputs of banks in different groups together.

Chapter VI: Bank Mergers and Cost Efficiency Gains in Indian Commercial Banks: An Empirical Analysis

In this chapter empirical results shed light on the incidence of mergers among banks in terms of cost efficiency gains in Indian commercial banks. In this study to examine bank merger and cost efficiency gains among Indian commercial banks the efficiency for each bank involved in a merger deal is obtained for the target bank during three years before merger and for the acquiring bank during the three years before and the three year after the merger deal.

The analysis of the present study consists of two stages. At the first stage, financial ratio analysis approach is applied to calculate the change in the position of banks during pre-merger and post-merger periods. The ratios applied in the financial ratio analysis are ROA (Return on assets), ROE (Return on equity), NIM (Net Interest Margin), CIR (Cost Income Ratio). The former two ratios are treated as profitability ratios while latter two ratios are used to measure the operational efficiency of banks. At the second stage, attempt is made to examine changes in the efficiency scores of banks
Summary and Conclusions

during the pre and post-merger periods by using non-parametric data envelopment analysis technique. For the purpose of analysis, case study methodology is applied.

**Empirical Findings:**

6.1.1 In case of Punjab National Bank (PNB) and New Bank of India (NBI) merger deal results indicate that although the difference between pre and post-merger financial performance is not significant and there is slight decay in all financial ratios of PNB, merger has affected the financial performance of PNB over a long period. The major factor accounted for this was the absorption of the sizeable NBI’s workforce into that of PNB.

6.1.2 As for merger between Bank of Karad and Bank of India is concerned findings indicate that merger has not proved to be beneficial for the acquiring bank. The main factor accounted for this may be that merger between Bank of Karad and Bank of India was a forced merger to prevent the interests of depositors.

6.1.3 Furthermore, the findings related with the merger deal between Oriental Bank of Commerce (OBC) and Punjab Cooperative bank indicates that ROE turned out to be 16.69 during pre-merger period and increased to 19.19 percent during post-merger period. In addition findings also highlight that mean value of CIR which was noted to be 50.47 before the incidence of merger has tended to decline (47.31 percent) after the merger which is an indication of bank’s better performance. The findings of statistical test indicate that all the financial measures of bank’s performance are not found to be statistically significant which indicates that there is no significant improvement in the profitability ratios of OBC during post merger period. Moreover, in terms of operational efficiency measures the bank has not shown any significant improvement.

6.1.4 In case of merger deal between ICICI Bank and Bank of Madura average NIM has decreased from 1.83 percent in pre-merger period to 1.13 percent during post-merger period. The CIR increased from 38.92 percent in pre-merger period to 49.76 percent during post merger period which implies that after the merger deal bank was not in a position to profitably generate income from its expenditure.

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6.1.5 The merger deal between Uttar Pradesh (UP) based Benares State Bank and Bank of Baroda took place in 2002. Prior to merger, three-year average CIR for the acquiring bank was noted to be 57.40 percent, which have tend to decline after the merger deal with t-value of 4.41. It implies that merger has benefited the acquiring bank to operate more efficiently. With these figures, the analysis leads to the conclusion that merger has benefitted the acquiring bank to operate more efficiently and t-test has proved the same. The pre and post-merger difference in CIR is found to be statistically significant at 1 % level of significance.

6.1.6 Further, findings reveal that PNB had gained from the merger deal when Nedungadi Bank was merged in it on Feb 3, 2003. The CIR, which bears an average of 62.14 percent before the merger deal has declined (50.6) after the subsequent years of merger deal. It implies that merger has benefitted the acquiring bank to operate more efficiently. Further, it has been noticed that after the three-year merger deal average ROA ratio for the PNB has increased to 3.27 percent which is not much higher than the pre-merger period (3.11 percent). Therefore, the results indicate that the merger deal between PNB and Nedungadi Bank can be considered as a successful deal and null hypothesis is accepted in case of profitability ratios.

