Chapter 1

Deregulation and Overall Efficiency of Commercial Banks in India:

A Review of Relevant Literature

This chapter primarily aims at reviewing some relevant literature pertaining to the estimation analysis of efficiency and TFP growth of commercial banks in the context of developed and developing countries including India which has evolved during 1990s and onwards. It is essential to develop a conceptual framework for the present study.

Gradowski (1994)\(^1\) derived several efficiency measures based on experience of US banks and found that deregulation has the biggest impact on efficiency of weak banks by forcing them to change the asset-liability composition to a sustainable standard.

Mester (1996)\(^2\) argued that estimates of bank cost efficiency can be biased if bank heterogeneity is ignored. He compared X-inefficiency derived from a model constraining the cost frontier to be the same for all banks in the U.S. and a model allowing for different frontiers and error terms across Federal Reserve Districts. He found that the data reject the single cost function model; X-inefficiency measures based on the single cost function model are, on average, higher than those based on the separate cost functions model; the distributions of the one-sided error terms are wider for the single cost function model than for the separate cost functions model; and the ranking of Districts by the level of X-inefficiency differs in the two models. The results suggested it is important when studying X-inefficiency to account for differences across the markets in which banks are operating and that since X-inefficiency is, by construction, a residual, it will be particularly sensitive to omissions in the basic model.
Naulas and Ketkar (1996)³ analysed the scale and technical efficiency of Indian PSBs using DEA. They utilized the cross sectional data of 18 PSBs for the year 1993. They found that the overall technical inefficiency is 3.75 percent of which only 1.5 percent is on account of technical efficiency and 2.5 due to scale inefficiency. Also, majority of the PSBs are found to be operating under increasing returns to scale.

Soteriou and Zenios (1997)⁴ developed a general framework for combining strategic benchmarking with efficiency benchmarking of the services offered by bank branches. In particular, the service-profit chain is cast as a cascade of efficiency benchmarking models. Three models—based on DEA—were developed in order to implement the framework in the practical setting of a bank’s branches: an operational efficiency mode, a quality efficiency model and a profitability efficiency model. To illustrate these models they used data for the branches of a commercial Bank. Empirical results indicated that superior insights could be obtained by analyzing operations, service quality, and profitability simultaneously than the information obtained from benchmarking studies of these three dimensions separately. They also investigated some relations between operational efficiency and profitability, and between operational efficiency and service quality.

Sarkar and Das (1997)⁵ compared the performance of Indian commercial banks for the years 1994-95 by using the measures of profitability, productivity and financial management. They found PSBs being compared poorly with the foreign and private banks. However, they caution that no firm inference can be derived from comparison done for single year.

Bhattacharya, Arunava, Lovell and Pankaj (1997)⁶ studied the impact of the limited liberalizations initiated before the deregulation of the nineties on the performance of the different categories of banks using DEA. Their study covered 70 banks in the period 1986-91. They constructed one grand frontier for the entire period and measured technical efficiency of the banks under
They found PSBs had the highest efficiency among three categories with the foreign banks and private banks having much lower efficiencies. However, PSBs started showing a decline in efficiency after 1987, private banks showed no change and foreign banks showed a sharp rise in efficiency.

In a study of US commercial banks Berger and Deyoung (1997)\textsuperscript{7} found that increase in non performing loans tended to a followed by decrease in estimated cost efficiency. A possible explanation for this relationship is that non-performing loans are more costly for banks to service than other loans.

Chen (1998)\textsuperscript{8} used DEA approach to create a benchmark measure for the relative operating efficiency of the publicly operated banks and their private counterparts in efficiency of the publicly operated banks and their private counterparts in Taiwan. The estimated results show that there are significant differences in efficiency between publicly owned banks and privately owned banks and the efficiency gains from privatization may be substantial.

Gilbert and Wilson (1998)\textsuperscript{9} used Malmquist indices of productivity change to investigate the effects of privatisation and deregulation on the productivity of Korean banks over the period of privatisation and deregulation starting from 1980. The derived indices were further decomposed into changes in technology and efficiency. They found that the Korean banks respond positively to privatisation and deregulation by substantially altering their mix of inputs and outputs, yielding large change in productivity.

