ST. MARY'S UNIVERSITY

BUSSINESS FACULITY

DEPARTMENT OF ACCOUNTING

TECHNICAL EFFECIENCY OF COMMERCIAL BANKS OF ETHIOPIA (IN THE CASE OF PRIVATE COMMERCIAL BANKS)

BY:

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HELINA MAHMOOD

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JUNE, 2014

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Abstract

This paper works technical efficiency of commercial banks of Ethiopia in the case of private commercial banks. The specific objective of the study was to measure the overall technical performance, to measure pure efficiency, to measure the scale efficiency and to identify the problems of inefficient banks. The methodology of the study was investigates efficiency using data envelopment analysis (DEA) in a sample of Ethiopian private commercial banks over the period 2012-2013.Using total deposits and interest income as input and loans and interest expense as output. Entirely secondary data was used in the research and the data was composed of audited financial statement and published materials. The major findings of the study in 2012, by the overall technical efficiency only four banks are efficient but the rest banks were inefficient. In selected year the pure technical efficiency that is efficient are also four the rest banks are inefficient. In 2013 the scale efficiency of LIB, WB, UB and NIB were inefficient. In the DEA analysis we observe no significant growth in productivity during the sampled period. In general, most banks are less efficient. There has been no growth in productivity in private commercial banks.

ACRONYMS

BOA:- Bank of Abyssinia

AIB: - Awash international bank

LIB: - Lion international bank

DB: -Dashen bank

WB: -Wegagen bank

NIB: -Nib international bank

BIB: - Bunna international bank

UB: -United bank

DEA: - Data envelopment analysis

CCR: - Charnes, Cooper and Rhodes

BCR: - Banker, Carnes and Rhodes

BCC: - Banker, Carnes and Cooper

PTE: -Pure technical efficiency

OTE: - Over all technical efficiency

SE:-Scale efficiency

xIDEA:- Trial version software

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Declaration

We the undersigned, declare that this senior project is our original work, prepared under the guidance of GebregziaberHagos. All resource of material used for the manuscript have been duly acknowledged.

NAME Signature

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Place of submission:_____

Date of submission: _____

SUBMITTION OF APPROVAL SHEET

This paper has been submitted to the department of Accounting in partial fulfillment for the requirement of BA Degree in Accounting with my approval as an advisor

NAME: _____

SIGNATURE: _____

DATE: _____

CHAPTER ONE

BACKGROUND OF THE STUDY

1.1. Introduction

In recent years the performance measurement concerns for financial institutions have attracted a great deal of attention. Given that the structures of financial service industries are changing rapidly, it is of considerable interest to measure the efficiency of evolving institutions, and explains measured variation in, the (in) efficiency of changing rapidly, it is of considerable interest to measure the efficiency of evolving institutions, and explain measured variation in, the (in) efficiency of institutions. Banks are key financial intermediary or an institution that serves as middle man in the transfer of funds from savers to those who invest in real asset as house, equipment and factories. The performing this function, financial intermediates improve the well – being of both savers (depositor) and investors By improving economic efficiency, they raise living standards of the source of financing for most business. It serves as a bridge in between saving and investment. The commercial banks play a very important role in the effort to attain stable play a very important role in the effort to attain stable prices, high level of employment and sound economic growth. They make fund available to meet needs of individuals, business and government. In doing this, they facilitate the flow of goods and services and the activities of government. (Mr.R.Dhannukodi, R.Thangauelu, 2007)

The commercial banks system provides a large portion of the medium of exchange in a given country, and is the primary instrument through which monetary policy is conducted through deposit mobilization and lending operations. Commercial banks make the productive utilization of idle funds that assists the society to produce wealth. (Dr.V.Venkatachalm, 2007)

Performances means of evaluating how effectively and efficiently organizations use resources to achieve objective. The financial performance of commercial banks is judged on profitability for the sustainability of commercial bank. Their profit is by earning more money that what they pay expenses, the major portion of a banks profit comes from the fee that it changes for its services and the interest that it earns on their assets.(WWW.bank profitability.com)

1.2. STATEMENT OF THE PROBLEM

As different theories states commercial banks mobilize resources from those who have more funds in the form deposit and lend to those who want more funds. These banks act as a bridging of the two, surplus and deficit, parties. Mobilizing of these funds concern to the stakeholders like government, investors, and householders.

Many private commercial banks are operating and expanding their branches continuously. However, some private commercial banks are technically inefficient in some areas such as;

- Poor resource utilization
- Managerial problem
- Luck of expanding their core business

Therefore, the study tries to assess the technical efficiency of private commercial banks in Ethiopia.

1.3. Research questions

- What was the main cause of inefficiency of the banks resource utilization?
- How will be the banks performance evaluates?
- What was the reason behind in the allocation of resources in the banks?
- How the banks performance is looks like?

1.4. Objective of the study

1.4.1 General Objective

The general objective of the study was to evaluate the financial performance of private commercial banks in 2012/13.

1.4.2 Specific objective

The specific objective of the study was

- To analyze the main cause of inefficiency of the banks resource utilization.
- To evaluate the banks performance.
- To assess the reasons behind the allocation of resource in the banks.
- To identify the banks performance looks like.

1.5 Significant of the study

The significance of the study was to asses and demonstrates how to measure financial performance ofbanks. In addition give an indication for internal users and external users that help for operating, financing and investing decision. Besides it provide information to other researchers for their investigation or serve additional source of reference to supplement knowledge of readers on how to evaluate the financial performance of banks.

1.6. Scope of the study

The paper conducted to evaluate the financial performance of private banks in Ethiopia. By now there are 14 private commercial banks but the study selects only eight banks and the data set was limited to audited financial statement of private commercial banks over the period of 2012/13 so the findings of the study would be more dependable if it was conducted widely.