6.1.7 In case of merger deal between Oriental Bank of Commerce (OBC) and Global Trust (GTB) the results show that the CIR of the bank during post-merger period has been on an average 44.9 percent, which was 10 percent more than three year pre-merger average CIR. The NIM to total assets ratio has dropped significantly from 3.16 percent in pre-merger period to 2.98 percent during the post-merger period. The overall analysis shows that bank has not gained much from merger and the profitability of the OBC had suffered due to the losses of GTB.

6.1.8 As for the findings related with the merger between Centurion Bank (CB) and Bank of Punjab (BOP) the empirical findings highlight that merger helped the CBOP (Centurion Bank of Punjab) to mobilize the low cost funds. Moreover, the analysis depicts that this deal was perceived by industry as the good merger deal as the combined entity attained the top 10 positions amongst PVT banks in the economy.
Overall, this deal can be considered as a successful merger deal in terms of achieving scale and geographic presence. From the empirical analysis, it can be concluded that the efficiency of the bank management increased after the merger and the overall financial performance of the CBOP is noted to be quite satisfactory after the merger deal.

6.1.9 The merger deal between Bareilly Co-operation Bank and Bank of Baroda is not considered as a good deal. The findings highlight that mean ratios of ROA and ROE were found to be less during post-merger period compared to pre-merger period. The mean ROA of Bank of Baroda is 0.775 percent during pre-merger period, which tends to decline to 0.686 percent during post-merger period and ROE ratio also exhibited declining pattern from 14.4 percent in pre-merger period to 12.66 percent during post-merger period. The CIR ratio increased from 53.43 percent to 56.85 percent during post-merger period. In terms of NIM ratio the performance of Bank of Baroda has worsened after merger deal.

6.1.10 As for the findings related with the merger between IDBI Bank and financially distressed United Western Bank (UWB), results show that IDBI bank’s performance has deteriorated in terms of profitability measures. Over the span of three year merger deal NIM ratio and CIR had decreased which implies that merger helped the IDBI to mobilize low cost funds. Moreover, the IDBI has enough capital to absorb the business of UWB.

6.1.11 Furthermore, findings highlight that the performance of the Federal Bank after acquiring the Ganesh Bank of Kurundwad improved in terms of ROA with t-value -3.828 (0.02), which shows that difference is statistically significant. Further, the performance of the Federal Bank in terms of ROE has also improved after the merger deal with t-value of 0.053, which is significant at 5 % level of significance. The CIR, which was on an average 40.7 percent before the merger deal, has declined after the subsequent years of merger deal.

**DEA Approach to Evaluation of Pre-merger and Post-merger Efficiency of Indian Commercial Banks**
6.2.1 The empirical findings reveal that cost efficiency of PNB has significantly declined during post-merger years viz. from 3-years average of 0.829 during 1990-1992 to 0.553 (3-years average during post merger period). Findings reveal that technical inefficiency (28 percent) is found to be major responsible factor for cost inefficiency than allocative inefficiency (24 percent) in case of PNB after 3 years of the merger acting. The major factor contributing for distortion in efficiency level is the acquisition of loss making and less efficient bank.

6.2.2 The average cost efficiency of the Bank of Karad during the period 1990-1992 was 0.776 or in other words cost inefficiency exists to the tune of 24 percent. The findings indicate that pre-merger performance of Bank of India is better than its post-merger performance. The main factor accounted for this is that merger between Bank of Karad and Bank of India was a forced merger to prevent the interests of depositors.

6.2.3 Findings relating to merger deal between OBC and Punjab Co-operative Bank show that OBC was much better than Punjab Co-operative Bank in terms of all efficiency measures. Comparison between pre-merger and post-merger efficiency scores indicate that average TE was 96.8 percent during pre-merger period which has increased to 100 percent during post-merger period. This finding implies that after merger bank is fully technical efficient which may be attributed to technological development in the bank. The cost efficiency has also increased from 0.912 during pre-merger period to 0.99 in the post-merger period. Further, findings reveal that no change has been noticed in the PTE and SE of the bank has improved from 0.968 during pre-merger period to 1 during post-merger period. These findings suggest that merged bank has enhanced the size of operations and enabled the bank to reap the maximum benefits of scale economies.

