Review of Literature
CHAPTER - II
REVIEW OF LITERATURE

Aswini Kumar Mishra and et.al (2013)analyzed the soundness and the efficiency of 12 public and private sector banks based on market cap. CAMEL approach has been used over a period of twelve years (2000-2011), and it is established that private sector banks are at the top of the list, with their performances in terms of soundness being the best. Public sector banks like Union Bank and SBI have taken a back seat and display low economic soundness in comparison. The present study makes an attempt to measure the efficiency change of these selected banks operating in India during 2010-2012. By using frontier based non-parametric technique, Data Envelopment Analysis (DEA), provides significant insights on efficiency of different banks and places private sector ones at an advantage situation and thereby hints out the possibility of further improvisation of most of the public sector banks. DEA results exhibit that among the public sector banks, the performance of Bank of India, Canara Bank and Punjab National Bank got dampened in the last two years under study where as among the private sector banks, except the case for Axis Bank which was not found to be satisfactory at all, the remaining private sector banks shows marked consistency at their efficiency level during the period under study.

Anita Makkar (2013) analyzed comparative analysis of the financial performance of Indian commercial banks. The study considered a sample of 37 banks (22 public sector banks and 15 private sector banks) for the period from 2006-07 to 2010-11. CAMELS rating methodology was used in the study to measure the performance of the considered banks. The study found that the IDBI Bank was the best performing bank followed by Kotak Mahindra Bank and ICICI Bank. Dhanalaxmi Bank had the worst performance followed by J & K Bank and Karnataka Bank Ltd. The results of the 't' - test disclosed that there is a significant difference in the Capital Adequacy, Asset Quality and Earning Capacity of public and private sector banks in India, while there is no significant difference in the Management, Liquidity Position and Sensitivity to market risk of the two different banks groups. The study concluded that on an average, there is no statistically significant difference in the financial performance of the public and private sector banks in India, but


Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.
still, there is a need for overall improvement in the public sector banks to make their position strong in the competitive market.

**Poonam Mahajan and et.al (2012)**\(^3\) empirically predicts the Return on Assets (ROA) performance of the public sector banks in India for the years 2005-06 and 2009-10. A sample of 27 banks is taken for the study. Backward stepwise regression analysis is used to study the impact of these determinants on the performance of the banks. ROA is taken as the dependent variable, while other variables like spread ratio, provisions and contingencies, non-interest income, credit-deposit ratio, operating expense ratio, investment-deposit ratio, capital adequacy ratio and non-performing assets have been controlled in the study. The results reveal that spread, credit-deposit ratio, non-performing assets, non-interest income and provision and contingencies have the capacity of predicting the profitability (measured by ROA) of public sector banks in India. The measured ROA reveals that the Indian banking sector remained relatively healthy during the current economic crisis, and the performance of the banks was not impacted negatively in a significant manner.

**PriyaPonraj and GurusamyRajendran (2012)**\(^4\) measured the bank competitiveness among the select Indian commercial banks in terms of financial strength. Liberalization and globalization has led Indian banking companies to focus on quality of service, speed and cost to face severe competition A bank is said to be competitive if it is financially strong. Financial strength of the bank is measured in terms of financial ratios viz. efficiency ratio, profitability ratio, capital adequacy ratio, income-expenditure ratio, deposits and return ratios. Factor analysis is used to structure and detect the components of financial strength. The competitive position mapping of the public sector, private sector and foreign banks is obtained by applying discriminant analysis. It is found that foreign banks are the most competitive compared to the private and public sector banks in terms of the profitability ratio, returns ratio and capital adequacy ratio.

---


SufianFadzlan (2012) examined the internal and external factors that influenced the performance of banks operating in the Indian banking sector during the period 2000-2008. The empirical findings from this study suggest that credit risk, network embeddedness, operating expenses, liquidity and size have statistically significant impact on the profitability of Indian banks. However, the impact is not uniform across banks of different nations of origin. During the period under study, the empirical findings do not lend support for the limited form of global advantage hypothesis. Likewise, the liability of unfamiiliarness hypothesis is also rejected, since, the study do not find significant advantage accruing to foreign banks from other Asian

PaneerSelvam and Radjaramane, (2012) focused on the performance of the nationalized banks in the context of the Indian economy. The performance is being carried out with the help of certain crucial operational variables of the banks including total business, expenditure, deposits, advances, profits etc. To identify the relative performance of the operational variables the linear and compound growth rates had been calculated. The growth rates worked out indicated that on the average in the case of a majority of the operational variables, the performance of the nationalized banks followed by private sector banks is found to be higher when compared to SBI and its associates and foreign banks.

Uppal and Amit Juneja (2012) analyzed comparison of different bank groups on their deposits, borrowings, loans and advances and investments related to different time periods. For the above analysis, all the banks are divided into four groups i.e. public sector banks, old private sector banks, new private sector banks and foreign banks. After the performance analysis, it is concluded that foreign banks are performing much better than the other bank groups, whereas the performance of old private sector banks is disappointing among all the bank groups. New private sector banks and Public sector banks are performing only satisfactorily.

Hitesh Arora and Padmasai Arora (2012) examined productivity growth in public sector banks (PSBs) in India in post-liberalization period from 1991-1992 to 2008-2009. Total factor productivity (TFP) in Indian PSBs is computed using Hicks-Moorsteen index numbers as given by

---

O'Donnell (2010a). The paper is perhaps the first study that focuses exclusively on productivity in Indian PSBs. It also compares and contrasts productivity growth results for Nationalized Banks (NBs) and State Bank of India Group (SBIG). Results show that Indian PSBs have experienced positive productivity growth since liberalization. Also, there exists significant difference in the productivity growth experienced by SBIG and NBs with the latter having experienced higher TFP growth. The difference has been traced to greater technological progress experienced in NBs rather than to the effect of higher efficiency gains.

Manas Kumar Baidya and Debabrata Mitra (2012) measured and evaluated the technical efficiency of 26 Indian public sector banks from the cross-section data of the financial year 2009-2010 and to provide ranking of efficiency to these banks using two popular data envelopment analysis (DEA) models: CCR and Andersen and Petersen's super-efficiency model. The results reveal that average technical efficiency of entire sample is 86.5% and that only seven banks (23%) are found to be fully efficient. So, there is a scope of efficiency improvement of 19 public sector banks in India. The study has found that, the banks which are using more labour for providing their services are relatively more inefficient. In order to improve the efficiency; most of the inefficient banks should follow the good operating practices of four banks namely Indian Bank, Allahabad Bank, State Bank of India and Corporation Bank. State Bank of India has been observed to be the most efficient bank followed by Indian Bank, Corporation Bank as per super-efficiency score whereas, most inefficient bank is United Bank of India.

Subroto Chowdhury (2012) In his study, he revealed that Indian banking has witnessed reforms since 1991 thus providing it with operational flexibility and institutional transformation. The reforms have strengthened the fundamentals of the Indian banking sector. Still more the resilience of the Indian banking sector in withstanding financial crisis has proved its stability beyond doubt. Deregulation of the Indian banking sector has opened up new avenues of banking both in terms of outreach and services. While Indian banking industry is placed globally and has to compete with global standards, it is still struggling to achieve global standards. The best rated banks in India are not able to get position within the top hundred banks globally. Thus, efficiency along with growth assumes vital tip in any analysis concerning bank. Efficiency of the banks in managing its inputs and outputs, is thus of prime importance in deciding the position of the bank. All this calls for a comprehensive analysis of the technical efficiency of the banks operating in India.


