X-efficiency Analysis of Commercial Banks in Pakistan: A Preliminary Investigation

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1. INTRODUCTION

The emergence of a fast-paced dynamic environment in the business world in general, and in the financial services sector in particular, has highlighted the significance of competition and efficiency. The need for deregulation has become a touchstone of success in fostering both competition and efficiency especially in the economies, which are exposed to structural reforms. In addition to that, intense competition both among domestic and foreign banks, rapid speed of innovations and introduction of new financial instruments, changing consumer's demands and desire for product augmentation have changed the way a bank conducts business and services its customers. Larger the degree of competition, it is perceived that the firms would become more efficient. However, when the structure of an industry is product of the government regulations, the degree of competition is impaired markedly implying that the efficiency suffers negatively.

Banking industry acts as life-blood of modern trade and commerce acting as a bridge to provide a major source of financial intermediation. Thus, appraisal of its efficiency is vital in context of an efficient and competitive financial system. Study of *x*-efficiency is believed to be important in particular as Berger, *et al.* (1993) found that *x*-inefficiencies account for around 20 percent or more of banking costs. Similarly, recent drive among banks towards downsizing, rightsizing and rationalisation of banking costs also implicates for the assessment of *x*-efficiency analysis of banks. It becomes vital in Pakistani context as there appears to be no study in literature on efficiency or *x*-efficiency analysis of banks in Pakistan. "A great deal more work is needed on *x*-efficiency research in banking. Managerial efficiency, the concept of *x*-efficiency, appears to be a much more important strategic and policy consideration" [Molyneux, *et al.* (1960), p. 273]. Given the

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significance of *x*-efficiency analysis, a study on Pakistan would be relevant and useful both to the executives of banks and policy-makers in the economy. This study fills the gap in literature by exploring the issue of *x*-efficiency of banks in Pakistan for the year 1998, a time period by which the pace of deregulation is believed to have gathered momentum and competition intensified with the explosive growth in information technology.

The concept of *x*-efficiency consists of two components: *technical efficiency*, which reflects the ability of a firm to obtain maximum output from a given set of inputs, and *allocative efficiency*, which indicates the ability of a firm to use the inputs in optimal proportions, given their respective prices.

The rest of the discussion is structured as follows. Sections 2 and 3 lead to a review of literature and an overview of banking sector in Pakistan respectively. Section 4 takes up the issue of methodology, specifically on data development analysis and specification of inputs and outputs for the study. Section 5 presents the evaluated results of 40 commercial banks in Pakistan while the last part concludes with scope for future research.

2. REVIEW OF LITERATURE

Efficiency of financial service firms and the strategy being followed by them is largely reflected through the information condensed in their balance sheets and profit and loss accounts. Oral and Yolalan (1990) have discussed the critical issues in efficiency of service organisations like banks using the DEA approach. They have studied the efficiency of 20 banks in Turkey. They used number of bank transactions as output of banks while labour, number of accounts and credit applications were considered to be the inputs.

Chen and Yeh (1998), where operating efficiency of 33 banks in Taiwan is measured. They have used the DEA approach to measure such efficiency using the factors like loan services, portfolio investment, interest income and non-interest income as banking output while factors like staff employed, bank assets, number of bank branches, operating costs and deposits as inputs.

Noulas (2001) has also calculated the efficiency of 19 banks in Greek by using the DEA approach. Variables like interest revenue and non-interest revenue were treated as output of banks while the inputs were interest expense and non-interest expense. These variables allowed him to capture the effects of sources of revenue and expenditure towards achieving efficiency.

Sathye (2001) provides an extensive account of *x*-efficiency analysis of 29 Australian Banks. He has used two outputs and three inputs with their respective prices as well in his quest for *x*-efficiency analysis. The outputs included loans and demand deposits while inputs represented labour, capital and loanable funds. Per capita expenditure on employees, per capita expenditure on premises and fixed assets and average interest expense on deposits were treated as input prices.

Mukherjee, *et al.* (2002) has investigated the relationship between strategic groups and firm performance in terms of efficiency for 68 Indian Banks. They have used the financial variables like net profits, deposits, advances, non-interest income and interest spread as output of banks. Inputs include net worth, borrowing of the banks, operating expenses, number of employees and number of bank branches.

Jemric and Vujcic (2002) have used the DEA approach to estimate the efficiency of 48 Croatian commercial banks. They have used three inputs, which include fixed assets and software, number of employees and deposits. The two outputs used were total loans extended and short-term securities.