1.7. Research design and Methodology

1.7.1. Research design

We have been conducted using descriptive research method.in conducting this study; secondary source of data was used. We try to obtain the secondary data mainly from the audited financial statement of 2012/13.

1.7.2. Population and sampling techniques

In Ethiopia By now there are 14 private commercial banks and the researcher select the eight private commercial banks which are established before 2009. This is because after 2009 established banks are too many and to know about their technical efficiency is difficult.

Private commercial banks	Lion international bank
	Awash international bank
	Bank of Abyssinia
	Wegagen bank
	United bank
	Nib international bank
	Dashen bank
	Buuna international bank

1.7.3. Types and method of data collection

Entirely secondary data was used in the research. The secondary data was composed of audited financial statement and published materials that include books, journals, magazines, brusher and other documents.

1.7.4. Data analysis method

Data Envelopment Analysis (DEA) under input oriented method was use to analyze the collected data. In order to use DEA we select two inputs and outputs. The input variables are deposit and interest income within the accounting period. The output variables are loan and interest expenses within the accounting period of 2012/13.

1.8 Limitation of the study

This research due to time and cost constraints and other factors should be affectedbut the major difficulty that we face was the availability of recent and well organized data. Thus the results we get in the later chapters were solely based on the data we found from different publicized documents.

1.9 Organization of the study

The first chapter deals with the background, statement of the problem, objective, significance of the study, scope and limitation, methodology, data source and organization of the study. Chapter two presentthe literature review of theresearch work. The data analysis, conclusion and recommendation part of the study was present in chapter three and four respectively.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Theoretical review

The idea of efficiency of a production unit was first introduced by Farrell (1957), under the concept of "input oriented measure". According to Farell, technical efficiency measure is defined by one minus the maximum equi-proportionate reduction in all inputs that still allows continuous production of given outputs. Technical efficiency is linked to the possibility of avoiding wasting by producing as much outputs as the use of input allows it (output oriented measure or by using as less as input that the production objective plans it (input oriented measure). This efficiency is measured by comparing observed and optimal values of production, cost, revenue, profit or all that the production system can follow as objective and which is under appropriate quantities and prices constraints. Therefore we can analyze technical efficiency, in terms of deviation compared with idealistic production frontier. The literature proposes two approaches for measuring frontier production: the mathematical programming approach (non parametric) and the econometric one (parametric). Molyneux Philip, (2008) editing frontiers of banks in a global economy, in bank capital and loan pricing, focused on implications of Basle II. According to his work, deregulations which occurred in 1980s in most European countries opened up for decentralized decision-making in a competitive environment.

The liberalization according to the Basle II led to very high lending rates of most African countries shown by Metzger Martina, (2008). This could make most banks look very efficient due to their high interest earnings despite their low capital employed (Asset utilization).

Akhtar (2002) used the DEA method on 40 sample commercial banks of Pakistan to investigate their efficiency. In his study, what he found was that under the constant returns to scale (CRS) DEA, the overall efficiency score for Pakistani commercial banks for the year 1998 was 80%.

However, according to this study; their efficiency score was lesser than the world mean efficiency.

Yeh (1996) demonstrates the efficiency of Taiwan banks using DEA in combination with other financial ratios and found that the efficiency score for the six banks were 90%. Moreover, he distinguished the DEA efficiency scores into three grouping as high, medium and low DEA efficiency for financial peer group analysis. In this study, Yeh investigate that as a result of business decline in the mid-1980s, the efficiency score declined during the years 1982-1996 and start to increase thereafter.

A case study of commercial banks efficiency in Tanzania by Aikaeli (2008) was made to investigate their efficiency using non parametric data envelopment analysis for the period 1998-2004. The result showed that commercial banks in Tanzania is not disappointing to financial sector reforms as the DEA efficiency scores was high, 96%. (Bryan and Tsegaye, 2007, P. 8-10)

2.1.1 Non-parametric Approach

The mathematical approach known under the name DEA method (Data Envelopment Analysis) consist of estimating the frontier by using non parametric mathematical linear programming. It offers an analysis based on the relative evaluation of the efficiency in an input/output multiple situations, by taking into account each bank and measuring its relative efficiency to an envelopment surface made up with the best banks. DEA approach has the advantage that it does not require the prior specification of the functional form. This can be important when functional form tends to vary across countries. However, this method doesn't allow for noise treatments. It attributes all deviations from the efficiency frontier to production inefficiency. If any noise is present in the data, due for example measurement error, this will affect the position of the Frontier and as a consequence, the measurements of the bank efficiency. DEA results are also biased by outliers in the data because in the data they too can affect the position of the frontier.

The non-parametric method was usually used by making the assumptions of constant returns to scale (CRS). Recently, the assumption of variable return to scale (VRS) was used in specifications because this hypothesis is more relevant with the environment of imperfect competition in which banks operate.

This assumption is made by Gregorian and Malone (2002) to evaluate the efficiency of transition countries banks from Eastern Europe, following the technological changes which occurred in the banking industry and the banking system reforms after financial liberalization. Leigthner and Lovell (1998) are also interested in the impact of financial liberalization on Thai banks efficiency. In the same way, Berg, Forsund, Hjalmarsson, Suominen (1993) study the productivity of banks in Nordic European countries (Finland, Sweden, and Norway) vis-à-vis financial integration and banks internationalization due to Europe integration. It comes out from their studies that, Swedish banks are the best ones to face European financial integration and banks internationalization.