Ashok Khurana and Kanika Goyal (2011)\textsuperscript{11} analyzed the financial performance of public sector banks and commercial banks in India for the period 2001-02 to 2006-07, they examined the productivity and efficiency using the trend of operating cost / total cost, cost to income, labour/non labour cost, net interest income, NPA and capital to risk weighted asset ratio. The study observed that there is a need for increased absorption of enhanced technological capability by several banks to further argument yield of the banking sector and this would call for changes in processes and improvement in human resource skills.

Doonger Singh Kheeche (2011)\textsuperscript{12} attempted to compare the profitability of different categories of banks and to find out the causes of difference in their profitability for the period 2003-04 to 2009-10. The results shows that return on funds and return on advances are high in private and foreign banks where as interest income is highly seen in public sector banks compared to their counter parts. Cost of operation, it is very high in both private and public sector banks whereas spread shows it is highly in foreign and new private sector banks.

Shobana and Deepa (2011)\textsuperscript{13} examined the technical efficiency of the nine select merged banks in the post-reform period. The study uses Stochastic Production Frontier Approach to measure the technical efficiency as a ratio of output to input. Mergers & Acquisitions (M&As) in the banking sector has been looked upon as an immediate mode for external growth. Market driven merger which are on gradual rise are outcomes of the post-reform period driven by the changes in competitive landscape of the Indian banking system which forced many of the incumbent banks to restructure themselves and boost their efficiency. The study reveals that of the nine select cases of M&As, the merger deals of Union Bank of India and HDFC Bank only resulted in significant improvement in the technical efficiencies.

Aditi Bhattacharya and Sudeshna Pal (2011)\textsuperscript{14} estimated technical efficiency of Indian commercial banks from 1989-2009 using a multiple-output generalized stochastic production frontier, and analyzed the effects of financial sector reforms on measured efficiency. The results showed that Indian commercial banks were operating with 64% efficiency on average during the sample period and that efficiency declined in both public and private banks during most parts of the post-reform period. The capital adequacy ratios negatively influenced efficiency while the

\textsuperscript{11} Ashok Khurana and Kanika Goyal (Feb-2011)- Performance of Public Sector Banks : An Analysis:Vol.2; issue.2.
\textsuperscript{12}Doonger Singh KheeChee (Jan-June’2011) – A Comparative study of profitability of different groups of scheduled commercial banks in India. IJMT, Vol.19, No(1).
number of branches had no significant effect on bank efficiency. Financial sector reforms had mixed results on technical efficiency. The initial phase of reform had positive impact on technical efficiency while the later phases adversely affected technical efficiency of commercial banks. Throughout the sample period, public sector banks show higher efficiency levels compared to private sector and foreign banks.

Syed Ibrahim (2011)\(^\text{15}\) emphasized the operational performance of commercial banks in India for the period 2000 to 2009. The study reveals that operational performance of Indian commercial banks has improved since the year 2000. Aggregate deposit share had constant increase following a positive correlation between demand deposit and time deposit. Commercial banks have been more efficient by maintaining the C-D ratio. Improvement in investment – Deposit ratio and share of percentage of priority sector advances in total credit all these have made positive impact on operational efficiency as well as the profitability of Indian commercial banks.

Rachita Gulati (2011)\(^\text{16}\) analyzed technical, pure technical and scale efficiency of Indian domestic banks using DEA. According to the study managerial inefficiency is the main source of overall technical in efficiency in Indian domestic banking industry. The new private sector banks dominate in the formation of the efficient frontier. The efficiency difference between public and private are not statistically significant, there exists significant differences between large and medium banks appear with regard to scale efficiency. The results pertaining to Tobit analysis reveal that the exposure to off-balance sheet activities and profitability are the most influential determinants of the technical efficiency.

Rajireddy and Kirankumar (2011)\(^\text{17}\) analyzed the financial performance of Indian banking sector, the study found that there was a major competition between nationalized and foreign banks. Over the period of study all the banks annual growth rate was considerable in all aspects. All the banks are equally good at some aspects and bad at some aspects. The banks have to take necessary measures to overcome this problem to withstand the stiff competition.

Amit Kumar Dwivedi (2011) analyzed efficiency of Indian banking in the post reform era. One of the major objectives of Indian banking sector reforms was to encourage operational self-sufficiency, flexibility and competition in the system and to increase the banking standards in India to the international best practices. The second phase of reforms began in 1997 with aim to reorganization measures, human capital development, technological up-gradation, structural development which helped them for achieving universal benchmarks in terms of prudential norms and pre-eminent practices. The paper seeks to determine the impact of various market and regulatory initiatives on efficiency improvements of Indian banks. Efficiency of firm is measured in terms of its relative performance that is, efficiency of a firm relative to the efficiencies of firms in a sample. Data Envelopment Analysis (DEA) has used to identify banks that are on the output frontier given the various inputs at their disposal. The study is confined only to the Constant-Return-to-Scale (CRS) assumption of decision making units (DMUs). Variable returns to scale (VRS) assumption for estimating the efficiency was not attempted. It was found from the results that national banks, new private banks and foreign banks have showed high efficiency over a period time than remaining banks.

Rajan and et.al (2011) examined technical efficiency and productivity performance of Indian scheduled commercial banks, for the period 1979-2008. The study used multiple output/multiple input technology production frontier using semi parametric estimation methods. The endogeneity of multiple outputs is addressed by semi parametric estimates in part by introducing multivariate kernel estimators for the joint distribution of the multiple outputs and correlated random effects. Output is measured as the rupee value of total loans and total investments at the end of the year. The estimates provide robust inferences of the productivity and efficiency gains due to economic reforms.

Pankaj Sinha and Dipanwita Dutta (2011) examined key determinants of profitability of Indian banks. It integrates the macroeconomic environment and industry level variables of India for predicting profitability of Indian banks. A simultaneous equation system has been formulated to derive the estimates of net interest income (NII)

---

and Credit for the banking system as a whole. Net interest income as well as efficiency ratio have significant role in determining profitability in Indian banking scenario. The Net interest income reacts inversely to bond yields and positively to credit. This stems from the inverse relationship of credit demand to bond yields and positive relationship of GDP with credit creation. Further, Deposit mix (higher share of low cost deposit in the total deposits) has favourable impact on NII%.

**BireshSahoo and AnandadeepMandal (2011)**[^21] evaluates the performance of the Indian banking sector during the post transition period (1997-2005). The productive performance, scale elasticity, efficiency and capacity utilization parameters are calculated using Data Envelopment Analysis (DEA). The empirical results calibrated through these models are analytic on several fronts. The positive trend of the reform process is visible through the increase in technical efficiency over the years of the post transition period. The cost efficiency parameters state that the nationalized banks are yet to exercise their cost minimizing principles compared to the other banks. Finally, the empirical findings show a significant difference between the technology and the market-based hypothesis. These results are in line with the distinction between economies of scale and the returns to scale.

**BalaNeetu and Kumar Sunil (2011)**[^22] examined, “How efficient are public sector banks in India?”. The increasingly popular technique of Data Envelopment Analysis (DEA) has been used to compute the efficiency scores for individual PSBs. Using the cross-section data for the financial year 2008-2009. The empirical findings reveal that PSBs are their outputs with high level of efficiency which is reflected by the mean efficiency score of 0.890. IDBI bank is the most efficient bank, operating in Indian public sector banking industry. The banks with lesser priority sector advances and more income from non-traditional activities are found to be more efficient.