Sarkar and Das (1998)\textsuperscript{10} explored the efficiency of the Indian Banking Sector with regard to productivity, profitability and financial management for the year 1994-95 of 73 scheduled commercial banks by using Principal Component Analysis. They found that there is a wide variation in efficiency performance among banks with different ownership pattern. The performances of PSBs were relatively poor compared to other categories of banks which might be due to their typical organizational culture, technological development, employment pattern and managerial skills, etc. The group-wise performance

\textsuperscript{7} Berger and Deyoung (1997)

\textsuperscript{8} Chen (1998)

\textsuperscript{9} Gilbert and Wilson (1998)

\textsuperscript{10} Sarkar and Das (1998)
indicated that excepting a few, not much variation could be found in terms of overall efficiency indices of the PSBs, whereas there was a wide variation in performance within the foreign banks. They noted that apart from internal factors, the performance of PSBs was influenced by several external factors such as the policy conditions relating to the allocation of credit to certain priority sectors and their entrenchment into the rural areas.

**Pal Manabendranath, Mukherjee Avinadan and Nath Prithwiraj (1999)** examined the operational efficiency of 68 major Indian commercial banks for the year 1999. They used output oriented (CCR) DEA model to find the efficiency of the banks. Following the traditional approach, initially, the ranks among the efficient banks (efficient DMUs) had been determined in two ways (a) Computing the number of times an efficient bank appears in the facets of all banks including its own, and (b) by summing among all facets, the optimal values of “i” corresponding to each efficient bank. In order to overcome some of the shortcomings of simple efficiencies obtained through self-appraisal in the traditional approach, a more democratic concept of cross-efficiency evaluated with the process of peer-appraisal had been brought in to rank the banks.

**Barr, Killgo, Siems and Zimmel (1999)** used a constrained multiplier, input-oriented, DEA model to evaluate the productive efficiency and performance of U.S. commercial banks from 1984 to 1998. They found strong and consistent relationships between efficiency, and inputs and outputs, as well as independent measures of bank performance. Further, their results suggested that the impact of varying economic conditions was mediated to some extent by the relative efficiencies of the banks that operate in these conditions. Finally, they found a close relationship exists between efficiency and soundness as determined by bank examiner ratings.

**Das (1999)** has attempted to estimate and compare various efficiency measures of PSBs for the year 1998. By applying DEA, he examined the issues
how for a bank can increase its output by augmenting its efficiency though optimal deployment of resources. He observed that PSBs has the scope of producing 1.23 times more output by using the same amount of inputs. This inefficiency was due to underutilization of resources and incorrect choice of input combination in terms of their prevailing prices. It is evident that deterioration in credit quality has negative relationship with efficiency estimates.

Saha and Ravishankar (2000)\textsuperscript{14} rated 25 PSBs using DEA for the period 1991-92 to 1994-95. It has been observed that barring few exceptions, the PSBs have in general improved their efficiency over the period. United Bank of India, UCO bank, Syndicate bank and Central Bank of India are found to be a lower end of the relative efficiency scale. Also Corporation bank, Oriental Bank of Commerce, State Bank of India, Canara Bank, State Bank of Hyderabad, Bank of Baroda and Dena Bank are found to be consistently efficient banks.

Ali and Gstach (2000)\textsuperscript{15} summarised that the operating environment for banking in Austria changed substantially during 1990-1997 due to gradual adjustment towards adherence to European banking standards, which became a legal requirement on Austria's entry, in 1995, into the European Union. They investigated the relative performance of Austrian banks during this period and thereby test the hypothesis of increased competition. They found that Aktiengesellschaften had consistent productivity improvement over the period, Sparkassen, and Volksbanken exhibited a turnaround in productivity in 1997, and Raiffeisenbanken experienced consistent productivity decline. Overall, Austrian banks experienced a decline in average efficiency and productivity until 1996 with slight improvements in 1997. The study revealed evidence of product diversification rather than increased price competition; a decrease in the spread of prices paid for inputs indicates increased competitiveness over the
period, which can be attributed to deregulation brought about by EU-membership.

**Somnez, Laws and Thompson (2000)**\(^{16}\) examined the efficiency of a sample of 16 large and medium-scale Turkish commercial banks over the period 1990 to 1997. Efficiency is measured through the Efficient Frontier Approach and in particular through DEA. Within this approach they made the assumption of constant returns to scale and efficiency was measured proportionately to the benchmark provided by efficient firms. The analysis suggested that as a whole the Turkish banking sector was efficient and that small-scale banks obtain higher efficient rankings than large-scale banks. These results should, however, be interpreted with caution given i) the small size of the sample and ii) the fact that efficiency was measured relative to a benchmark composed of Turkish banks – it was feasible that the Turkish benchmark banks were inefficient when measured against an international benchmark.