English, Grosskopt, Hayes and Yaisawang (1993), using a distance function with logrithmic form found that on average, US banks were inefficient after mergers and consolidations of the US banking system in the 90s. Allen and Rai (1996) in an international banks comparison use the stochastic frontier analysis (SFA) and the distribution free approach (DFA) and show that the efficiency level displayed by universal banks is smaller than that of separate activities banks. In a second step, they analyzed the determining factors of efficiency. However they did not take into account environmental variables in the explanation of efficiency. Moreover, Chuling (2009) studied the efficiency of banks in Sub Saharan African Middle-Income countries and provide possible explanations for the difference in the efficiency levels of banks. Conclusively to Chuling's work, banks could save 20 – 30% of their total cost if they were operating efficiently (operating on the frontier), and the foreign-owned banks are more efficient than the public banks and domestic private banks.(Bryan Enyihngu and TsegayeMesfin, 2007, P. 9-10).

2.1.2 Parametric approach

The parametric approach in this study consists of the ratio analysis which includes the following: return on equity, return on asset and asset utilization ratios. These ratio offers analysis of the performance of the decision making units under evaluation.The ratios so mentioned focus on the returns against investment and management of shareholders equity. Moreover, other performance measurement of ratio analysis and studies include the following: Robert, Hughes and Choon-Geol Moon, (2001) Expressed that the deregulation of U.S. banking industry has fostered increased competition in banking assets, which in turn has created incentives for banks to operate more efficiently and/or take more risk.

They examined the degree to which supervisory CAMEL ratings reflect the level of risk taken by banks and the risk-taking efficiency of those banks (i.e., whether increased risk levels generate higher expected returns). Their results suggest that supervisors not only distinguish between the risk taking of efficient and inefficient banks, but they also permit efficient banks more latitude in their investment strategies than inefficient banks.

CAMELS Evaluations:

Banks and other depository institutions are evaluated by the appropriate regulators on six major areas, depicted by the CAMELS acronym. Each component is discussed below:

C: Capital Adequacy – Risk based capital requirements are now used. The regulators also evaluate the bank's loss experience, amount of problem assets in relation to capital and the bank's access to capital.

A: Asset Quality – Banks are required to classify assets according to soundness and to allocate loss reserves based on their evaluation of the quality of their assets. Regulators can require bank managers to reassess the loan or other assets and may require the bank to set additional loss reserves. Adequacy of internal controls and the loan policy are also evaluated. Over concentrations of credits in certain loan or investment types or concentrations in geographic areas can lead to lower evaluations of asset quality.

M: Management – The technical competence of management, their history of past compliance, the adequacy of internal controls, management compensation and experience level are all components of the evaluation of management.

E: Earnings – The stability and growth rate of earnings are important elements of this evaluation. Peer group comparisons of profitability and interest rate risk exposure are normally used to evaluate earnings, as is the adequacy of the loan loss reserve.

L: Liquidity – Estimating liquidity risk requires knowledge of the turnover rates of the bank's sources of funds, particularly deposit turnover.

Measures for this category would include the percentage of core deposits versus "hot money" sources, the amount of loan commitments and the volume of liquid assets held by the bank.

S: **Sensitivity to Market Risk** – This category attempts to measure the bank's exposure to changes in interest rates, foreign exchange rates, and commodity or equity prices. Capital adequacy, the extent of formal risk management plans and the stability of earnings are considered.

Other studies analyses banks efficiency using parametric approach including that of Gilbert Alton and Wheelock David, 2007, with studies based on two bank groups. S-Banks (banks not subject to corporate tax but shareholders are taxed on the entire earning of the bank and the C-Banks subject to this corporate tax. The authors used the estimate of the federal corporate income tax that S-Banks will pay if they were subject to the tax to show that the difference in the tax treatment on S-Banks and other banks has a large impact on measures of U.S. Banking system profitability. Their conclusion was that S-Banks had a higher after tax profit however, shareholders face high personal income tax, congruently, since shareholders are not taxed twice, dividend still remain high though S- Banks are not permitted to have more than 100 shareholders.(Sandrine Kablan, 2010, P.11-12)

2.1.3 Theoretical Framework

Measuring bank efficiency is difficult because there is no satisfactory definition of the bank output. Neither the number of accounts nor total assets, total loans, nor total deposits provides a good index of output (Dimitri et al, 1991). Moreover, the value added of banks - given by their labor costs and profits - measures both the output and cost of banking.

Many analysts use accounting data on bank margins, costs and profits as measures of bank efficiency. But the usefulness of such data is undermined by substantial structural and accounting differences across countries, among individual banks and over time. Great caution and extensive knowledge of local banking conditions are required to interpret bank ratios. The author uses three sets of operating ratios to discuss the impact of differences in structure and practice on bank performance: operating asset ratios; operating income ratios; and operating equity ratios. The author also uses return-on-equity (ROE) analysis to highlight the effects of differences in banking structure and practice. The author's analysis is applied to the performance of banks in OECD countries in the 1980s. The analysis has major implications for assessing bank performance in developing countries, where inflation, higher risk, and operating inefficiencies often cause cost and other bank ratios to be generally higher than in OECD countries.(Source: VittasDmitri, Country economics department, the world bank 1991). Many research works have been carried out on evaluating determinants of commercial banks efficiency. In these works, some showed geographical deregulation as having an impact on bank operation. The banking industry is highly regulated. Theoretically those regulations increase bank's operation cost and decrease competition and efficiency within the industry. According to Kalish and Gilbert (1973), who tested whether regulations affect the operating efficiency of banks by using a bank efficiency index, they hypothesized that operational efficiency has a positive relationship with the degrees of current competition and a negative relationship with the degrees of potential competition in the industry. The statistical results show no significant effect on banking industry for current potential competition. This means that regulations causing banks to produce services and products at excessive cost have no significant influence on bank operational efficiency.

In the 1980s, deregulation in financial markets resulted in dramatic changes in the banking industry. Because of the deregulation, the barriers to geographic expansion and interest rate ceilings were eliminated. Thus, in the financial market, commercial banks experience substantial competition from in-state banks, out-of-state banks and non-bank rivals. Kaufman (1995) suggests the existing regulatory framework is costly and imposes inefficiency. This means that the regulation causes banks to make less profit and be at a greater disadvantage to their non- or less-regulated competitors.