**Namita Rajput and Monika Gupta (2011)**[^23] analyzed efficiency of public sector banks in post reform period. According to the author, the Indian banking sector has witnessed a series of reforms since 1991 with the major objective to promote flexibility, operational autonomy and


competition in the system and to raise the banking standards in India to the international best practices. There is a change in the importance of public sector banks because of the entry of foreign and private sector banks. In the recent past, the banking industry has succeeded to draw attention of investors by its steady performance and tremendous prospects to grow and to meet broad challenges like threats of risks from globalization; implementation of Basel II; improvement of risk management systems; implementation of new accounting standards; enhancement of transparency and disclosures etc. The competitive pressures force banks to improve their efficiency scores, and mapping the progressive pathway is an education tool for investors. In this backdrop, this study evaluates the technical efficiency (TE) of public sector banks (PSBs) operating in India during the post reforms period from 1992-1993 to 2009-2010, using non-parametric linear programming-based technique data envelopment analysis (DEA). The results exhibit the positive impact and greater propel of reforms on 20 banks and seven showed an inverse trend.

Kajal Chaudhary and Monika Sharma (2011) analyzed, “How efficiently public and private sector banks have been managing NPA?”. The study revealed that it is right time to take suitable and stringent measures to get rid of NPA problem. An efficient management information system should be developed. The bank staff involved in sanctioning the advances should be trained about the proper documentation and charge of securities and motivated to take measures in preventing advances turning into NPA. Public banks must pay attention on their functioning to compete private banks. Banks should be well versed in proper selection of borrower/project and in analyzing the financial statement.

Uppal (2011) analyzed the efficiency of all the bank groups in the post-banking sector reforms era. Time period of the study is related to second post-banking sector reforms (1999-2000 to 2005-06). This period has been chosen taking into consideration the following factors; On the basis of some parameters of efficiency i.e. profitability per employee, per branch, business per employee, per branch and expenses per employee and per branch, the paper concludes that efficiency of all the bank groups has increased in the second post-banking reforms period but these banking sector reforms are more beneficial for new private sector banks and foreign banks.

---

Ashish Kumar (2011) attempted to investigate the efficiency of Indian commercial banks with data envelopment analysis (DEA), a deterministic non-parametric approach. The results of the study show that only 22 banks are efficient on the criteria of technical efficiency and pure technical efficiency respectively. Further ANOVA test indicates that there is no significant difference in the mean technical efficiency scores of various banks belonging to various groups defined for the purpose of the study.

Bhagirathi Nayak and Nahak (2011) analyzed the performance of public sector banks in India during the post-liberalization period. There has been a significant improvement in the performance of public sector banks after reform measures. The study has used various accounting ratios pertaining to profitability, financial efficiency, operational efficiency and financial soundness to build performance index for banks. Principal Component Analysis method has been used to construct index and rank performance of banks. Twenty-two parameters pertaining to operational and financial efficiency of banks have been considered to construct the performance index for public sector banks. Altman Z-Score of solvency analysis has been applied to banking sector with suitable financial, operational and other efficiency ratios. Logit model is used to construct the Altman Z-Score for public sector banks in India. The logit model is found to be robust as per its predictability of financial health of the public sector banks. It is found that reform measures have impacted positively in enhancing the stability and soundness of the public sector banks in India. The analysis has found that State Bank of India continues to be the number one bank in India and there is competition between Punjab National Bank, Canara Bank, Bank of India and Bank of Baroda for the number two place in different years.

Vikas Choudhary and Suman Tandon (2010) analyzed the financial performance of public sector banks in India. Public sector banks form major part of total banking system in India so there is a need to evaluate the performance of these banks. The study is based upon secondary data covering the period from 1997-2007. For analyzing the performance Compound Annual Growth rate and Coefficient of Variation of advances, deposits, total assets, return on assets, and return on equity and spread ratio are calculated. Decline in growth of non-performing assets ratio is also considered for this evaluation. It is concluded the CAGR of various variables have shown variation from bank to bank. State Bank of Indore has shown maximum CAGR in case of total advances, total deposits and total assets. Punjab & Sind Bank has shown least growth of deposits and advances and State Bank of India has least growth of deposits. CAGR of return on equity and return on assets was at peak of United Bank of India whereas Dena Bank, Punjab & Sind Bank and...
Indian Bank have shown negative trend in these ratios. Decline of NPA’s ratio was highest in case of State Bank of Hyderabad and least in case of Dena Bank.

*Sreeramulu and et.al (2010)* compares the efficiency of Indian banking industry over two time periods, 1999-2003 and 2004-2008. A Cobb Douglas stochastic frontier model is adopted in order to estimate the bank efficiency. The analysis suggests that there is a substantial efficiency improvement in the Indian banking sector during 2004-2008 as compared with 1999-2003. The overall mean efficiency of Indian banks increased to 64% in 2004-2008 as compared to 30%; during 1999 - 2003. In between labour and capital inputs, labour is found to be the dominant input factor in determining the overall banking efficiency. Labour efficiency improved significantly from 74% in 1999-2003 to 98% during 2004-2008. Among three ownership groups, domestic private sector banks are found to be most efficient in generating the banking output measured in terms of total business and total income. The improvements in the Indian banking sector are mainly attributed due to globalisation, deregulation and advances in information technology. Nevertheless, still there is a wide scope for Indian banking industry to improve efficiency further.

*Santhosh Kumar Das(2010)* analyzed the performance of the Indian banking sector after the initiation of financial liberalization and aims to measure the cost efficiency of the Indian banking sector during the post reform period. The concentration has declined which resulted in increasing competition. The share of private and foreign banks in banking asset, deposit and credit has gone up. The profitability of all bank groups has gone up, but the foreign banks are more profitable. Using Stochastic Frontier Approach (cost frontier) and RBI data for 60 Indian commercial banks and on the basis of empirical investigation (panel estimation), the paper concludes that after financial liberalization there has been no significant change in the cost efficiency of the public sector banks. The finding shows a marginal decline in the cost efficiency of the public sector banks in the post reform period. A comparison among various bank groups in the post reform period shows, the domestic private banks are becoming more efficient in comparison to the public sector and the foreign banks. However, the study finds the public sector banks to be more cost efficient than the private and the foreign banks.

*Mukesh Kumar (2010)* in his study, he employed data envelopment analysis (DEA) models to rank Indian banks based on their performance over 13 years of post-reform period by

---


*Santosh Kumar Das (March-2010); Financial Liberalization and Banking Sector Efficiency: The Indian Experience. Research paper 12th Money and Finance Conference 11-12th.*

using the progressive time-weighted means of variable benchmarking super-efficiency scores. Further, the relative performances of these banks are evaluated against the ‘best practice’ bank by using the fixed benchmarking DEA model. The results show no statistical evidence of dominance of either public sector banks over private sector banks or vice-versa when their efficiencies are evaluated with the common frontier. However, the variations in efficiency across the public sector banks are comparatively less as compared to private sector banks. The efficiency based on ownership frontier further supports our argument that the public sector banks are relatively more consistent in their performance over the years as well as across the banks. Further, results show a huge difference in the ranking of some of the banks when the usual method of ranking is compared with progressive time-weighted mean approach, where the performance of the banks over the years is taken into account.

**Ibrahim Onour and AbdelgadirAbdella(2010)** investigated efficiency performance of Islamic banks in Sudan using DEA. The result indicates that among the sample of twelve banks the largest bank in the group which is government owned and middle sized private sector bank score technical efficiency level (i.e scale and pure technical efficiency). While the smallest bank in the group private owned score pure technical efficiency (i.e managerial efficiency) but scale inefficient. This result add additional evidence to the existing literature that ownership (government versus private) is not a constraint of managerial and scale efficiency but bank`s size is important factor for scale efficiency.

**MabweKumbirai and Robert webb (2010)** investigates the performance of south Africa`s commercial banking sector for the period 2005-2009.Financial ratios are employed to measure the profitability, liquidity and credit quality. The study found that overall bank per increased considerably in the first two years of the analysis. A significant change in trend is noticed at the onset of the global financial crisis in 2007, reaching its peak during 2008-2009.This resulted in falling profitability, low liquidity and deteriorating credit quality in the south African banking sector.