3. BANKING SECTOR IN PAKISTAN

Till the end of 1980s, Pakistan's banking sector was heavily regulated in most of the areas of activities. "— the activities of financial sector in Pakistan were largely directed by the government as a means to implement its development strategy" [Hardy and di Patti (2001), p. 4]. The government regulated and nationalised banking system created an industry structure where competition was unknown to management of the banks. Forced by the structural reforms agenda and the desire to strengthen its financial system, Pakistan moved towards liberalisation and financial sector deregulation in 1990. It started with the privatisation of state-owned commercial banks and induction of new ones from private sector to establish a market-based banking system. The government seems to be conscious about improving the efficiency of banking sector in Pakistan. Few considerable efforts have been made in this regard which include enhanced capital adequacy, strengthening asset quality, improving management and increasing earnings. Furthermore, interest rate deregulation, abolition of credit controls and further developments in capital market have also led towards a more competitive banking environment.

The market for banks is diverse in Pakistan comprising nationalised commercial banks (NCBs), Private banks and foreign banks. In 1993, there were 33 commercial banks in Pakistan 14 being local and 19 foreign. By the end of 2001, the number of banks has increased to 43, 24 being local and 19 as foreign.[1] The deregulated and increasingly competitive environment poses a challenge in terms of efficiency as the most efficient banks would survive while the less efficient will be driven out of the market. This phenomenon of deregulation market liberalisation raises the questions like: Has the process of deregulation and liberalisation led towards an efficient banking system? Has the response to such phenomenon been same for private *vis-à-vis* state-owned and foreign banks? Answer to these questions can be sought by measuring efficiency of banks in Pakistan.

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[1]The information has been taken from the *Annual Report* of the State Bank of Pakistan (2001).

Table 1

List of Banks Studied with Their Ownership Forms

No.	Name	Ownership	No.	Name	Ownership
1	Allied Bank of Pakistan	Private	21	ABN-Amro Bank	Foreign
2	Askari Commercial Bank	Private	22	American Express	Foreign
3	Bank Al-Habib	Private	23	ANZ Grindlays Bank	Foreign
4	Bolan Bank.	Private	24	Bank of America	Foreign
5	First Women Bank	Public	25	Credit Agricole Indosuez	Foreign
6	Habib Bank	Public	26	Bank of Tokyo	Foreign
7	Bank Al-Falah	Private	27	Bank of Ceylon	Foreign
8	Indus Bank	Private	28	Citibank N.A.	Foreign
9	Metropolitan Bank	Private	29	Deutche Bank	Foreign
10	Muslim Commercial Bank	Private	30	Doha Bank	Foreign
11	National Bank of Pakistan	Public	31	Emirates Bank Int.	Foreign
12	Prime Commercial Bank	Private	32	Habib Bank AG Zurich	Foreign
13	Soneri Bank	Private	33	HSBC	Foreign
14	Schon Bank	Private	34	IFI Commercial Bank	Foreign
15	Union Bank	Private	35	Mashreq Bank	Foreign
16	United Bank	Public	36	Oman Int. Bank	Foreign
17	Faysal Bank	Private	37	Rupali Bank	Foreign
18	Platinum Commercial Bank	Private	38	Societe Generale Bank	Foreign
19	Prudential Commercial Bank	Private	39	Standard Chartered Bank	Foreign
20	Al-Baraka Islamic Bank	Foreign	40	Trust Bank	Foreign

Source: SBP (2001).
Notes: HSBC= Hong Kong and Shanghai Banking Corporation.

4. METHODOLOGY AND MODEL SPECIFICATION

4.1. Efficiency Measurement

There are diverse ways of measuring efficiency of banks. Berger and Humphrey (1997) provide an extensive account of 130 studies that applied different frontier efficiency analysis for 21 countries. The traditional method of approaching the efficiency measurement issue is the financial ratio analysis. But there is lack of agreement on the relative importance of various types of input or output under this

method [Chen and Yeh (1998), p. 402]. This method also does not consider the value of management actions and investment decisions that will affect future as opposed to current performance. It is a short run measure and may be inappropriate for describing the actual efficiency of a bank in the long run [Oral and Yolalan (1990)]. Financial ratios give only a restricted, incomplete picture of the process and fail to account for the interactions between the different factors, leading to contradictory results [Mukherjee, *et al.* (2002), p. 124]. In addition to that, there are parametric and non-parametric frontier analysis used in measuring the *x*-efficiency of financial service firms. The parametric approach includes stochastic frontier analysis, the free disposal hull, thick frontier and Distribution Free Approaches (DFA) while the non-parametric approach is the data envelopment analysis (DEA) [Molyneux, *et al.* (1996)].