Intuitively, the removal of the regulation would increase the efficiency level of the banking industry. However, Humphrey (1991) finds that deregulation leading to bank mergers might have expensive one-time expenditures to integrate back office operations and standardize banking products instead of reducing costs in the short run. Moreover, acquiring banks instead of removing excess branch office capacity have tended to perpetuate the overcapacity conditions that might lead to higher cost. Thus deregulation might result in more costs to the banking industry and make the whole industry less efficient. Hughes, Lang, Mester, and Moon (1996) also reviewed the impact of the interstate banking efficiency Act of 1994 on risk diversification by using a structural model of production.Their results suggested increasing geographic and depositor diversification improved expected return. Increases in branches also enhance efficiency by making inefficient institution closer to efficiency frontier in both the return and risk dimensions. (Bryan EnyihNgu and TsegayeMesfin, 2007, P.12-14)

2.1.4. Data envelopment analysis

The DEA technique defines an efficiency measure of a production unit by itsPosition relative to the frontier of the best performance established mathematically by the ratio of weighted sum of outputs to weighted sum of inputs. The estimated frontier of the best performance is also referred to as efficient frontier or envelopment surface. The frontier of the best performance characterizes the efficiency of production units and identifies inefficiencies based on known Levels of attainment. Thus, a production unit attains 100% efficiency only when it is not found to be inefficient in using the inputs to generate the output when compared with other relevant Production units.

The original formulation of the DEA model introduced by Charnes, Cooper and Rhodes (1978), denoted CCR hereafter, assume CRS and the production frontier is a piecewise linear envelopment surface.

Let us first define the following measures:

$S = \{1... s\}$ is the set of outputs considered in the analysis
$M = \{1...m\}$ is the set of inputs considered in the analysis
Y_{rj}=known positive output level of production unit j, $r \in S$
X_{ij} = known positive input level of production unit j, $i \in M$
n = total number of production units evaluated

An interpretation of the CCR model that estimates the proportional increase θ, in all outputs required to achieve efficiency in DMU 'k' is given by Min μ k (1)
Subject to

$$\sum_{j=1}^{n} \lambda jyrj \geq \frac{yrk}{k} \, , r = 1,2, \dots s$$

$$\sum_{j=1}^{n} \lambda jxij \leq xik, i = 1,2, \dots m$$

λj ≥ 0 .j = 1,2…,n

The variables in the CCR model are k μ and λj. The sufficient condition for efficiency of DMU'k' is that the optimum value of μ k is 1. Otherwise, it is labeled as inefficient compared to other DMUs in the sample.

The constraints in the model ensure that relative technical efficiency of DMU '*k*', given by μ *k* never exceeds 1. In the CRS model, the technical efficiency estimated with input and output orientation is the same. The optimal value of μ will be the Farrell *(technical) efficiency. A DEA run involves solving the above model n times, once* for each DMU analyzed.

The measure of efficiency obtained from the solution to model (1) consists of two components: 'pure' technical efficiency and scale efficiency. Banker, Carnes and Cooper (1984) proposed the variable-returns-to-scale (VRS) version of the model (1), denoted as BCC hereafter.

The BCC model is (1) together with the additional constraint

$$\sum_{i=1}^{n} \lambda j = 1$$

That captures returns to scale characteristics. Hence, the efficiency estimates obtained in the BCC model is net of the contribution of scale economies and therefore is referred to as 'pure' technical efficiency and also as the managerial efficiency. The orientation of the model given in (1) is output augmentation since it provides information as to how much equip-proportional increase in output is necessary (while maintaining levels of input) for an inefficient unit to become DEA-efficient. Under CRS specification, input and output orientation provides identical DEA estimates. Moreover, the efficiency frontier estimated within input and output orientation DEA model is the same. Therefore, under VRS specification both types of orientation will produce the same set of efficient DMUs. Under VRS, the estimated efficiency of inefficient DMUs can differ between the orientations adopted.

A DEA run will produce a relative efficiency scoreand a set of λj= 1,2...*n* values For each production unit. In the DEA literature, the units evaluated are referred to as decision making units (DMUs).

The set of λj values of each unit defines a point on the envelopment surface3 made up of a convex combination of the efficient units. Therefore, for an inefficient unit, the point so defined by the λj values becomes a role model that in turn establishes precedence for it to become efficient. The set of efficient production units {j: >0λj} is called the peer group of the designated unit, 'k'. The constraint given in (2) is referred to as the convexity constraint and accounts for VRS.BCC model measures technical efficiency only. Hence, the efficiency estimates obtained in the BCC model may be considered as "pure" technical efficiency estimates.

When the convexity constraint is removed the resulting model represents the CRS situation. The relative efficiency score obtained for a designated unit under CRS is a measure of overall technical efficiency of the unit and is always at least as much as the corresponding value obtained under VRS. The relative efficiency score obtained under VRS is a measure of pure technical efficiency. The difference in overall and pure technical efficiencies is attributed to scale efficiency. A measure of scale efficiency is simply the ratio of overall and pure technical efficiencies.

Charnels et al (1978) proposed a model that had an input-oriented and assumed constant return to scale (CRS). The CRS assumption is only appropriate when all DMUs are operating at not so optimal scale. However factors like imperfect competition and constraints on finance may cause a DMU to be operating at optimal scale. As a result, the use of CRS specification may profit from measures of technical efficiency which are confounded by scale efficiencies. Therefore, the VRS specification (Introduced by Banker et al, 1984) has been the most commonly used specification. The input-oriented DEA method seeks to identify technical inefficiency as a reduction in input usage. It is also possible to measure technical inefficiency as a proportional increase in output production. These two measures provide the same results under CRS but unequal results with assumption of VRS. The choice orientation has both practical and theoretical implications.(Don u.aGalagedra and Piyadasaedirisuriya, 2002, P.5-8)

Many studies have chosen to select the input-oriented measures because the input quantities appear to be the primary decision variables, although this argument may not be valid in all industries.