**Bhide, Prasad and Ghosh (2001)**\(^{17}\) examined the process of banking sector reforms in India. They noted the beneficial impact on the financial system consequent upon the reforms and highlighted the current weaknesses in the banking system. Against this background, they identified the emerging challenges and discussed ways in which these challenges could be tackled. In order to evaluate the efficacy of the prudential norms, they conducted a stress test of credit risk. Their analysis revealed that, depending on the percentage of loans that graduate into non-performance and the provisioning made, the immediate hit was a loss of interest income between Rs.21-55 billion. The maximum level of additional provisioning that can support the present capital adequacy ratio was determined.

**Mahadevan, Renuka and Kim Sangoo (2001)**\(^{18}\) investigated the influence of financial deregulation on technical efficiency and productivity growth of Korean banks. They adopted intermediation approach and used DEA as empirical technique to analyse the performance of 5 nationwide and 10
regional Korean banks during 1986-96 using balanced panel data. They found that financial deregulation did not improve the efficiency and productivity growth of nationwide and regional banks in Korea.

Ray and Ping (2001)\(^9\) used DEA to examine changes in levels of technical efficiency over time in China’s state-owned enterprises (SOEs) during 1980-1989. They added to the growing body of literature in this area by obtaining measures of technical efficiency of individual SOEs over years and by identifying how different aspects of the reforms have affected efficiency. They estimated a Tobit regression model, using the technical efficiency score as the dependent variable and a set of reform variables and firm attributes as repressors. They found that specific aspects of the reforms were very effective in improving technical efficiency.

Das (2002)\(^{10}\) tried to explore the interrelationships among capital, non-performing loans and productivity in Indian PSBs for the period 1995-96 through 2000-2001, he found that capital, risk and productivity change to be intertwined, with each reinforcing and to a degree, complementing the other. The results imply that inadequately capitalised 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.

Jemric and Vujcic (2002)\(^{21}\) analysed bank efficiency in Croatia between 1995-2000, using DEA. They found that foreign-owned banks were on an average most efficient, that the new banks are more efficient than an old one, and that smaller banks are globally efficient but large banks appears to be efficient when allowed for variable returns to scale. They also found that there has been strong equalization in terms of average efficiency in the Croatian banking market, both between and with in the peer groups of banks.

Sturm and Williams (2002)\(^{22}\) considered the efficiency of banking in Australia during the post-deregulation period 1988-2001. Since 1986
restrictions upon foreign bank entry and foreign ownership had been affectively abolished. Using DEA and Malmquist Indices, they found that the new foreign banks were more (input) efficient than domestic banks, mainly due to their superior scale efficiency. However, this superior efficiency did not necessarily result in superior profits. They argued that the major Australian banks had used size as a barrier to entry to the new entrants in the post-deregulation period. Furthermore, bank efficiency seems to have increased in post-deregulation and the competition resulting from diversity in bank types was important to prompt improvements in efficiency. Finally, the recession of the early 1990s resulted in a distinct shift in the process of efficiency changes.

Ram Mohan and Ray (2003) compared the performance of state-owned enterprises with those of private sector firms in respect of technical efficiency. The comparison was made in eight different sectors over the period 1991-92 to 1998-99. They measured technical efficiency using the method of DEA. Judged by the average levels of technical efficiency, no conclusive evidence of superior performance on the part of the private sector was found.

Bikram De (2003) used Panel Regression techniques to analyse the effects of ownership on bank performance in the context of an emerging economy, India. He found mixed results in this context by using sample of PSBs, old private sector banks and new private sector banks, ownership does not seem to have any effect on the Return on Assets but, PSBs do seem to have higher Net Interest Margin and Operating Cost Ratio. However, when the State Bank of India and it seven associates are dropped from the sample, he found that new private sector banks start showing a higher Return on Assets.

Jones, Williams, Thorat and Thorat (2004) argued that discussions on banking reforms to reduce financial exclusion have referred little to possible attitudinal constraints, on the part of staff at both branch and institutional levels, inhibiting the provision of financial services to the poor. For this purpose behavior and attitude of rural bank branch managers, including personal
background, professional background and workplace has been examined for the time period of May 2001 to April 2002 using both quantitative and qualitative analysis. They concluded that bank reforms to address human resource management, the work environment, intermediate bank management and organization, and the client interface are much more required than financial reforms.