**Lakshmi kumar and et.al (2010)** examined the productivity growth and efficiency change in Indian banking with the influence of technology change by employing Data Envelopment Analysis (DEA) and to determine the change in Total factor productivity (TFP) and its components

---

32 Ibrahim Onour and AbdelgadirAbdella (Nov.2010): Scale and Technical Efficiency of Islamic Banks in Sudan: Data Envelopment Analysis; Munich Personal REPEC. Archive.
namely technical change and technical efficiency change for the period 1995 – 2006. The study found that TFP growth over the entire period was driven by technical change as compared to efficiency change, showing that technology and innovation had a greater impact than efficiency change or the catch-up effect. The fixed effects estimates of the determinants of TFP change and its components show that size, ownership and time period exert significant effect on technical change.

**Sunil Kumar (2010)** analyzed the trends of cost efficiency and its components across Indian public sector banks (PSBs) during the post-deregulation period spanning from 1992-1993 to 2007-2008. The study also examines the issue of convergence in cost, technical and allocative efficiencies levels of Indian PSBs. The empirical results indicate that deregulation has had a positive impact on the cost efficiency levels of Indian public sector banking industry over the period of study. Further, technical efficiency of Indian public sector banking industry followed an upward trend, while allocative efficiency followed a path of deceleration. In Indian public sector banking industry, the cost inefficiency is mainly driven by technical inefficiency rather than allocative inefficiency. The convergence analysis reveals that the inefficient PSBs are not only catching-up but also moving ahead than the efficient ones, i.e., the banks with low level of cost efficiency at the beginning of the period are growing more rapidly than the highly cost efficient banks. In sum, the study confirms a strong presence of s- and b-convergence in cost efficiency levels of Indian public sector banking industry.

**Ramachandran and Kavitha (2009)** analyzed the importance of improving the profitability performance of the banking sector in recent years, a census study has been adopted by covering all the Indian scheduled commercial banks, which have been divided into three groups viz., the SBI group, the Nationalized Banks group and the Private Banks group with two sessions, i.e., Period I and Period II by dividing the 10 year-study period into the first five years and the last five years. The step-wise multiple regression analysis was adopted for the study. An analysis of the SBI group reveals that in both the periods of study, the variable provisions and contingencies to total expenses occupied a prominent place. The nationalized banks group showed a position of provisions and contingencies to total expenses in the first half of the study period and Capital Adequacy Ratio (CAR) during the second half of the study period. In relation to the private banks group, it has changed from other interest expenses ratio to capital adequacy ratio.

Karl Werner and Jurgen Moormann (2009) investigated the empirical relation between efficiency and profitability in five large economies of the European Union during the period 1998-2005 and discusses the results from the perspective of corporate bank strategy. Methodologically the existing literature is expanded by the use of DEA super-efficiency values to regress profitability, the incorporation of risk by calculative costs of capital, and a model specification built on the modern understanding of banks as centers of value creation. The results of the conducted static and dynamic regression analyses show that profitable banks operate with higher technical efficiency than their competitors. Furthermore, the strategic environment and in this regard the structure and concentration of the national financial sector have a considerable impact on a bank's financial performance. Both issues proved to be statistically and economically significant. Thus, the results support the appropriateness of the generic strategy of cost leadership for the European banking market. Banks following this strategic position were able to achieve higher excess returns during the analyzed period.

Sunil Kumar and Rachita Gulati (2009) in their study appraise the efficiency, effectiveness, and performance of 27 public sector banks (PSBs) operating in India by using a two-stage performance evaluation model. Using the cross-sectional data for the financial year 2006-2007, the technique of data envelopment analysis has been used for computing the efficiency and effectiveness scores for individual PSBs. The overall performance scores have been derived by taking the product of efficiency and effectiveness scores. The empirical results reveal that high efficiency does not stand for high effectiveness in the Indian PSB industry. A positive and strong correlation between effectiveness and performance measures has been noted. Further, on the efficiency front, State Bank of Travancore appears as an ideal benchmark, while State Bank of Bikaner and Jaipur, and State Bank of Mysore emerge as ideal benchmarks on the effectiveness front. The practical implication of the research findings is that in their drive to improve overall performance, Indian PSBs should pay more attention to their income-generating capabilities (i.e. effectiveness) relative to their ability to produce traditional outputs such as advances and investments (i.e. efficiency).

Singh SatyaDev and Singh Rajesh Kumar (2009) focused on India’s banking sector which has been attracting increasing attention since 1991 when a streamlined financial reform programme was launched. It assesses whether the selected bank specific and macro-economic determinants have any significant impact on profitability of banks in India. In the late 1980s and early 1990s, many countries adopted a series of financial sector liberalization measures that included interest rate liberalization, entry deregulations, reduction of reserves requirements and removal of credit allocation etc. This led to significant change in the pattern of profitability and efficiency of banking industry. The paper concludes that the most of the selected indicators have significant positive impact on profitability of banks in India. Thus, it can be inferred that the last decade and a half has seen the transformation of the Indian banking sector with a high level of technology, diversity and sophistication in products and services and improved efficiency. The banking sector is rapidly moving towards international benchmarks with increasing efficiency, transparency and dynamism. The broad-based reforms have made the banking sector competitive and positioned it well to support sustained economic growth.

Mihir Dash and Christabel Charles (2009) investigated technical efficiency of Indian banks, segmented in terms of ownership. For this purpose, the data envelopment analysis (DEA) model was used with five input variables (viz. borrowings, deposits, fixed assets, net worth, and operating expenses) and four output variables (advances & loans, investments, net interest income, and non-interest income), and the efficiency scores were calculated for a sample of forty-nine major banks operating in India. The results of the study show that foreign banks were slightly more efficient than public and private banks, and that there was not much of a difference in the efficiency of public and private banks.

Roma MitraDebnath and Ravi Shankar (2008) evaluate the efficiency of 50 Indian banks by using Data Envelopment Analysis (DEA). DEA is capable of handling multiple inputs and outputs and the sources of inefficiency can be analysed and quantified for every evaluated unit. The aim of study is to estimate and compare efficiency of the banking sector in India. The analysis is supposed to verify or reject the hypothesis whether the banking sector fulfills its intermediation function sufficiently to compete with the global players. The results are insightful to the financial policy planner as it identifies priority areas for different banks, which can improve the performance. This study evaluates the performance of Banking Sectors in India.

40 Mihir Dash and Christabel Charles (June10, 2009): A study of Technical Efficiency of Banks in India.(SSRV)
Paroma Sanyal and Rashmi Shankar (2008) investigated the effect of ownership and competition on bank productivity while controlling for size and structure of the bank. Indian private banks dominate the public and foreign banks, both in terms of productivity levels and productivity growth and that competition affects banks differently depending on ownership. Public banks productivity shows little growth over the post reform period, and the new Indian private banks seemed to have led the change in productivity enhancement. However, the results differ in the pre and post-1998 period. The latter period shows a much higher productivity gap between the Indian private banks, and public and foreign banks. This is due to the faster productivity growth of Indian private banks in the post-1998 period. New Indian private banks are hurt by competition, whereas foreign banks thrive under it in the post-1998 period.

Rasoul Rezvanian and et.al (2008) studied a nonparametric frontier approach to examine the effects of the ownership on the efficiency, efficiency change, technological progress and productivity growth of the Indian banking industry over the period 1998 to 2003. A host of best practice frontiers are constructed relative to which the performance of foreign-owned banks, private-owned banks and public-owned banks operating in India are assessed. The results indicate that foreign banks are significantly more efficient when compared to other banks, i.e. the privately-owned and publicly owned-banks. The findings also provide evidence to indicate that a large number of Indian banks operate below their optimal scale. Specifically, the Indian banking industry can be characterized by the existence of very few large, but inefficient publicly-owned banks along with many small size banks that would be able to improve their cost efficiency by expanding their scale of operations. Therefore, in order to assist the Indian banking system to function more efficiently and be more competitive in the global marketplace, the Indian policy makers should create policies to encourage private ownership of banks, facilitate the entry of foreign banks and promote mergers and acquisitions among Indian banks. Such policies will help Indian banks increase their scale of operations and improve their cost efficiency.