Other studies have pointed out that restricting attention to a particular orientation may neglect major sources of technical efficiency in the other direction (Berger et al, 1993). Presently, theoretical literature is not conclusive as to the best choice amongst the alternative orientations of measurement.

2.2. Empirical review

The choice of the variable set in DEA is an empirical issue. Inclusion of many variables is not a viable option in DEA as the number of variables in the model increases, more and more production units become efficient. On the other hand, when relevant variables are omitted DEA underestimates efficiency and the effect of this is more severe than when irrelevant variables are included in the DEA model. Lack of a standard structured approach to variable selection in DEA makes the task of variable selection even more difficult. Berger and Humphrey (1997) commented on the difficulty of variable selection in performance appraisal of banks using the DEA technique as: there is no 'perfect approach' on the explicit definition and measurement of banks' input and outputs. In choosing the variables, there are some restrictions on the type of variables since there is a need for comparable data and to minimize possible bias arising from different accounting practices even among the banks that are bounded by federal bank guidelines. Indian banks are no exception.

There are two common approaches to variable selection in bank performance appraisal in DEA: intermediation approach and production approach. In the intermediation approach where the banks are considered as intermediaries, the role of deposits is considered as an input to the production process where as in the production approach where the banks are considered as service providers, the deposits are considered as an output involving the creation of value added for intermediation approach may be superior for evaluating the importance of frontier

Efficiency to the profitability of financial institutions because minimization of total costs is needed to maximize profits and not just minimization of production costs alone. Besides, interest expenses often Account for one-half to two-thirds of total costs that the production approach ignores. The intermediate approach accommodates interest expenses. The choice of the appropriate input output variable selection approach could be based on the aim of the analysis as well. Grifell-Tatjé and Lovell (1997) argued that when the interest in the analysis is on bank productivity, the production approach is preferred to the other approaches as they essentially focus on bank profitability and two outputs: y1= loans and y2= other earning assets. (Don u.aGalagedra and PiyadasaEdirisuriya, 2002,P 10-11)

2.2.1. Empirical findings

- Master thesis in economics and finance done by bryanenyihngu and tsegayemesfin in the title of measuring commercial bank performance and efficiency in sub Saharan Africa paper offers to measure efficiency of banks in Sub Saharan Africa and its determining input and output factors on two fronts. At this purpose, they applied the first font; Data Envelopment Analysis (DEA) for assessing efficiency level. The actual and target level of inputs/outputs to foster efficiency are shown in the results. Secondly, the banks ratio analysis measuring banks performance through returns volatility for each bank, asset utilization and provision for bad and doubtful debts over the study period are all used as tools for this analysis. Their results suggest that Sub Saharan African Banks are about 98.35% efficient. They are aware that the level of efficiency could be subject to up and down swing if environmental factors influencing banks efficiency where taken into consideration. Finally, the result shows that (DEA) is more sensitive to loans, other liabilities, and other noninterest expense.

- The study done by department of development economics ,faculty of agriculture economics and rural sociology in the title of role of agricultural credits and efficiency commercial bank in Pakistan estimated that the technical efficiency of commercial banks operating in Pakistan by employing Data envelopment analysis (DEA) under variable returns to scale (VRS) after intensive agricultural lending bycommercial banks.

For this purpose, inputs and outputs of the commercial banks were defined on the Of intermediation approach. After the estimation of technical efficiency, Tobit model was used to develop its relationship with bank specific variables.

Under VRS specification of DEA, technical efficiency scores of commercial banks for year 2001, 2002, 2003 and 2004 were calculated. For year 2001, 30 commercial banks were fully efficient and out of these, 16 were local (six were public sector & ten were private sector) and 14 were foreign. The most inefficient bank for this year was Union Bank with estimated efficiency score of 0.877. This bank could be converted to technical efficient under VRS, if it was able to produce the level of output by utilizing 12.3% less of currently utilized inputs. Similarly 17 (six public & 11private), 17 (five public & 12 private), and 19 (four public& 15 private) local commercial banks and ten, nine and six foreign commercial banks were highly efficient for year 2002, 2003 and 2004, respectively. In 2002, the most inefficient bank was Saudi Pak Commercial Bank Ltd. With estimated technical efficiency score of 0.881, while in 2003Bolan Bank Ltd. with estimated technical efficiency score of. The result shows that the assets, ownership characteristic and after merger year affects are significant contributors to the technical efficiency, while agricultural lending has no significant impact over time on the efficiency of commercial banks.

- The banking in Pakistan has been dominated by government owned institutions the researcher Abdul quayem investigate that Financial sector and reforms and the efficiency of banking study shows that the average output oriented TE, PTE and SE are 64.9, 88.7 and 73.6 percent respectively. In the existing situation of 1991 banks can improve their output by 35% without any additional expenditure or they can reduce their expenditures on inputs without harming their output. It is revealed that whatever the methodology we use to estimate efficiency scores the scale inefficiency dominates the pure technical inefficiency. It is further revealed that approximately 25% of inefficiency in banking sector is due to their scale, implying that there is a room to improve efficiency of banks by reducing number of employees.

- The analysis revealed that in 1991 six banks out of twenty are on efficient frontier.These include two public sector banks and four private banks. It is also revealed that four public sector banks (i.e., UBL, ABL, NBP and MCB) are at the top of inefficiency hierarchy. Out of these four banks only one bank (i.e., ABL) which is technically inefficient when VRS is assumed.