6.2.4 The average CE of the ICICI bank during the period 1998-2000 was 0.729. Moreover, the findings indicate that Bank of Madura was more efficient than ICICI Bank in terms of CE, AE, PTE, in the pre-merger period. The CE of the Bank of Madura was 0.872 during pre-merger period in comparison to ICICI Bank (0.729).
The CE of ICICI Bank has increased during post-merger period (0.947), which indicates that ICICI Bank has gained from merger deal.

6.2.5 As for the merger deal between Bank of Baroda and Bareilly Co-operation Bank Ltd. findings indicate that prior to merger Bank of Baroda was an efficient bank in terms of all efficiency measures as CE, AE, TE, PTE and SE scores turned out to be 100 percent during pre-merger period. These findings imply that bank is fully efficient to convert its inputs into outputs and there is no wastage of resources. Further findings indicate that bank is not able to maintain its pre-merger level of efficiency scores and the average TE, AE, and CE have declined to 0.999, 0.932 and 0.931 respectively during post-merger period. Moreover, the findings indicate that during post-merger period major cause of CIE in Bank of Baroda has been AIE (6.8 percent). The declining trend in AE may be attributed to the fact that CIR of the bank has increased after merger deal and NIM ratio has declined.

6.2.6 The findings of merger deal between Bank of Baroda and Benares State Bank indicate that prior to merger average CE of the Bank of Baroda (BOB) was noted to be 0.969. After merger commencing from 2003 to 2005 it has been found that CE of the BOB tended to decline (0.792). Only marginal decline has been noticed in the PTE and SE. The major factor accounted for declining efficiency scores was the enforcement of Benares State Bank’s workforce into Bank of Baroda work culture.

6.2.7 As for the merger deal between PNB and Nedungadi Bank findings indicate that average CE of the PNB was noted to be 0.834 during pre-merger period (2000 to 2002) and it has declined during post-merger period spanning from 2004 to 2006. On the other hand mean TE efficiency of the bank has improved from 0.917 during pre-merger period to 0.983 during post-merger period and average AE has shown declining trend. After merger TE has improved which may be due to the technological development in PNB which helped in using the minimum level of inputs to produce a given level of output.

6.2.8 The results indicate that prior to merger deal GTB (Global Trust Bank) was less efficient bank than OBC. The three year pre-merger CE of OBC was 0.910 in
comparison to 0.803 of GTB. In OBC cost inefficiency exists to the tune of 9 percent which is primarily due to allocative inefficiency (9 percent) than technical inefficiency. The comparative analysis of pre-merger (2001 to 2003) and post-merger (2005 to 2007) indicates that OBC has gained from merger deal.

6.2.9 As for the merger deal between Centurion Bank and Bank of Punjab findings indicate that merger has put positive impact on the all measures of efficiency on the acquirer bank. The average CE of Centurion Bank of Punjab has turned out to be 100 percent during post-merger period in comparison to 0.863 during pre-merger period which imply that after merger bank is fully efficient.

6.2.10 The comparative analysis of pre-merger (2003- 2005) and post-merger period( 2007 to 2009) shows that average CE of the Federal Bank has increased to 85.7 percent during post-merger period in comparison to 73.4 percent during pre-merger period. As for the sources of TE, average PTE score of acquirer bank has increased to 95.8 percent during post-merger period in comparison to 88.8 percent during pre-merger period.

6.2.11 Furthermore findings indicate that average CE of the United Western Bank during the period 2003 to 2005 was 0.695 or in other words CIE exists to the tune of 30.5 percent. The comparison between pre-merger (2003 to 2005) and post-merger (2006 to 2009) efficiency measures indicates that bank remain technical efficient in both periods. The average CE of the bank decreased to the level of 89.5 percent in post-merger period to 97.7 percent in pre-merger period which implies that bank is not able to achieve cost saving with the help of given state of technology.