Elena Loukoianova (2008) analyzed the efficiency and profitability of Japanese banks from 2000-06. It uses a non-parametric approach, the data envelopment analysis (DEA) to analyze banks' cost and revenue efficiency. The results show that the performance of Japanese banks has steadily improved since 2001, but there are significant differences within the banking sector, with regional banks being less cost and revenue efficient relative to both City and Trust banks. While Japanese bank profitability is low compared to that in other advanced countries, there is considerable potential for efficiency gains, particularly through increased cost-sharing arrangements among regional banks, consolidation of regional banks with major or other regional banks, and the creation of bank consortia to pool resources for asset and risk management.

Rudrasensarma (2008) studied the effects of deregulation on the banking industry in an emerging economy using profit-based measures of performance. Using panel data of 83 Indian banks belonging to different ownership groups for the period 1986 to 2005, the study found that profit efficiency and productivity declined following deregulation. While public sector banks performed better than private banks in the pre-deregulation period, there was no difference in their performances after deregulation. Foreign and new private banks turned out to have the highest levels of profit productivity. The results are in contrast with the findings of previous studies that have found significant improvements in efficiency and productivity of Indian banks using cost-based measures of performance.

Sunil Kumar and Rachita Gulati (2008) Using data envelopment analysis (DEA), the study aims to measure the extent of technical, pure technical, and scale efficiencies in 27 public sector banks (PSBs) operating in India in the year 2004/05. The empirical findings reveal that PSBs operate at 88.5 percent level of overall technical efficiency i.e., inputs could be reduced by 11.5 percent without sacrificing output if all banks were efficient as 7 benchmark banks identified by DEA. Further, the contribution of scale in efficiency in overall technical inefficiency has been observed to be smaller than what been observed due to managerial inefficiency (i.e., pure technical inefficiency). The findings pertaining to returns-to-scale in Indian public sector banking industry highlight that the predominant form of scale inefficiency is decreasing returns-to-scale. The results

of logistic regression analysis provide that the exposure of the banks to off-balance sheet activities (i.e., non-traditional activities) has a strong and positive impact on the overall.

**Harish Kumar Singla (2008)** examined, “How financial management plays a crucial role in the growth of banking?” It is concerned with examining the profitability position of the selected sixteen banks (BANKEX-based) for a period of five years (2000-01 to 2006-2007). The study reveals that the profitability position was reasonable during the period of study when compared with the previous years. Return on Investment proved that the overall profitability, and the position of selected banks was sustained at a moderate rate. With respect to debt equity position, it was evident that the companies were maintaining 1:1 ratio, though at one point of time it was very high. Interest coverage ratio was continuously increasing, which indicated the company's ability to meet the interest obligations. Capital adequacy ratio was constant over a period of time. During the study period, it was observed that the return on net worth had a negative correlation with the debt equity ratio. Interest income to working funds also had a negative association with interest coverage ratio and the Non-Performing Assets (NPA) to net advances was negatively correlated with interest coverage ratio.

**KusumKetkar and SuhasKetkar (2008)** examined the long run impact of reforms and liberalization on individual banks’ efficiency and profitability. using Data Envelopment Analysis and bank-specific data from 1997 to 2004. The results show that the relative efficiency of banks by ownership does not critically depend upon whether deposits are treated as an input (intermediation approach) or output (production approach, foreign banks to be the most efficient followed by new private banks. While the efficiency scores of all banks have increased over the reform period, the nationalized banks have registered the strongest gains. This reflects the infusion of new capital and the increase in competition that these banks have experienced in recent years. Turning to banks’ profitability, efficiency scores and net interest spreads impact it positively while non-performing assets and priority sector lending have the opposite impact. Liberalization and deregulation of banks have raised efficiency scores overtime of all banks in India regardless of their ownership. These gains in efficiency have also improved bank profitability.

---

Niranjan Chipalkatti and Meenaksi Rishi (2007)\(^{49}\) evaluates the performance of Indian banks by examining quantitative data on bank profitability and risk subsequent to the market-oriented reforms in 1991. A bank transparency indicator is also constructed to appraise the performance of Indian banks with respect to the quality of their disclosures. The assessment indicates deteriorating profitability, heightened risk exposure and inadequate transparency of accounting disclosures. The study underscores an urgent need for an improvement in the risk management skills of Indian banks and their supervisors. Such practices may necessitate more rather than less governance in areas of corrective action, financial transparency, and risk management.

Rashmi Shankar and Paroma Sanyal (2007)\(^{50}\) examined the impact of ownership, competition and productivity on profitability and spreads in India’s commercial bank sector following the 1991 reforms. The results show that private sector banks show significant gains relative to public sector banks in terms of profitability and foreign banks outperform Indian private sector banks. Profitable banks are more likely to have a diverse range of output, to be operationally efficient, and to have high spreads. Productivity has increased across all bank categories, but its impact is relatively small in magnitude when compared to the output expansion variables. This leads to conclude that banks in India have resorted to output expansion rather than efficiency enhancement as a strategy to boost profits. Profitability of public sector banks has improved in response to greater competition. In addition, when competition is taken into account, private banks have lower spread than public banks and there is no difference between old and new private banks. Also, all categories of domestic banks have lower spreads than their foreign counterparts. Last, productivity lowers spreads, although the magnitude is relatively small.

Mahesh (2006)\(^{51}\) attempted to examine the efficiency level of Indian banks for the period 1985-2004. By employing the technique of stochastic frontier analysis to estimate bank specific cost, profit and advance efficiencies. The study analyzed that deregulation has significant impact on all three types of efficiency measures. Public sector banks ranks first in two of the three


\(^{51}\)Mahesh (2006), Liberalisation and Efficiency of Indian Commercial Banks: A stochastic frontier Analysis; Institute for Social and Economic change.
efficiency measures showing that as opposed to the general perception, these banks do not lag behind their private counterparts.

Abhiman Das and Saibal Ghosh (2006)\textsuperscript{52} investigated the performance of Indian commercial banking sector during the post reform period 1992–2002. Several efficiency estimates of individual banks are evaluated using nonparametric Data Envelopment Analysis (DEA). Three different approaches viz., intermediation approach, value-added approach and operating approach have been employed to differentiate how efficiency scores vary with changes in inputs and outputs. The analysis links the variation in calculated efficiencies to a set of variables, i.e., bank size, ownership, capital adequacy ratio, non-performing loans and management quality. The findings suggest that medium-sized public sector banks performed reasonably well and are more likely to operate at higher levels of technical efficiency. A close relationship is observed between efficiency and soundness as determined by bank’s capital adequacy ratio. The empirical results also show that technically more efficient banks are those that have, on an average, less non-performing loans. A multivariate analysis based on the Tobit model reinforces these findings.

Tianshuzhao and et.al (2006)\textsuperscript{53} examined the impact of regulatory reform on the performance of Indian commercial banks. Using a balanced panel data set covering from the beginning of the deregulation period (1992) to the most recent years (2004) and employing a DEA-based Malmquist index of total factor productivity change, the paper attempted to quantify the magnitude of total factor productivity change and identify its main sources. The study also explored whether deregulation has had a different impact on the performance of public, private and foreign banks and whether it affected the risk-taking behavior of market participants. The empirical results seem to indicate that, after an initial adjustment phase, the Indian banking industry experienced sustained productivity growth, driven mainly by technological progress. Banks’ ownership structure seems to have an impact on bank efficiency but does not appear to have an influence on total factor productivity change. Although ownership per se does not seem to matter as much as increased competition, during the deregulation process foreign banks appear to have acted as technological innovators, thereby increasing even further the competitive pressure in the


Indian banking market. Finally, the results also indicate an increase in risk-taking behavior along with the whole deregulation process.