- The researcher who is the director of university of leister evaluate that the performance of Turkish (TR) commercial banking sector technical efficiency of individual TR banks using the non- parametric frontier methodology, the Data Envelopment Analysis (DEA). Initially we have derived the relative technical efficiencies in the TR banking sector by implementing non-parametric Data envelopment Analysis on a cross-section of 48 banks taken in 1998. a further analysis was conducted after excluding the four large state owned banks from the data set. The explanation of the efficiency scores using Tobit regressions offers useful economic insights. We interpret the significance of bank size as an indication of higher efficiency of large banks. Also, more profitable banks achieved higher technical efficiency. The significance of capital adequacy ratio in explaining efficiency implies that banks with higher capital adequacy ratio, are less efficient since they are risk-averse and prefer safer and lower-earning portfolios. The ownership and the number of branches variables have negative sign, but they are insignificant. The state ownership and the branch expansion policies may be an impediment for being efficient in the Turkish commercial banking sector. Finally we find that larger and profitable banks are more likely to operate at higher levels of technical efficiency. Also another finding reveals that the capital adequacy ratio has a statistically significant adverse impact on the performance of banks, which may reflect a risk-return tradeoff in the sector.

- The researcher who is the professor of university of Pakistan Dr. Mohammed Hanif in Maltan, examines that the trends in efficiency and productivity changes of the banking industry during the post-deregulation period and the responses of different forms of

Banking firms to the reform process. Efficiency scores and total factor productivity growth are estimated using the input-oriented DEA model.

Two input and output specifications are used to represent efficiency and productivity gains in intermediation and assets transformation. This is based on a proposition which assumed that financial reform has improved banking efficiency and productivity gains.

The analysis of mean estimated efficiency scores in both models—which used intermediation and asset approaches for specification of input and output variables—indicated a reduction in estimated efficiency. However, the mean estimated efficiency (intermediation) scores of different types of banks show that there is a negative trend in efficiency in the first half and a positive trend at the end of the second half of the study period.

- The Malaysian researcher Izahmohdtahir and sudinharon done the study for the purpose of examine the technical efficiency of the Malaysian commercial banks over the period of 2000-2006, using the stochastic frontier approach (SFA) the finding show that the average technical efficiency score of Malaysian banks for the 147 observations over the years 2000-2006 ranges between 77 percent to 84 percent and increases over the years. Katib and Mathews (2000) find the score ranges between 68 percent and 80 percent but on a decreasing trend whilst Sufian (2004) finds Malaysian banks exhibited 95.9 percent. As an overall, the efficiency score is 81 percent. In other words, the sample banks have wasted on average 19 percent of their inputs. Both domestic banks and foreign banks average efficiency is on increasing trend. The scores for domestic banks on average ranged between 88.8 percent and 92.8 percent whilst that of foreign banks ranged between 69.7 percent and 78.2 percent.

The overall efficiency level for domestic banks was higher (90.9 percent) compared to that of foreign banks (74.4 percent) suggesting that domestic banks are on average more efficient than foreign banks. The results also found that the level of efficiency has increased during the period of study. Finally, domestic banks are found to be more efficient relative to foreign banks.

- The researcher zijiang yang presents in the title of bank branch operating efficiency in DEA approach using the method and methodology of different approach are each of them is used to obtain different aspects of efficiency measures. The most important two approaches are production approach and the financial intermediation approach.

  Finally the researcher concludes that, the degree of correlation between inputs and outputs is an important issue that has great impact on the robustness of the DEA model. Thus, a correlation analysis is imperative to establish appropriate inputs and outputs. On the one hand, if very high correlations are found between an input variable and any other input variable (or between an output variable and any of the other output variables), this input or output variable may be thought of as a proxy of the other variables. Therefore, this input (or output) could be excluded from the model. On the other hand, if an input variable has very low correlation with all the output variables (or an output variable has very low correlation with all the input variables), it may indicate that this variable does not fit the model. I did not find any evidence of very high correlation between any one input variable and any other (nor between output variables) and any one input variable having very low correlation with any of the output Variables (nor between output variable and input variables) in the above five tables. This is a reasonable validation of my DEA models. Otherwise, the sensitivity analysis on the impact of including and excluding different variables on the efficiency should be performed. If all the branches can perform efficiently, by using the target input and output values, the bank could save as much as 11% of its resources from a theoretical point of view. In practice, the saving will almost certainly be substantially less.

CHAPTER THREE

DATA PRESENTATION AND INTERPRETATION

Tillnow, we are discussed the theoretical and empirical part of technical performance of private commercial banks deeply and roughly. Thus, in this chapter we entail the banks technical performance in terms of their efficiency.

The study is based on secondary data. The data had obtained from the audited annual report of individual banks.

3.1. Overall Technical Efficiency

The efficiency score results of the banks, which are under consideration for this study, was displayed using xIDEA software. Table-1 indicates that those banks which are relative efficient having efficiency score of 1. On the other hand, those banks with relative inefficiencies do have scores less than 1. If the efficiency scores are less than 1, it means they can achieve the existing level of output with less amount of input (as it is an input oriented approach). For instance, Table-1 shows the OTE (overall technical efficiency) of selected Ethiopian private commercial banks within the years 2012-2013 under the CRS using xIDEA. The efficiency results of the banks during the year of 2012 were 1.0000 for AIB, DB, UB, and BIB, but BOA, NIB, WB, and LIB OTIE (Overall Technical Inefficiency) was 0.9942, 0.8953, 0.8404 and 0.8554 respectively.

The OTE of DB, UB, and BOA was 1.0000 and the OTIE banks are AIB, NIB, WB,BIB and LIB and their results were 0.9240, 0.8885, 0.7396,0.8187 and 0.8444 during the year of 2013.