**Taneja and Singh (2004)** argued that the efficiency of intermediating (financial Institutions) depends on the width, depth and diversity of the financial system. They measured the efficiency and financial performance of PSBs since commencement of the opting for the LPG program. For the purpose of analysis they studied the impact of banking sector reforms mainly on all PSBs except SBI and its Associate, by data envelopment analysis with intermediation approach. They concluded that the financial sector reforms has taken these banks in better position than pre-nineties as TFP growth in Indian PSBs was mainly driven by frontier effect i.e. Technological Efficiency Change.

**Bhaumik and Piesse (2004)** used bank-level data from India, for six years (1995-96 to 2000-01), and showed that while foreign banks had high credit-deposit ratios, the domestic banks experienced much greater improvements in technical efficiency in the context of credit. The most significant improvements in technical efficiency were registered by the domestic banks. They also found that there was weak evidence that foreign banks may be bullish only with respect to blue chip borrowers. Together with recent literature on the Indian banking system, these results emphasize the dominance of competition rather than changes in ownership-mix as a policy objective for banks in an emerging market economy.

**Ram Mohan and Ray (2004)** attempted a comparison between PSBs and their private sector counterparts based on measures of efficiency and productivity that use quantities of outputs and inputs. They employed three
measures: Tornquist total factor productivity growth, Malmquist efficiency and revenue maximisation efficiency for the period 1992-2000, comparing PSBs with both domestic private and foreign banks. Out of a total of six comparisons they have made, there are no differences in three cases, PSBs do better in two, and foreign banks in one. In other words, PSBs were 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 PSBs relative to their peers in the private sector.

Ram Mohan and Ray (2004) compared performance of 58 public, private sector and foreign banks using a revenue maximisation efficiency approach for the period 1992-2000. Loans, investments and other incomes were taken as bank outputs. They took the following inputs for their study—deposits and operating costs. They found that PSBs are significantly better placed than private sector banks on revenue maximisation efficiency but there is no difference between PSBs and foreign banks. They also found that PSBs are significantly better than private banks in respect of technical efficiency but not in respect of allocative efficiency.

Tompson (2004) examined the state of the Russian banking sector in 2004 and assesses the most important reform initiatives of the last two years, including deposit insurance legislation, a major reform of the framework for prudential supervision, steps to increase transparency in the sector, and measures to facilitate the development of specific banking activities. He concluded that the Russian authorities’ approach to banking reform is to be commended. The design of the reform strategy reflected an awareness of the need for a ‘good fit’ between its major elements, and the main lines of the reform address some of the principal problems of the sector. The major lacuna in the Russian bank reform strategy concerned the future of state-owned banks. Despite a long-standing official commitment to reducing the role of the state—
and of the Bank of Russia in particular – in the ownership of credit institutions, there is still a need for a much more clearly defined policy in this area.

Misra (2004) examined whether allocative efficiency of the Indian Banking system has improved after the introduction of financial sector reforms in the early 1990s. He studied allocative efficiency of twenty three States of India for two periods 1981-1992 and 1993-2001; broadly corresponding to the pre financial sector reforms and the post reforms periods, respectively. He carried analysis under panel co integration framework which reveals that overall allocative efficiency of the banking system has almost doubled in the post reform period. This suggests that reforms are successful in improving allocative efficiency of the banking system in India. He also estimated allocative efficiency at the State and sectoral level to get a deeper insight. The allocative efficiency of banks’ funds deployed in the services sector has improved in the agriculture and deteriorated in industry during the post reform period for the majority of the States. He found improvement in the overall allocative efficiency in the post reform period for the majority of the States. Further, the improved allocative efficiency was more marked for the services sector than for industry across the States.

Das, Ray and Nag (2005) used DEA to measure labor use efficiency of individual branches of a large public sector bank with several thousand branches across India for the period 1997-2003. They found considerable variation in the average levels of efficiency across the four metropolitan regions considered in this study. In this context, they introduced the concept of area or spatial efficiency for each region relative to the nation as a whole. Their findings suggest that the policies, procedures, and incentives handed down from the corporate level cannot fully neutralize the influence of the local work culture in the different regions. Most of the potential reduction in labor cost appears to be coming from possible downsizing the clerical and subordinate
staff. Their analysis identified branches that operate at very low levels of efficiency and may be gainfully merged with other branches wherever possible.