6.2.12 The empirical findings related with whether there is any significant difference between the acquirers and targets performance during the years prior to merger indicate that during the pre-merger period, the acquirers were relatively more profitable and cost efficient than targets. The empirical findings of both tests reported that acquirers are larger than target banks and average size of acquirers in terms of log of total assets is turned out to be 4.3141 Rs. crore against 2.9905 crore
for targets. It implies that acquires are growing faster than targets and this value is found to be statistically differ at 5% level of significance.

6.2.13 The results also reported that the ownership of banks participating in merger activity also influence the technical efficiency of banks during the post-merger period. Merger of banks belong to same ownership have more scope of efficiency gains from mergers because they operated within the same technological and regulatory environment. The empirical findings show that post-merger efficiency of merged banks fluctuated after merger.

Chapter VII: Determinants of Efficiency among Indian Commercial Banks

In this chapter empirical results highlight the factors affecting the efficiency of Indian commercial banks over the entire study period. To view this objective Tobit regression model is applied on unbalanced panel data for the period 1990 to 2012 and three Tobit regression equations have been estimated for CE, TE and AE. The explanatory variables that have been used in regression analysis are Size (log of total assets), exposure to off-balance sheet activities (Non-interest income/ total assets), ROA (net profits/total earning assets), operating expenses (establishment expenses + salaries over total no. of employees), operational Risk (total loans/ total assets). In addition to this two dummies (Dumerger and Duprivate) have been used. Dumerger used to examine the impact of merger on the efficiency of banks. It takes value 1 if bank involved in merger activity otherwise zero. Duprivate is used to examine the association between bank ownership and efficiency.

Empirical Findings:

7.1 Size: Log of total assets is used as a proxy of size to determine the possible cost advantages associated with size. Previous studies in banking sector have predicated a strong and positive relationship between size and bank efficiency. The value of size co-efficient has worked out to be (0.04363) for all Indian CBs in case of CE, (0.586016) for TE and (0.24710) for AE and the values of those co-efficients are found to be significant. The empirical findings of the study suggest that larger the bank size, the more efficient the bank will be because of the U-
shaped scale economies implied by the empirical literature, which may be due to the fact that larger banks have more capital that can be used to adopt new technology and that can help the banks for minimizing their management cost. The findings also suggest that when banks achieve economies of scale large banks are able to attract more loan and deposits which further result in high level of efficiency scores.

7.2 **Exposure to Off-Balance Sheet Activities:** The present study has used the ratio of non-interest income to total assets to investigate the influence of banks diversification strategy into non-traditional activities. Findings suggest that the value of OFFBALANCE co-efficient turned out to be (0.224975) in case of cost efficiency and it is found to be statistically significant at 5 % level of significance. The findings suggest that the banks tend to become more cost efficient as they increasingly engage themselves in modern banking activities. The results for allocative efficiency and technical efficiency have also shown the same trend. For TE the value of OFFBALANCE co-efficient worked out to be (90.167648) and (0.14625) for AE and it found to be significant at 1 percent level of significance in case of TE and at 5 percent in case of AE. Therefore, OFF BALANCE sheet activities has been observed as an important variable affecting efficiency of banks in India.

7.3 **Operating Expenses:** The present study has used operating expenses variable to represents total amount of wages and salaries, as well as cost of running branch office facilities. Most of the previous studies suggest that reduced expenses improve the efficiency of banks which indicates that banks that allocate more expenses to their personnel are found to be less efficient. The value of operating expenses works out to be (-0.16273) for CE, (0.018) for TE, and (-0.02183) for AE. Except TE, all other measures of efficiency are negatively and significantly related to OE, which implies that banks which incurred more expenditure on staff are found to be less efficient.

7.4 **Operational Risk:** This study applied the total loans to total assets ratio as a proxy variable for operational risk. Operational risk variable proved to be a very
useful variable for measuring the risk observing behavior of banking sector. Both TE and AE have been found to be positively related with operational risk. The findings further reveal that AE has recorded a significant relationship with operational risk at 1 % level of significance whereas CE is negatively but not significantly associated with operational risk and indicates that bank should put more emphasis to improve operational efficiency and should devote more funds into productive resources.