Table 1: Overall Technical Efficiency score under CCR

BANK ID	Year 2012	2013
AIB	1.0000	0.9240
DB	1.0000	1.0000
BOA	0.9942	1.0000
UB	1.0000	1.0000
NIB	0.8953	0.8885
WB	0.8404	0.7396
BIB	1.0000	0.8187
LIB	0.8554	0.8444

Source: own Computation from audited financial statement 2012-2013

The result shows that most of the banks are efficient this means is that they are efficient in converting their input to output. In 2012 only four banks were efficient AIB, DB, UB and BIB but the rest banks were inefficient also in 2013 only DB, BOA, LIB and UB were efficient.

This implies that among selected private banks most of the banks were inefficient in convertingtheirinput to output. The banks don't use their resource efficiently that is why their score is less than1.0000.

3.2. Pure Technical Efficiency

OTE helps to measure the efficiency of the two, pure technical and scale inefficiency, under the BCC model, with VRS assumption. PTE measures the managerial performance of the given DMU and SE also indicate about the appropriateness of bank size and scale operations.

Table-2 represents the PTE results of AIB, DB, UN, and BIB were 1.0000 during the year of 2012. The pure technical inefficient bank during these years was BOA, NIB, WB and LIB with score of 0.9997, 0.9267, 0.8764 and 0.8583 for the period stated above respectively.

The inefficient banks in the year of 2013 were AIB, NIB, WB and LIB with a score of 0.9345, 0.9019, 0.7539 and 0.9675 the pure technical efficient banks during this year was DB, BOA, UB and BIB.

Table 2: Pure Technical Efficiency score under BCR

Bank ID	Year	
	2012	2013
AIB	1.0000	0.9345
DB	1.0000	1.0000
BOA	0.9997	1.0000
UB	1.0000	1.0000
NIB	0.9268	0.9019
WB	0.8764	0.7539
BIB	1.0000	1.0000
LIB	0.8583	0.9675

Source: own computation from audited financial statement 2012-2013.

Table 2, result shows that, the banks PTE. Comparing the result within two years the banks that are efficient is equal in year 2013 but from the selected banks only the four is efficient so their need to be a good managerial improvement or the banks management system should be correctly managed.

3.3. Scale Efficiency

The scale efficiency (SE) result in Table-3 reveals that during the year 2012 AIB, DB, UB and BIB were efficient but BOA, NIB, WB and LIB was inefficient with a score of 0.0055, 0.0315, 0.0360 and 0.0029 for the years respectively. AIB, NIB, WB, BIB and LIB were inefficient with a score of 0.0105, 0.0134, 0.0143, 0.1813 and 0.1231 in the year of 2013 and during this year DB, BOA and UB were efficient.

Table-3: Efficiency scores under BCC

Bank ID	SE 2012	SE 2013
AIB	1.0000	0.0105
DB	1.0000	1.0000
BOA	0.0055	1.0000
UB	1.0000	1.0000
NIB	0.0315	0.0134
WB	0.0360	0.0143
BIB	1.0000	0.1813
LIB	0.0099	0.1231

Source: own computation from audited financial statement 2012-2013

Scale efficiency of the private commercial banks for the year 2012 is given in table 3. The result shows that there are four banks which are on efficient frontier these include AIB, DB, UB and BIB. In this year inefficientbanks are WB, BOA and NIB. During 2013 also there are banks which are on inefficient frontier AIB, NIB, WB, BIB and LIB. When we compare the two years in 2013 banks that are on inefficient frontier is greater than the 2012.

This implies most of the banks scale efficiency is less the Inefficiency ones so most of the banks need to expand their core business, strengthen their capital base, improved asset quality and profitability during the year 2012 and 2013.

3.4. Peer Group Results

Table 4: inefficiency scores 2012

Inefficient unit	Year	Input/output	Actual value In Birr	If they were efficient In Birr	difference In Birr
BOA	2012	Deposit	6771245588	6769483080	1762508
		Interest income	497487397	497357904	129493
		Loan	3797305660	4074316072	277010412
NIB	2012	Deposit	5838126809	5410064067	428062742
		Interest income	433645833	401850082	31795751
		Interest expense	151907746	162657803	10750057
WB	2012	Deposit	5758180886	5046597590	711583296
		Interest income	441664543	387084612	54579931
		Interest			

		expense	139882171	153042699	13160528
LIB	2012	Deposit	1736656583	1473504706	263151877
		Interest income	115711928	99317672	16394256
		Loan	955619914	961095666	5475752

Source: own computation from audited financial statement

In the above table 4, BOA in 2012, a deposit of the actual value was greater than the expected value by the amount of 1762508 and the interest income greater than from the expected value by the amount of 129493 but their loan in 2012 was less than from they expect by the amount of 277010412. In this year the actual interest expense paid by NIB was less than the expected efficient value predetermined by the bank by the amount of 10750057 and the actual value deposited by the customer was greater than the expected efficient value expected by the bank in the amount of 428062742 and the interest expense that they expected was less than from their actual value.

The actual interest expense paid by WB in 2012 was greater than the expected efficient value expected by the bank by the amount of 54579931 and also the loan that they lend was greater than the amount that they expect by the amount of 13160528 and also in this year the actual value that their customer deposit was less than the expected value by the amount of 711583296. LIB in 2012 the actual value of deposit was greater than the expected efficient value by the amount of 263151877. Their interest income and loan was less from what they expected by the amount of 16394256 and 5475752 respectively.

The peer group result shows that AIB, DB and UB banks should continue the method that they use to convert their resource utilization perfectly. In the same year the other banks need to have the same as the above banks experience so they could show a good result.

Table5: Inefficient score in 2013

Inefficient unit	Year	Variables	Actual value	If efficient	Difference
AIB	2013	Deposit	12545208622	11723315857	821892770
		Interest income	890192139	788216221	101975918
NIB	2013	Deposit	6655214042	6002217215	652996827
		Interest income	570518514	443397236	127121278
WB	2013	Deposit	7550846153	5692388206	1858457947
		Interest income	585446928	408553654	176893274
LIB	2013	Deposit	2105863493	2037354606	68508889
		Interest income	168961597	157032893	11928704

Source: own computation of audited financial statement.