4.2. Data Envelopment Analysis (DEA)

The DEA approach refers to the ability of banks to control costs and generate revenues and was developed by Charnes, Cooper and Rhoades (1978). The DEA is a linear programming based technique for measuring the relative efficiency and management performance of firms where presence of multiple inputs and outputs makes comparison difficult. It uses the observed values of inputs and outputs and attempts to find which of the firms in the sample determine an envelopment surface. Firms lying on the surface are deemed to be efficient and receive a value of unity (1). Firms that do not fall on the surface (below the frontier) are deemed to be inefficient and capture a value of less than unity. Hence, all deviations from the estimated frontier represent inefficiency. The DEA measure compares each of the firms in the sample with the best practice ones known as peers or role models. Firms under the DEA approach are referred to as decision making units (DMUs). The mathematics of DEA is presented at Appendix A to improve readability.

DEA serves as an alternate to regression technique. While regression rests upon the central tendencies, DEA is based upon extreme observations. Under the regression analysis, a single estimated regression equation is assumed to apply to each observation vector (firm). DEA analyses each DMU (firm) distinctively, producing individual efficiency measures relative to the entire set being evaluated. The merit with the DEA is that unlike the regression analysis, it does not require *a priori* assumption about the analytical form of the production function. Instead, it devises the best practice production function solely on the basis of observed values making it impossible to misspecify the production technique.

The DEA model allows for the treatment of constant as well as variable returns to scale. The constant returns to scale (CRS) is advantageous as it allows for comparison between small and large firms/banks in a situation where the frequency distribution is skewed due to presence of small and large banks in the sample. In

such a situation the use of variable returns to scale (VRS) raises the possibility that large banks would appear as efficient in the sample for the simple reason that there are no truly efficient banks [Berg, *et al.* (1991)]. This study assumes constant returns to scale for the analysis.

4.3. Data and Model Specification

The data source for the research is the *Banking Statistics of Pakistan 1998-99* published by the State Bank of Pakistan. This is an annual report, which presents the major financial information about all commercial banks operating in Pakistan, including public, private and foreign. Information required for the analysis was extracted for 40 banks out of 46 (25 local and 21 foreign) provided in the report for the year 1998. Six of the local banks were not considered for analysis, as their operations were restricted only for specialised activities/areas.[2] All the financial data are in terms of Pakistani rupees (in thousands).

The efficiency of banks can be measured either by using the operating approach or the intermediation approach. Under the former approach, the bank is perceived to be the producer of services for its account holders and is known as the cost/revenue management perspective. The intermediation approach considers banks as entities, which convert and transfer financial assets between surplus units and deficit units acting as an intermediary better called a mechanical perspective. This study uses the intermediation approach as it enables financial institution like bank to be perceived as a manufacturing unit, converting inputs into output e.g. deposits into loans and investments.

Inputs used in the study are deposits (D) and capital (K) while the outputs represent portfolio investment (I) and loans and advances (L). The choice of the inputs[3] and outputs was influenced by extant literature on DEA applications in banking industry, data availability and theoretical considerations. Deposits are the overall resources available to banks for carrying on their activities like lending and investment and are one of the main inputs. Capital is an important factor of production for a bank unlike the other business activities and is proxied by the book value of premises and fixed assets, net of depreciation. The price of capital (P1) was arrived at by dividing the total expenditures on premises and fixed assets by their total value. Cost of servicing the deposits is the interest paid on deposits. Hence, input price for deposits (P2) was derived from total sum of interest paid on deposits

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[2]These include Agriculture Development Bank, Federal Bank for Co-operatives, Industrial Development Bank of Pakistan, Punjab Provincial Co-operative Bank, Bank of Punjab, and Bank of Khyber.

[3]One of the major inputs of banks not considered here is labour. Both labour as input variable and price of labour could not be included in the study as data regarding such variables could not be found in the balance sheets of the banks. The only possibility of collecting this information was to conduct a survey of the banks included in the study but resource constraints did not allow for such a venture.

divided by the total value of deposits. The outputs chosen for the study constitute one of the major activities of banks that channel their funds into investments or lending for profitability motives.