Panayiotis Athanasoglou et.al (2006)\(^{54}\) examined the profitability behavior of bank-specific, industry-related and macroeconomic determinants, using an unbalanced panel dataset of South Eastern European (SEE) credit institutions over the period 1998-2002. The estimation results indicate that, with the exception of liquidity, all bank-specific determinants significantly affect bank profitability in the anticipated way. A key result is that the effect of concentration is positive, which provides evidence in support of the structure-conduct-performance hypothesis, even though some ambiguity arises given its interrelationship with the efficient-structure hypothesis. In contrast, a positive relationship between banking reform and profitability was not identified, whilst the picture regarding the macroeconomic determinants is mixed. The paper concludes with some remarks on the practicality and implementability of the findings.

Ram Pratap Sinha (2006)\(^{55}\) analyzed comparative assessment of public and private sector bank intermediation cost efficiency during the reform period, taking spread or net interest margin as the output indicator. The years covered in the study are 1996-97, 1998-99, 2000-01 and 2002-03. The study concentrates on 20 public and 10 Indian private sector banks. The paper makes use of two non-parametric methods: the Free Disposal Hull (FDH) approach and the Data Envelopment approach for construction of the cost frontier for measurement of efficiency. In the FDH approach, the author takes segments of the cost frontier as the benchmark. In the DEA approach, it takes a linear version of the entire frontier as the benchmark. As per the FDH results, the observed public sector commercial banks exhibit higher mean efficiency scores (when the year-wise figures are averaged) than the observed private sector banks. In terms of DEA, however, the observed private sector commercial banks have higher mean cost and higher technical and cost efficiencies than the observed public sector commercial banks. The author conducts a test of significance to examine if the mean cost efficiencies of the two bank groups are significantly different across bank groups. The results are positive for both FDH and DEA.

\(^{54}\) Panayiotis Athanasoglou, Manthos Delis and Christos Staikouras (2006): Determinants of Bank Profitability in the South Eastern European Region – MPRA paper university Library of Munich, Germany


Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.
Santi Gopal Maji and Soma Dev (2006)\textsuperscript{56} empirically investigates the productivity and profitability of five large Indian public sector banks and five large Indian private sector banks during the period 1996-97 to 2003-04. The process of globalization and liberalization has strongly influenced the Indian banking sector. The ongoing reforms in the banking sector, with their thrust on transparency, efficiency and profitability, have forced the Indian banking sector to adopt suitable strategies with focus on productivity, profitability, competitiveness, and sustainability.

Varadi Vijay Kumar and et.al (2006)\textsuperscript{57} estimated the efficiency of commercial banks operating in India for the period 1999-2000 to 2002-2003 with four indicators i.e., productivity, profitability, financial management and asset quality using DEA methodology. From the analysis it is clear that public sector banks are having high efficiency in terms of productivity, profitability, financial management and asset quality, whereas the private banks are having a very high inefficiency levels during the sample period in the different indicators but foreign banks are seems to more efficient than the private banks.

Sathya Swaroop (2006)\textsuperscript{58} attempted to measure the relative performance of Indian banks over the period 1997–2004 using the output-oriented CRR DEA model. The analysis used nine input variables and seven output variables. Segmentation of the banking sector in India was done on bank assets size, ownership status and years of operation. Overall, the analysis supports the conclusion that foreign owned banks were on average most efficient and that new banks are more efficient that old ones, which are often burdened with old debts. In terms of size, the smaller banks are globally efficient, but large banks are locally efficient. Moreover, the study finds evidence of concentration of efficiency parameters among peer bank groups.


\textsuperscript{57}Varadi Vijay Kumar, Mavaluri Pradeep, Boppana Nagarjuna (Aug-2006): Measurement of Efficiency of Banks in India – Menrich personal REPEC Archive University of Hyderabad.

Abhiman Das and et.al (2005) estimated and analyzed various efficiency scores of Indian banks during 1997-2003 using Data Envelopment Analysis (DEA). In spite of gradual liberalization aimed at strengthening the operational efficiency of the financial system in the 1990’s, it is observed that Indian banks are still not much differentiated in terms of input or output oriented technical efficiency and cost efficiency. However, they differ sharply in respect of revenue and profit efficiencies. Bank size, ownership and being listed on the stock exchange are some of the factors that have a positive impact on average profit efficiency and to some extent, revenue efficiency scores. Finally, the median efficiency scores of Indian banks, in general and of bigger banks in particular, have improved during the post-reform period.

Umakrishnan and Arindam Bandyopadhyay (2005) investigates the relationship between the changing patterns of bank’s source of income and risk adjusted performance. A database of 77 banks over the period of 1999 to 2004 is constructed for the 27 public sector banks, 22 private banks, 25 foreign banks and 3 cooperative banks to compare their change in income composition. Bank’s performance is measured by risk adjusted return on BIS risk allocated capital (RARORAC). To examine the relationship between ownership pattern and performance, the study compared the difference between new generation private sector banks and foreign banks with their public sector and cooperative banks counterparts. In a competitive financial market in order to change the profitability drivers in banking, Indian banks need to improve their non-interest income and also augment risk adjusted interest income through better risk based pricing.

Milind Sathye (2005) examined the effect of bank privatization on bank performance and efficiency for the period 1998-2002. Statistical analysis was performed using the difference of mean test for three groups of banks – partially privatized, full state owned and those in private sector. The results revealed that partially private banks have continued to improved performance and efficiency. The mixed state private firms often do worse than fully state owned.


Panayiotis Athanasoglou et al. (2005) examined the effect of bank-specific, industry-specific and macroeconomic determinants of bank profitability, using an empirical framework that incorporates the traditional Structure-Conduct-Performance (SCP) hypothesis. To account for profit persistence, the study applied a GMM technique to a panel of Greek banks that covers the period 1985-2001. The estimation results show that profitability persists to a moderate extent, indicating that departures from perfectly competitive market structures may not be that large. All bank-specific determinants, with the exception of size, affect bank profitability significantly in the anticipated way. However, no evidence is found in support of the SCP hypothesis. Finally, the business cycle has a positive, albeit asymmetric effect on bank profitability, being significant only in the upper phase of the cycle.

Ram Mohan and Subhash Ray (2004) attempted a comparison of performance among three categories of banks - public, private and foreign - using physical quantities of inputs and outputs, and comparing the revenue maximization efficiency of banks during 1992-2000. The findings show that PSBs performed significantly better than private sector banks but no differently from foreign banks. The conclusion points to a convergence in performance between public and private sector banks in the post-reform era, using financial measures of performance.

Shanmugam and Abiman Das (2004) analyzed banking efficiency by measuring technical efficiency of banks in four different ownership groups in India during the reform period, 1992–1999. It employs the stochastic frontier function methodology for panel data. The results indicate that the efficiency of raising interest margin is time invariant while the efficiencies of raising other outputs-non-interest income, investments and credits are time varying. The state bank group and foreign banks are more efficient than their counterparts. The reform period witnessed a relatively high efficiency for augmenting investments, which is consistent with economic growth objective of the reform measures. However, there are still larger gaps between the actual and potential performances of banks.