In table 5, 2013 AIB deposit and interest income actual value was greater than the expected value by the amount of 821892770 and 101975918 respectively.

The expected value of NIB deposit was less than from the actual value by the amount of 652996827 but the loan expected value was less than the actual value by the amount of 127121278.In this year WB actual deposit value was greater than the expected value and also the actual value of interest income was greater than the expected efficient value by the amount of 1858457947 and 176893274 respectively. LIB in 2013 expected deposit value was greater than the actual value by the amount of 68508889 and the interest income that they expected was less than the actual value by the amount of 11928704.

DB, UB and BIB result in 2013 shows those banks seems use a good resource utilization system but banks like AIB, BOA, NIB, WB and LIB seems not good in their resource utilization converting input to output.

CHAPTER FOUR

SUMMARY, CONCLUSIONS AND RECOMENDATIONS

4.1. Summary

The objective of this paper was to apply a two-step methodology to investigate the recent performance record and assess the performance in the private commercial bank sector.

Initially we have derived the relative technical efficiencies in the private banking sector by implementing non-parametric approach (Data envelopment Analysis) on a cross-section of eight banks taken for 2012 and 2013.

The method in analyzing and presenting data the researchers use DEAOS.COM ONLINE SERVICE. The summary includes:

- To evaluate their technical performance we use the data envelopment analysis by implementing non-parametric approach. And the variables (input/output) are inputs, deposit and interest income and the outputs are interest expense and loan.

- Among the 14 private commercial banks we select the earlier ones that established before 1996 G.C. Those are AIB, BIB, BOA, NIB, LIB, WB, UB and DB.

- After we find the annual audited financial statement of the banks we process using the DEAOS.COM software.

- The major objective of the study was to evaluate the OTE, PTE, and SE and to look the peer groups.

- When we see the result under OTE most of the banks are under efficient score this means is that the banks were efficient in converting their input to output.

In 2012 only four banks were efficient AIB, DB, UB and BIB but the rest banks were inefficient also in 2013 only DB, BOA, LIB and UB were efficient. This implies that among selected private banks most of the banks were efficient in converting their input to output.

- Under PTE results of AIB, DB, UN, and BIB were 1.0000 during the year of 2012 and in 2013 the pure technical efficient banks during this year was DB, BOA, UB and BIB. Comparing the result within two years the banks that are on the efficient frontier is equal in year 2013 but from the selected banks only the four is efficient so their need to be a good managerial improvement or the banks management need to use a good managerial system.

- The scale efficiency (SE) result reveals that during the year 2012 AIB, DB, UB and BIB were efficient but BOA, NIB, WB and LIB was inefficient with a score of 0.0055, 0.0315, 0.0360 and 0.0029 for the years respectively. AIB, NIB, WB, BIB and LIB were inefficient with a score of 0.0105, 0.0134, 0.0143, 0.1813 and 0.1231 in the year of 2013 and during this year DB, BOA and UB were efficient.

- In peer groups we evaluate the input that they use and the output most banks didn't score 1.0000 because they were poor in their resource utilization converting input to output.

4.2. Conclusions

This chapter examines the trends in efficiency changes of the Banking industry during in 2012 and 2013 period and the responses of different forms of banking firms to the reform process. Efficiency scores growth are estimated using the input-oriented DEA model. Two input and output specifications are used to represent efficiency in production approach. In 2012, by the overall technical efficiency only four banks are efficient, these are AIB, DB, UB and BIB, and NIB, WB, LIB and BOA are inefficient.

In 2013 also only three banks DB, UB and BOA are efficient, whereas BIB, NIB, WB, LIB and AIB are inefficient. Among selected private banks most of the banks were inefficient in converting their input to output. In those years the pure technical efficiency that scores 10000 was AIB, DB, UB and BIB but the rest banks scores less than 1.0000 like NIB, WB, LIB and BOA. . Comparing the result within two years the banks that are efficient is equal in year 2013 but from the selected banks only the four is efficient.

The SE of AIB, DB, BOA and BIB were efficient in 2012 in this year LIB, WB, UB and NIB were inefficient also in 2013 DB, BOA and UB were efficient and the rest banks are inefficient. This implies most of the banks scale efficiency is less the Inefficiency ones so most of the banks need to expand their core business, strengthen their capital base, improved asset quality and profitability during the year 2012 and 2013.

The peer group result shows BOA in 2012, a deposit of the actual value was greater than the expected value by the amount of 1762508 and the interest income greater than from the expected value by the amount of 129493. In this year the actual interest expense paid by NIB was less than the expected efficient value predetermined by the bank by the amount of 10750057 and the actual value deposited by the customer was greater than the expected efficient value expected by the bank in the amount of 428062742 and the interest expense that they expected was less than from their actual value. 2013 AIB deposit and interest income actual value was greater than the expected value by the amount of 821892770 and 101975918 respectively. The expected value of NIB deposit was less than from the actual value by the amount of 652996827 but the loan expected value was less than the actual value by the amount of 127121278.

4.3. Recommendations

In our research, we have identified certain weakness and we give the following recommendation so that appropriate consideration is given by the banks in order to improve the weak side of the banks.

- Most banks need to have best resource utilization because when we evaluate the OTE most banks didn't score 1.0000 this implies the banks didn't use their resource efficiently.
- The managerial problem of the banks lead to inefficiency score both in selected years. The most banks, management process or strategies should revised and used properly so that they can improve their managerial problem.
- Finally, we would like to recommend that most of the banks need to expand their core business, strengthen their capital base, increase their branches and improve asset quality and profitability.