The sample size for the study is larger than few of those mentioned in the literature review and also suffices the suggested criterion. To achieve greater reliability in the analysis and for meaningful results, literature on the DEA suggests for a larger sample size than the variables, to be examined in DEA as inputs and outputs. There is, however, no limitation on applying the DEA technique as long as the number of subjects is greater than the product of the number of inputs and outputs [Soteriou and Zenios (1998)]. Nunamaker (1985) suggests that the sample size should be at least three times larger than the sum of the number of inputs and outputs.

5. ANALYSIS AND RESULTS

Summary statistics of the various efficiency measures are presented in Table 2. The overall efficiency score of Pakistani banks was found to be 0.80 in the year 1998. This is higher than the results obtained by Mukherjee (2002) for Indian banks and Jemric and Vujcic (2002) for Croatian banks.[4] However, the overall efficiency score of Pakistani banks is lower than the world mean efficiency found to be 0.86 by Berger and Humphrey (1997). Relatively lower efficiency score of Pakistani banks implicates that these banks should improve their efficiency to be at par with the world best practices. Recent drives both by the public and private sector banks in terms of restructuring, branch closures, trend towards mergers and acquisition and rationalisation of various expenditures allude to the fact that these banks are concerned about the need to improve their efficiency.

The technical efficiency, reflecting the productivity of inputs, of Pakistani banks is found to be lower than the allocative one. It suggests the fact that banks in Pakistan need to improve their inputs productivity e.g. deposits and capital. Stating differently, these banks need to garner low cost deposits and channelise them into more rewarding gestures and ensure optimum utilisation of capital. As the competition in banking sector is getting intense, these banks need to rationalise their operational expenditures. These can be further reduced by switching over to internet banking modes that are believed to be cost-effective service delivery channels for financial firms like banks.

Pakistani banks are found to be utilising the inputs (deposits and capital) and outputs (portfolio investment and loans and advances) in an optimum manner as the allocative efficiency appeared to be very high. The banks need to be consistent in this drive and share the benefit of increased efficiency with their clients.

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[4]These comparisons need to be viewed with caution, as there are significant differences across countries in the regulatory environment, banking traditions, degree of competition and soundness of financial system.

Table 2

Efficiency Measures of Pakistani Banks across Ownership

	Minimum	Maximum	Mean	Standard Deviation
All Banks				
TE	0.52	1.00	0.86	0.12
AE	0.75	1.00	0.93	0.01
OE	0.50	1.00	0.80	0.14
Publicly Owned Banks				
TE	0.76	1.00	0.85	0.11
AE	0.75	1.00	0.90	0.10
OE	0.58	1.00	0.77	0.18
Privately Owned Banks				
TE	0.52	1.00	0.86	0.12
AE	0.80	1.00	0.93	0.01
OE	0.50	1.00	0.80	0.14
Foreign Banks				
TE	0.52	1.00	0.82	0.13
AE	0.80	1.00	0.92	0.01
OE	0.50	1.00	0.75	0.14

Note: TE = Technical efficiency; AE = Allocative efficiency; OE = Overall efficiency such that OE = TE *AE.

Private banks in Pakistan emerged as efficient on both fronts, i.e., technical efficiency and allocative one, compared to their counterparts, the public and foreign banks. Result on the foreign banks is converse to expectations. An implication of the results might be the fact that most of the foreign banks in Pakistan often target a niche market that is corporate sector which is more volatile and might make them inefficient. The high efficiency of private banks can be attributed to the fact that these banks have an extensive branch network, distribution power and a stable retail market size. Relatively lower efficiency of publicly owned banks alludes to the common perception that these banks are less efficient due to lack of motivation and performance-based earnings among employees of these banks. This also alludes towards the weak monitoring mechanism of bank performance in the public sector. This supports the latest drift towards denationalisation and privatisation of public sector banks in Pakistan. The findings are supported by Rizvi (2001) in his article on the efficiency and productivity of banking sector in Pakistan.

6. CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

This paper is a preliminary investigation about efficiency assessment of 40 commercial banks in Pakistan through data envelopment analysis, during the on-going process of liberalisation. The variables used as inputs and outputs give us some insight about the efficiency dynamics of banks in Pakistan. Although, these cannot be considered as universally accepted measures of bank performance but their inclusion merits with theoretical strands and existing literature on banking efficiency. The study calls for the improvement in efficiency of Pakistani banks through combined efforts of banking sector and the government to be at par with the best world practice. The results support the on going process of privatisation of public sector banks in Pakistan. Furthermore, bank performance monitoring mechanism needs to be strengthened both for the private *vis-à-vis* public sector banks in order to improve and maintain the efficiency drive of commercial banks in Pakistan.