---


Don Galagedera and Piyadasa Edirisuriya (2004) investigated performance of Indian commercial banks using data envelopment analysis (DEA) and productivity growth using Malmquist index in a sample of Indian commercial banks over the period 1995-2002. Using total deposits and operating expenses as input and loans and other earning assets as output in the DEA analysis the study observed no significant growth in productivity during the sampled period. The rate of increase in technical efficiency though small is likely to be due to scale efficiency compared to managerial efficiency. In general, smaller banks are less efficient and highly DEA-efficient banks have a high equity to assets and high return to average equity ratios. There has been no growth in productivity in private sector banks where as the public sector banks appears to demonstrate a modest positive change through 1995-2002. Technological change in the public sector banks reveals a growth while the private sector banks experienced a negative growth of almost the same magnitude.

Anugu Amarender Reddy (2004) examined the competitiveness of Indian commercial banks in the deregulated period 1996-2002. The data used for the study has been collected from annual reports of Reserve Bank of India. Data envelopment analysis and window analysis were used to find changes in pure technical efficiency, scale efficiency and the nature of returns to scale over the period among bank ownership groups namely State banks, nationalized banks, private and foreign banks. The main findings indicate increase in technical efficiency and scale efficiency of most of the banks in deregulated period. Bank profitability increased and interest margins decreased in the deregulation period. Most of the foreign banks exhibited most productive scale size, while most of the public sector banks working under decreasing returns to scale, as a result of wider branch network with a low level of technological upgrade in terms of networking (computerization) connection. The size of non-performing assets and share of non-approved investment in total investment turned out to be negatively influencing the overall efficiency of banks. Capital adequacy ratio had negative influence on scale efficiency while its influence on pure technical efficiency was positive. Number of branches had negative influence, while total assets have positive influence on pure technical efficiency and scale.


efficiency. Share of priority sector advances had positive influence, on scale efficiency, as priority sector lending needs widespread bank branches in rural India.

Ram Mohan and Subhash Ray (2004)\textsuperscript{67} attempted a comparison between PSBs and their private sector counterparts based on measures of productivity that use quantities of outputs and inputs. The study employed two measures of productivity: Tornquist and Malmquist total factor productivity growth. The study attempted these comparisons over the period 1992-2000, comparing PSBs with both domestic private and foreign banks. Out of a total of four comparisons, there are no differences in three cases, PSBs do better in two, and foreign banks in one. To put it differently, PSBs are seen to be at a disadvantage in only one out of six comparisons. It is difficult, therefore, to sustain the proposition that efficiency and productivity have been lower in public sector banks relative to their peers in the private sector.

PetyaKoeva (2003)\textsuperscript{68} examined new empirical evidence on the impact of financial liberalization on the performance of Indian commercial banks. The analysis focused on examining the behavior and determinants of bank intermediation costs and profitability during the liberalization period. The empirical results suggest that ownership type has a significant effect on some performance indicators and that the observed increase in competition during financial liberalization has been associated with lower intermediation costs and profitability of the Indian banks.

RuchiTrehan and NitiSoni (2003)\textsuperscript{69} attempted to analyze the operating efficiency and its relationship with profitability, in the public sector banking industry in India. The analysis of the relationship between the group status and technical efficiency shows that 1) the banks affiliated to the SBI group are more efficient than nationalized banks and 2) the difference in the efficiency levels of these two groups is statistically significant.

\textsuperscript{69}RuchiTrehan and NitiSoni (2003): Efficiency and Profitability in Indian Public Sector Banks; The IUP Journal of Bank Management 2003, Vol-II issue 4; pp 73-82.
Maggi and Rossi (2003) aimed at investigating the efficiency of European and United States commercial banks from 1995-98. By fitting three cost functions Fourier flexible form, translog form and Box-cox form, the study showed that the overall average cost curve was relatively flat which shows an evidence of scale efficiency gains.

Ram Mohan and Subbash (2003) attempted a comparison of public sector banks based on measure of efficiency. The study was related to 1999-2000 and it employed three measures- Tornquist total factor productivity growth, Malmquist efficiency and revenue maximization efficiency. The study found that in 1992-93 the estimated Tornquist total factor productivity growth was -8.16 in 1992 but it was 2.99 in 1991-2000. The estimated Malmquist total factor productivity was -5.14 in 1992-93 but it increased to 2.10 percent in 1999-2000. The revenue maximization efficiency declined from 0.74 in 1991-92 to 0.33 in 1999-2000.

Abhiman Das (2002) attempted to examine the capital, risk and productivity change in Indian public sector banks for the period 1995-96 to 2000-01. The results imply that inadequately capitalized banks have lower productivity and are subject to a higher degree of regulatory pressure than adequately capitalized ones. Finally, the results lend some credence to the belief that lowering government ownership tends to improve productivity.

Jackson and Fethe (2000) analyzed the technical efficiency of Turkish commercial banks by using Data Envelopment Analysis and Tobit model. The study tried to explain the variation in calculated efficiency to a set of explanatory variables – bank size, number of branches, ownership and capital adequacy ratio. It found that in 1998, larger and profitable banks were likely to operate at higher level of technical efficiency.

Avkiran (2000) in the study on “Technical efficiency of trading banks in the de-regulated period (1986-1995)” used Data Envelopment Analysis and found that there were declining average efficiency score until 1991, followed by a steady rise thereafter and it identified interest expenses as an important source of inefficiency. The study was related to four major trading banks and six

72 Abhiman Das (Feb 2, 2002): Risk and Productivity change of Public Sector Banks; Economic and Political Weekly.
73 Jackson and Fethe (2000): Evaluating the efficiency of Turkish Commercial Banks: An Application of DEA and Tobit Analysis. EPRU.
regional banks. It found that under constant returns to scale technical efficiency score declined from 0.97 in 1986 to 0.82 and it increased to 0.94 in 1995. The pure technical efficiency under variable returns to scale also decreased from 0.98 in 1986 to 0.84 in 1991, but it increased to 0.95 in 1995.

**Kraft and Tirtiroglu (1998)** used the stochastic cost frontier analysis and estimated both operating and scale efficiency for old versus new and state versus private banks in Croatia for 1994-95. The study showed that the old state owned banks were more scale efficient than the new ones, although the new banks were highly profitable.

**Sathye (1998)** attempted a study on “Efficiency of banks in a developing economy: The case of India”. The basic objective of the study was to measure and to explain the measured variation in the performance and productive efficiency of Indian commercial banks. The study was related to 27 public sector banks, 33 private banks and 34 foreign banks for the year 1997-98. The study applied non-parametric approach. The efficiency had been calculated using variable returns to scale input oriented model of the Data Envelopment Analysis methodology. The study formulated two Data Envelopment analysis models – Model A comprising interest and non-interest expenses as input and net interest income and non-interest income as outputs; Model B considered deposits and number of employee as inputs and net loans and non interest income as outputs. The study found that mean efficiency score of public sector banks was 0.89 as per Model A and 0.60 as per Model B. Among the public sector banks as per Model A – State bank of India, Bank of Baroda, Canara Bank, Oriental Bank of Commerce have efficiency rating of 100 percent, While Indian bank had the lowest efficiency score of 67.4 percent. As per Model B - State Bank of India, Bank of Baroda, Bank of India was on the efficiency frontier. However United Commercial Bank had the lowest efficiency score of 28 percent. The study recommended that to improve the efficiency of banks there is a need for bringing down non-performing assets, curtailing the establishment expenditure through voluntary retirement scheme for bank staffs and rationalization of rural banks.

**Hughes et al. (1998)** measured the efficiency of capital allocation in commercial banking. It was found that banks efficiency was influenced by the level and allocation of capital and asset ratio and marginal increase in capitalization and asset quality boost the market value efficiency of banks.