7.5 **Profitability:** The present study has applied return on assets as a proxy variable for banks profitability. It has been well studied in the literature that higher level of profitability leads to higher level of efficiency among banks. The value of ROA co-efficient worked out to be (0.3254) in case of CE and is found to be highly significant at 1 percent level of significant. For TE the value of co-efficient turned out to be (0.172754) and (0.283422) for AE. All the co-efficients bear expected signs and are found to be highly significant at 1 percent level of significance. Therefore, ROA has proved to be the major determinant of efficiency among Indian commercial banks.

7.6 **Ownership:** In the present study to investigate the relationship between ownership of bank and bank efficiency DUPRIVATE is used as explanatory variable in the regression model. It takes a value 1 if the bank belongs to private sector and zero otherwise. The estimated co-efficient of the ownership dummy variable indicate that PVT banks were significantly more cost efficient and allocative efficient than PSBs. The value of DUPRIVATE is found to be 0.5936 in case of CE and 0.0656 in case of AE efficiency and these values are found to be significant at 1 percent and 5 percent levels of significance respectively.

7.7 **Dumerger:** DUMERGER is used as a dummy variable to study the relationship between merger activity and efficiency of banks. This variable takes the value of 1 if the bank participates in merger activity and zero otherwise. The findings of Tobit regression analysis indicates that the estimated co-efficient of merger dummy variable is found to be (-0.0059) for cost efficiency which is not found to be significant. DUMMERGER variable shows negative sign across various measures of efficiency except TE, which indicates that merger, causes a decline in
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efficiency performance. This variable is not found to be significant at any conventional level of significance.

The study thus concludes as follows

1. Commercial banks (CBs) in India are found to be relatively cost inefficient (CIE) with a reported average inefficiency score of 27.6 percent and standard deviation measure of 0.09 for the period 1990-2012. Looking at the components of CE findings indicate that AE (82.9 percent) is mainly responsible for CIE rather than TE (86.9 percent)

2. As for the sources of TE are concerned, the mean PTE score of CBs has turned out to be 0.914, which implies that average PTIE to the tune of about 8.6 percent. On the other hand SE of banks has turned out to be 0.948 for the entire study period. The findings of the study reveal that major portion of TIE among Indian commercial banks comes from adopting inappropriate management practices and remaining part is due to the fact that banks are either operating at above or below the optimum level.

3. The comparative analysis of first-phase of reforms and second-phase of reforms indicates that average CE scores of Indian CBs worked out to be 72.8 percent during 2000-12 as against 69.9 percent during 1992-1999.

4. The ownership-wise analysis of CE scores highlight that the cost efficiency of PSBs over the period 1990-2009 is 0.715 which indicates that PSBs in India incurred only 71 percent of what it actually outlaid to yield the same level of output. On the other hand cost efficiency of PVT banks over the study period is found to be 0.743.

5. Furthermore, the empirical findings reveal that Nanital Bank has emerged to be the worst efficient bank in many a times (i.e. 4 times in case of TE, 4 times in case of CE and 2 times in case of AE) over the study period. In addition Sangli Bank also reported minimum level of CE score in three consecutive years starting from 2003-04 to 2005-06.
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6. The study concludes that two market driven mergers showed significant improvement in efficiency levels. The merger deals viz. Centurion Bank and Bank of Punjab and ICICI Bank and Bank of Madura were the examples of deal between private sector banks.

7. With a view to expanding its assets, client base, and geographical coverage, these banks have been voluntary merged. As a result, the ICICI bank emerged as one of the largest private sector bank in the country.

8. The findings of this study reported that both banks enjoyed significant cost efficiency gains during post-merger years. The mean cost efficiency of ICICI Bank turned out to be 0.843 during the pre-merger period, which has shown an increasing trend (0.986) during the post-merger period. This score was found to be statistically significant at 5 percent level of significance. Similarly, after merger Centurion Bank’s (Centurion Bank of Punjab) efficiency has significantly increased from 0.889 in pre-merger period to 1 percent during post-merger period which suggests that banks have experienced managerial ability to maximize revenue and minimize costs after the merger deal.