Nath, Pal and Mukherjee (2005) studied efficiency of 68 commercial banks operating in India for the period 1996-1999 using the output oriented Charnes, Cooper and Rhoades (1978) DEA model. They have taken the following as outputs of the banking industry (i) deposits, (ii) net profits, (iii) advances given by the banks, (iv) non-interest income and (v) interest spread which is the difference between the interest earned by the bank and the interest paid by it. The five input parameters taken are: (i) net worth of the banks, (ii) borrowings of the banks, (iii) operating expenses which are the non-interest related expenses like sum of establishment expenses; rent, taxes, and electricity; printing and stationery; advertising; depreciation; director's fees; auditor's fees; law charges; post, telegram, and telephone expenses; repair and maintenance; insurance and miscellaneous other expenses, (iv) number of employees in the country and (v) number of bank branches in the country. The results obtained from the study show that the private commercial banks have the highest efficiency figures and the least variation whereas the foreign owned banks exhibits the least average efficiency figure and maximum variation. The public sector commercial banks come in between.

Chatterjee and Sinha (2006a) estimated efficiency of Indian commercial banks using the data envelopment and free disposal hull approaches respectively. They have taken net interest income, non-interest income and loan as the output indicators. Number of bank branches and borrowed capital were taken as two inputs. The results were for 1996-97, 1998-99, 2000-01 and 2002-03 respectively. The results suggest an improvement in performance if net interest income or non-interest income are taken as the output indicator but a decline in performance if loan is taken as the output indicator.

Chatterjee and Sinha (2006b) estimated efficiency of Indian commercial banks using the DEA under variable returns to scale. They have
taken non-interest income and loan as the output indicators. Number of bank branches and borrowed capital were taken as two inputs. The results were for 1996-97, 1998-99, 2000-01 and 2002-03 respectively. The results suggest that comparative performance depends on the output indicator chosen.

Chatterjee and Sinha (2006c) estimated input oriented technical and scale efficiency of Indian commercial banks using the DEA under constant and variable returns to scale taking net interest income, non-interest income and loan as the output indicators. Number of bank branches and borrowed capital were taken as two inputs. The results were for 1996-97, 1998-99, 2000-01 and 2002-03 respectively. As per the study, the observed PSBs exhibited lower mean technical efficiency as compared to the observed private sector commercial banks irrespective of the output indicator chosen. Further, almost all the observed banks exhibit decreasing returns to scale. The mean scale efficiency scores of the observed public and private sector banks have, nonetheless, improved.

Sinha (2006a; 2006b) estimated efficiency of Indian commercial banks (under constant returns to scale) using the DEA taking loan and net interest margin as the output indicators. Number of bank branches and borrowed capital were taken as two inputs. The results were for 1996-97, 1998-99, 2000-01 and 2002-03 respectively. The results suggest superior performance by the observed private sector commercial banks as compared to the observed public sector commercial banks.

A A Reddy (2006) examined total factor productivity scale and technical efficiency changes in regional rural banks by using DEA and Malmquist index of 192 banks for the period 1996 to 2002. He found that the technical efficiency of rural banks is higher in service provision than in the parent PSBs. The efficiency of rural banks is higher in economically and socially developed regions as well as in low banking density regions. Rural banks show significant economies of scale in terms of assets and number of
branches under each bank. Total factor productivity growth of rural banks was higher in profitability than service provision during the liberalisation period. Banks located in economically developed as well as low banking density regions exhibited significantly higher productivity growth. Overall there was a convergence of efficiency of rural banks during the study period. There is no influence of parent PSBs on the efficiency and productivity growth of rural banks. The decomposition of productivity into technical change growth and technical progress indicates that technical efficiency change contributed more to productivity growth than technical progress in both rural and parent PSBs, however, comparatively contribution of technical progress is higher for rural banks than parent PSBs.

Chaterjee and Sinha (2007)\textsuperscript{38} examined the efficiency of thirty Indian commercial banks and found that mean cost efficiency of the observed commercial banks declined in 2002-03 significantly i.e. banks have diverged from the best practice frontier. Further, the observed private sector commercial banks exhibited higher mean cost efficiency than the observed PSBs. The PSBs lagged behind the private commercial banks both in respect of technical efficiency and allocative efficiency.

From the above analysis, it is amply clear that no definite conclusion can be drawn with respect to the impact of deregulation on efficiency and total factor productivity growth of Indian commercial banks. Hence, this necessitates re-examining the estimation of levels of efficiency and its components and total factor productivity growth and its decomposition with respect to Indian commercial banks as a whole as well as classified by ownership after deregulation. This becomes more important in the context of significant changes in the banking landscape and environment in response to the emerging financial and banking scenario of openness, economic liberalisation, and globalisation and promotion of “greater economic efficiency”. The present study is a humble addition to the growing body of literature in this area.
References