The study owns certain limitations. First, apart from the quantitative measures of output considered here, data on qualitative variables e.g. service quality and level of technological advancement could also have been included in the analysis. However, the data and resource limitations did not allow for inclusion of these variables. Secondly, the study uses cross-sectional data to assess the efficiency of banks in Pakistan for the year 1998. Such analysis do not allow for efficiency comparisons overtime. Thirdly, the period of analysis is just after the year 1997 which marks the start of multifaceted and thorough phase of restructuring in the banking sector. A pre-liberalisation and post-liberalisation efficiency analysis would allow us to compare the results and see the effect of reforms in the banking sector. Obviously, this would be a meaningful task to be fulfilled in future. On positive note, it can be mentioned here that the study is a forerunner to a more active research interest about Pakistani banks using the data envelopment analysis.

Appendices

APPENDIX A

SUMMARY OF MATHEMATICS OF DATA
ENVELOPMENT ANALYSIS

Relative efficiency of a DMU is defined as the ratio of weighted sum of outputs to weighted sum of inputs. This can be written as follows:

$$h_0 = \frac{\sum\limits_{r-1}^{S} u_r y_{ro}}{\sum\limits_{i-1}^{m} v_i x_{io}} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \text{(A-1)}$$

Where:

s = number of outputs;

u_r = weight of output r;

y_{ro} = amount of r product by the DMU;

m = number of inputs

v_i = weight of input i; and

x_{io} = amount of input i used by the DMU.

Equation A-1 assumes constant returns to scale and controllable inputs. While both inputs and outputs can be measured and entered in this equation without standardisation, determining a common set of weights can be difficult. DMUs might assess outputs and inputs quite differently. The CCR model takes into account this concern.

Charnes, Cooper, and Rhoades (CCR) Model

Charnes, *et al*. (1978) addressed the above problem by permitting a DMU to adopt a set of weights that will maximise its relative efficiency ratio without the same ratio for other DMUs exceeding one. Thus, Equation A-1 is re-written in the form of a fractional programming problem:

$$max \ h_0 = \frac{\sum_{r-1}^{S} u_r y_{ro}}{\sum_{i-1}^{m} v_i x_{io}} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (A\text{-}2)$$

subject to

$$\frac{\sum_{r-1}^{S} u_r y_{rj}}{\sum_{i-1}^{m} v_i x_{ij}} \leq 1 \text{ for each DMU in the sample.}$$

where j = 1….n (number of DMUs).

To measure efficiency, Equation A-2 is converted into the more familiar components of a linear programming problem. In Equation A-3, the denominator is set to a constant and the numerator is maximised:

$$max \quad ho = \sum_{r-1}^{S} u_r y_{ro} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (A\text{-}3)$$

Subject to:

$$\sum_{i-1}^{m} v_i x_{io} = 1$$

$$\sum_{r-1}^{S} u_r y_{rj} - \sum_{i-1}^{m} v_i x_{ij} \leq 0$$

$$u\text{r}, v\text{i} \leq \in$$

To prevent the mathematical omission of an output or an input in the iterative calculation of efficiency, weights *u* and *v* are not allowed to fall below non-Archimedean small positive numbers ($\in$). Equation A-3 assumes controllable inputs and constant returns to scale. It is a primal type of linear programming problem that models input minimisation.

REFERENCES

Berg, S. A., F. Forsund, and E. Jansen (1991) Technical Efficiency of Norwegian Banks: A Nonparametric Approach to Efficiency Measurement. *Journal of Productivity Analysis* 2, 127–42.

Berger, A. N., and D. D. Humphrey (1997) Efficiency of Financial Institutions: International Survey and Directions for Future Research. *European Journal of Operational Research* 98, 282–94.

Berger, A. N., W. C. Hunter, and S. G. Timme (1993) The Efficiency of Financial Institutions: A Review and Preview of Research Past, Present and Future. *Journal of Banking and Finance* 17, 221–49.

Charnes, A., W. Cooper, and E. Rhoades (1978) Measuring Efficiency of Decision Making Units. *European Journal of Operational Research* 2, 429–44.