9. The results also indicate that the ownership of banks participating in merger activity also influence the technical efficiency of banks during the post-merger period. Mergers of banks in case of same ownership have more scope of efficiency gains because they operate within the same technological and regulatory environment. The empirical findings show that post-merger efficiency of merged banks fluctuated after merger.

10. The empirical findings highlight that ROA coefficient experienced positive relationship with all measures of efficiency. This indicates that higher level of profitability leads to higher level of efficiency among banks.

11. The findings indicate that another important variable affecting significantly the efficiency of banks is bank size. It indicates that larger the bank size, the more efficient the bank will be because of the U-shaped scale economies.
12. There is a need to pay greater attention to the training of banks staff so that productivity of staff in the banks may be improved which will result in higher level of efficiency. From the above analysis it may be concluded that merger is not only one of the factors responsible for affecting the efficiency of banks but there are several other bank-specific and macroeconomic variables which influence the efficiency of bank

**Policy Implications:**

In light of the above – mentioned results - the following policy implications have been put forward:

- The findings suggest that large investments should be made in information technology and human resource development programmes for imparting knowledge and inculcating special skills among workforce. The bank managers should pay key attention to make proper and optimum use of the enhanced technologies in order to augment efficiency gains.

- The findings pinpoint that merger is just a facilitator but not guarantee for improved profitability on a sustained basis. The implications for the decision makers is that merger should be based on the need to attain a meaningful balance sheet size and market share in the face of heightened competition and driven by synergies, locational and business specific complementarities.

- The findings suggest that the policy makers should be more cautious in promoting mergers as a mean to enjoying efficiency gains.

- The findings of the study suggest that while promoting mergers as a way to achieve economies of scale and scope, the policy makers should consider the possible gains against the possible losses.

- The empirical findings highlight the complexities involved in the integration of two diverse cultures. The skills, capabilities of the staff in different banks are different with each other. Therefore, it is suggested that the attitude to work and
different culture of employees of target and bidder bank should be taken into account before the merger deal.

- If the merger occurs between strong bank with relatively weak bank then it may be possible that the poor performance of weak bank may pull down the performance of the strong bank as in the case of PNB and NBI.

- The findings imply that it cannot be said that merger has put negative impact on efficiency of banks. In 6 out of 11 merger cases bank’s performance has improved after merger deal.

- Furthermore it has been observed that most of the banks have experienced declining pattern in cost efficiency. Therefore, it is suggested that immediate gain in efficiency is not the main aim of merger in Indian banking sector while motive can be increase in geographical diversification and achieve good place in the competitive global market by the presence of large banks in terms of assets and liabilities.

- Further, findings revealed that in majority of cases 15 out of 24 bank merger deals, private sector banks were merged with strong public sector banks. Only in 8 cases private banks have been merged with another private sector bank. All these mergers take place only on the direction of the Government. except the merger deal between Centurion Bank with Bank of Punjab in 2005, Centurion Bank of Punjab with Lord Krishna Bank in 2008, HDFC with Times Bank during 2000, ICICI Bank with Bank of Madura in 2001. When two different entities combine, that is public and private, there is culture difference, and may be differing perspective among workforce during the process of bank merger. Findings imply that merger does not mean integration of financial assets and liabilities of two banks. All these issues require proper attention and treatment from the Government and policy makers.

- The findings suggest that the expected gains associated with mergers are not realized and significant improvement are not noticed in cost efficiency because of the reason that mergers and acquisition constitute a complicated process and
should be considered with great care and still there is need to elaborate the actual problems.

- Finally, the findings suggest that consolidation of banks through mergers and acquisition may be need of future. In contrast to the previous merger deals which took place to protect the interests of depositors in future merger process should aim to be driven by market-related parameters such as size and scale, geographical and distribution synergies and skills and capability.