---

76 Dr. Militon Sathye: Efficiency of Banks in a Developing Economy- The Case of India.
77 Hughes et al., William, Cloon and S. Pagam (1998) : Measuring the efficiency of capital allocation on commercial banking; ideas.repec.org
Berger and Mester (1997)\textsuperscript{78} tried to analyze the causes for differences in the efficiencies of financial institutions with specific reference to United States Banks for the period 1990-95. The basic objective of the study was to focus difference in measurement methods used and potential correlation of efficiency bank market and regulatory characteristics. It tried to measure cost, Standard profit and alternative profit efficiency by using stochastic frontier approach and the distribution free approach. As per the study, the variable input prices include the interest rate on purchased fund and core deposits as the price of labour. The variable output $Y$ include consumer loans, business loans and securities. The mean cost efficiency was estimated as 0.868. The average adjusted $R^2$ of the cost, standard profit and alternative profits function across the six years was 0.93, 0.61 and 0.33 respectively. Banks with gross total assets below $50$ million had been measured standard and alternative profit efficiency of 0.068 and 0.020 respectively whereas the corresponding efficiency for banks with over $10$ billion assets was 0.768 and 0.783. The mean scale efficiency were operating below efficient scale and scale economies were exhausted well below $10$ billion in assets.

Avkiran (1997)\textsuperscript{79} tried to measure the relative efficiency of Australian trading bank from 1986-1995. They found that efficiency increased in the post deregulation period and acquiring banks were efficient than target banks.

Ajit and Bangar (1997)\textsuperscript{80} analyzed the performance of Indian public sector banks in financial intermediation. The study revealed that between 1970-1996, the share of public sector banks in total deposits increased from 84.7 percent to 85.4 percent, while the share in credit declined from 84.6 percent to 82.2 percent. In terms of branches, public sector banks accounted for nearly 80 percent in 1969 and this proportion declined to 70 percent by 1996. As per the study, in terms of operational efficiency the performance of the public sector banks was unsatisfactory. The study noted that in 1995-96 net non performing assets as a proportion of net advances was highest for Allahabad Bank (16.12 percent), while the lowest was for the Corporation Bank (2.30 percent).

Sathyanarayana (1996)\textsuperscript{81}, in his study on “What are the public sector banks in India – need for strategic thrust?”, found improvement in performance of Indian public sector banks in the post reform period. In 1994-95 the public sector banks have registered the net profit of Rs.116 crores as


\textsuperscript{80} Ajit and Bangar (June-Sep 1997): “Banks in Financial intermediation, RBI Occasional papers.

\textsuperscript{81} Sathyanarayana (1996): “What are the public sector banks in India – need for strategic thrust”. The journal of Indian Institute of Bankers, Jan-March 68:04
compared to the net loss of Rs.3,369 crores in 1992-93. Non-performing advances as a proportion of total loans came down from 23 percent in 1992-93 to around 16 percent in 1995-96.

Ravi (1996)\textsuperscript{82} analyzed the performance of Indian public sector banks in post reform period. The study found that in 1995 the highest net profit was earned by Canara Bank with Rs.204.10 crores while Bank of Maharashtra, Andhra Bank, United Commercial Bank, Central Bank of India, Syndicate Bank, Union Bank of India, Indian Bank have registered a negative profit. The study noted that customer focus, product diversification, emphasis on investment banking and non-fund based activities, derivative instruments etc., will provide a wide base for profitable banking operation in the future.

Tannenwald (1995)\textsuperscript{83} evaluated the operational efficiency of First Federal Reserve District banks based on data from 1985 to 1993. The study found substantial dispersion in X efficiency among First district banks with difference between the most and least efficiency managed banks widening over time, while difference between the most efficiently managed banks exhibiting an average degree of efficiency narrowed.

Mester (1993)\textsuperscript{84} tried to estimate scale efficiency and scope efficiency of banks in Third Federal Reserve District. The study employed the Translog cost function for 1991-92 data, from consolidated reports of conditional income. For the sample of 214 banks, the study considered three outputs real estate loans, commercial industrial loans and loans to individuals and the inputs included labour, physical capital and borrowed money. The study found that average X-efficiency of banks in the Third District was on the order of 6 percent to 9 percent i.e., given its particular output level and mix if the average bank were to use its inputs as efficiently as possible it could reduce its production cost by roughly 6 to 9 percent.

Varde (1991)\textsuperscript{85} analyzed the performance of public sector banks from 1985-90 with the basic objective of highlighting important trends in performance of public sector banks. As per the study, between 1985-1990, the deposits and advances of public sector banks have increased with average growth rate of 17.30 percent and 24.86 percent respectively. To improve the performance of public sector banks the study recommended that there is a need to control overhead cost by adopting a policy of consolidation rather than expansion.

\textsuperscript{84}Mester (1993): Efficiency of Banks in the Third Federal Reserve District; idea.repc.org
Vivekkumar and et.al\textsuperscript{86} compared the technical efficiency of Indian banks operating abroad and foreign banks operating in India for the period 2006-07 to 2008-09. The result revealed that Indian banks operating abroad are more efficient than the foreign banks operating in India and banks operating in developed countries are found to be more efficient than the banks operating in developed countries. The effect of openness of the country as well as ownership pattern of the Indian banks operating outside India has no significant effect on their technical efficiency.

Deepak Tandon\textsuperscript{87} analyzed technical efficiency of Public Sector Banks operating in India applying Data Envelopment Analysis (DEA) Model. The performance of Banks is assessed in DEA using the concept of efficiency or productivity, which is the ratio of total outputs to total inputs. The study explained the performance variance and relative efficiencies of 19 (nineteen) public sector banks excluding State Bank Group operating in India during 2003 to 2008 financial years.

Milind Sathye\textsuperscript{88} measured the productive efficiency of banks in India. The measurement of efficiency is done using Data Envelopment Analysis (DEA). Two models have been constructed to show how efficiency scores vary with change in inputs and outputs. The efficiency scores, for three groups of banks, that is, publicly owned, privately owned and foreign owned, are measured. The study shows that the mean efficiency score of Indian banks compares well with the world mean efficiency score and the efficiency of private sector commercial banks as a group is, paradoxically lower than that of public sector banks and foreign banks in India. The study recommends that the existing policy of reducing non-performing assets and rationalization of staff and branches may be continued to obtain efficiency gains and make the Indian banks internationally competitive which is a declared objective of the Government of India.

Manish Mittal and Aruna Dhade\textsuperscript{89} made a comparative study on Profitability and productivity in Indian Banks. A five years period (1999-00 to 2003-04) has been selected for evaluating the performance. In their study they found that the improved profitability is the only key parameter for evaluating performance from the shareholders point of view. Now it is up to the bank management.

\textsuperscript{86}Vivek Kumar, Vishal Maurya and Sujeesh Kumar S., RBI Research Paper; Occasional Paper. www.vbi.org.in
\textsuperscript{87}Deepak Tandon: Performance Vavianles and Efficiency Parameters of the Indian Public Sector Banks- A Suggestive DEA Model. IILM Gurgaon.
\textsuperscript{89}Manish Mittal and Aruna Dhade (May-2007): A Comparative Study of Various banks on their profitability and productivity. AIMS International. Vol.1 No.2
to decide how to strike a trade-off between social and commercial banking in order to improve market holdings and services and play the role of government agent at the same time. In the study the public sector banks are less profitable than the private sector and foreign banks in terms of overall profitability (Spread ± Burden ratio) but profitability is improving over the last 5 years. Foreign banks top the list in terms of the net profitability. Non-interest income of private sector banks is higher as compared to public sector banks because private sector banks are offering more and more fees based services to their different customer categories (like commission, exchange brokerage etc). There is a pressing need for introducing more services to the customer by the public sector banks to have an advantage of competitive over private and foreign banks.