Chen, T-Y., and T-L Yeh (1998) A Study of Efficiency Evaluation in Taiwan's Banks. *International Journal of Service Industry Management* 9:5, 402–15.

Hardy, C. D., and Emilia Bonaccorsi di Patti (2001) *Bank Reform and Bank Efficiency in Pakistan*. Washington, D. C.: International Monetary Fund. (IMF Working Paper 01/138.)

Jemric, I., and B. Vujcic (2002) Efficiency of Banks in Croatia: A DEA Approach. *Comparative Economic Studies* 44: 2, 1–25.

Molyneux, P., Y. Altunbas, and E. Gardener (1996) Efficiency in European Banking. Wiley, Chichester, p. 198.

Mukherjee, A., P. Nath, and M. N. Pal (2002) Performance Benchmarking and Strategic Homogeneity of Indian Banks. *International Journal of Bank Marketing* 20: 3, 122–39.

Noulas, A. G. (2001) Deregulation and Operating Efficiency: The Case of the Greek Banks. *Managerial Finance* 27: 8, 35–47.

Nunamaker, T. R. (1985) Using Data Envelopment Analysis to Measure the Efficiency of Non-Profit Organisations: A Critical Evaluation. *Managerial and Decision Economics* 6: 1, 50–58.

Oral, M., and R. Yolalan (1990) An Empirical Study on Measuring Operating Efficiency and Profitability of Bank Branches. *European Journal of Operational Research* 46: 3, 282–94.

Pakistan, Government of (2002) *Economic Survey 2000-2001*. Islamabad: Ministry of Finance.

Rizvi, S. F. A. (2001) Post-liberalisation Efficiency and Productivity of the Banking Sector in Pakistan. *The Pakistan Development Review* 40: 4, 605–632.

Saythe, M. (2001) X-efficiency in Australian Banking: An Empirical Investigation. *Journal of Banking and Finance* 25, 613–30.

SBP (2000) *Banking Statistics of Pakistan 1998-99*. Karachi: SBP.

SBP (Various Issues) *Annual Report*. Karachi: SBP.

Soteriou, A., and S. Zenios (1998) Data Envelopment Analysis: An Introduction and Application to Bank Branch Performance Assessment. In G. Marcoulides (ed.) *Modern Methods for Business Research*. London: Lawrence Erlbaum Associates. p. 136.

Comments

This paper is an attempt in an important area of the financial sector of the economy, where banking sector has gone through institutional and structural reforms and efficient role of commercial banks is demanded to encourage investment for economic growth. The banking sector has already started some results of financial sector reforms and banking regulations. Recently we have observed privatisation of nationalised commercial banks, mergers and acquisition, excess liquidity management task with these banks, diversion towards consumer banking and information technology (IT) role has been enhancing in terms of e-banking. These all factors demand nothing but efficient operation of banks.

This paper does the X-efficiency analysis of commercial banks in Pakistan, which considers both technical efficiency and allocative efficiency. As for as the paper is concerned the value of the paper, potential and importance of the topic for policy implications is reflected only in the last conclusion section where the author has provided a proposal for future research. The paper is well conceptualised and motivated, however, I have some observations:

- The generalisation of results on the basis of only 1998 data is risky because 1998 has been very sensitive with respect to many financial and economic events like foreign currency account freeze and nuclear tests etc.
- To establish a hypothesis that process of deregulation and liberalisation led towards and efficient banking system using intermediation approach where deposits are converted to loans, the non-performing loans are important component, author has not mentioned anything about the same.
- Comparing the bank efficiency with world banking system efficiency may not be very meaningful without comparing the diversification of output in these countries, level of default of non-performing loan and size of operation etc.

I would like to submit some suggestions:

- As author pointed that it will be interesting and relevant if more terminal points could be included to compare the bank efficiency before, after and during the reform period.
- In choosing methodology, the author has mentioned that efficiency results are sensitive to methodology. To resolve the same author either can give the pros and cons of these methodologies. Or alternatively one should be careful in choosing the methodology and draw policy implications from

empirical studies. For example, using parametric approach needs to be defined. Reason should be given of not using the non-parametric approach by the author.
- The paper should mention the objective function and constrained clearly.
- The author may look into latest study "Bank Reforms and Bank Efficiency in Pakistan" done by IMF researchers namely: Daniel, C. Hardy *et al.* (2002).

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