Measuring Bank Branch Performance in Pakistan: Data Envelopment Analysis (DEA)

Muhammad Imran Qureshi, Lecturer
Department of Management Sciences,
COMSATS Institute of Information Technology, Abbottabad, Pakistan

Adeela Rustam, MS-Banking and Finance Student
Department of Management Sciences,
COMSATS Institute of Information Technology, Abbottabad, Pakistan

Sehrish Rustam, MS-Banking and Finance Student
Department of Management Sciences,
COMSATS Institute of Information Technology, Abbottabad, Pakistan

Abdullah Bin Umar, MS-Banking and Finance Student
Department of Management Sciences,
COMSATS Institute of Information Technology, Abbottabad, Pakistan

Khalid Zaman (corresponding author), Assistant Professor
Department of Management Sciences,
COMSATS Institute of Information Technology, Abbottabad, Pakistan.
E-mail: khalidzaman@ciit.net.pk
Abstract: This study provides comparative analysis of different banks branches efficiency in Pakistan during the year 2010. The main objective of the study is to develop an effective model for measuring the relative efficiency and achievable development proficiency of selected bank branches by analyzing their competencies and deficiencies through application of Data Envelopment Analysis. Furthermore, this study is to measure the production and profitability features of bank branches and examine that how the scale efficiency is determined by size of selected branches. The results of the study indicates that after estimation of efficiency under constant returns to scale, two banks are comparatively efficient and eight banks are comparatively less efficient. The less efficient banks have need to improve their overall system i.e., well equipped technological system and best utilization of all input resources in order to meet the challenging environment and their competitors.

Keywords: Efficiency, Relative efficiency, Scale efficiency, Data envelopment analysis, Bank branches efficiency, Development proficiency.

Introduction

Bank plays a leading role in the economy. They hold the savings of the public and finance the expansion of business, investment and trade. Moreover efficiency of banking sector affects economic growth and development while on the other side, failure and inefficiency of banking sector can result in financial crisis which have antagonistic and unfavorable effects on the growth of the economy. The Banking sector of Pakistan is playing crucial role in the growth of country’s economy. In accordance with the State Bank of Pakistan Act, the banking system of Pakistan is a two-tier system including the State Bank of Pakistan (SBP), commercial banks, specialized banks, Development Finance Institutions (DFIs), Microfinance banks and Islamic banks. As of June 2010, the banking sector comprised 36 commercial banks (including 25 local private banks, 4 public sector commercial banks and 7 foreign banks) and 4 specialized banks
with a total number of 9,087 branches throughout the country. Among
the banks, there are 6 fully fledged Islamic banks as at end of June 2010.
Besides the commercial banks, 8 Microfinance banks and 7 Development
Finance Institutions (DFIs) are operating in the banking industry of Paki-
stan. Due to closing down of a number of Development Financial Institu-
tions (DFIs) during the last decade, the government is currently re-
considering to set-up either an “Infrastructure Bank” or “Infrastructure
Institution” as this is requirement of the country.

The banks in Pakistan provide settlement and cash services to indi-
viduals and companies, including correspondent-banking. Banks also of-
fer domestic and cross-border remittance services to the population. Fur-
thermore, they provide depository services for the accounting and safe-
keeping of securities. During the last few years, banks have been paying
great attention to the expansion of services rendered to households and
the enhancement of their quality and efficiency. New forms and guides of
making compensations have also been introduced the monetary land-
scape of the country which was significantly adjusted in early 1970s has
been changed - through sector reforms initiated in the early 1990s - into
an proficient, sound and well-built banking system (OSEC, 2011). The
transformations have resulted in well-organized and aggressive economic
system. In particular, the mostly state-owned banking system has been
changed into one that is principally under the control of the private sec-
tor. The governmental framework and the State Bank of Pakistan’s deci-
sion-making capacity have been improved significantly. As a result, the
financial sector is sounder and demonstrates an increased flexibility to
shocks (Husain, 2006).

Banking expertise that was almost missing in Pakistan until a few
years ago has transformed the customer services and contact on-line
banking, internet banking, ATMs, mobile phone banking/ branchless
banking and other forms of delivery have made it possible to provide ex-
pediency to the customers while reducing the business costs to the
banks. The credit cards, debit cards, smart cards etc. business has also stretched out (Nawab, 2011).

Prior to the recent pecuniary crisis, the overload liquidity and struggle among the banks encouraged them to move away from the conventional limited product range of credit to the government and the public sector enterprises, trade financing, big name corporate loans, and credit to multinationals to an ever-expanding list of options of products and services (OSEC, 2011). The borrower base of the banks stretched many folds as the banks diversified into agriculture, SMEs, consumers financing, mortgages, etc. The middle class that could not have enough money to purchase cars or houses/apartments as they did not have the economic force for cash purchases had been the major beneficiaries of these new products and services (Nawab, 2011).

The struggle in the financial markets forces the monetary institutions to distribute their assets optimally. Besides, due to delicate nature of banks, it has been required for them to assess their competence in standard basis. The effectiveness is very imperative for the banks, which try to obtain the greatest outcomes based on their existing inputs. Therefore, distinguishing possible financial problems in the banking sector at untimely stage and taking defensive measures may diminish the disparaging results for the whole economy. Thus, the economic well-being of banks in the banking sector is very vital for whole economy. Because of this reason, risk management such as asset and liability management have gained the maximum concentration recently for the organizations (Aydin et al, 2009).

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. 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
Performance is generally conceptualized as bank’s ability to generate transaction by effective utilization of its resources. Economically the efficiency refers to the ratio of outputs to inputs. Inputs which refers to the scarce resource and outputs in terms of goods and services offered to the consumers. The notion of efficiency in terms of banking operation is more consequential as banking sector is deemed to have significant role in the financial division of a country. Primarily, the performance is measured through an analysis using different accounting ratios like; return on assets (ROA), return on investments (ROI), return on equity (ROE), equity to assets (ETA) and internal growth of equity, etc. Although these ratios are still used as performance measures and thought to be partial productivity measure, data envelopment analysis (DEA) can be considered a tool for measuring total productivity (Ramanathan, 2007).

**Literature Review**

Research has indicated that Data envelopment is a useful technique & principal method of linear programming for assessing banks performance & for obtaining insights to support decisions. Researchers have carried out a number of studies to find out the impact of input & output variables on technical efficiency, allocative efficiency, production efficiency, profitability efficiency of banks & their branches.

Efficiency of bank branch depends upon the size of the branch when size scale increases efficiency increases as well. Each region needs different management of branches & branches with low production & profit efficiency should be developed in the direction of extra ordinary production & profit efficiency region. Paradi et al (2010) research indicates that there are two stages of bank branch efficiency that a single overview of assessment cannot fully contemplate the Branch multifunctional environment & it is essential to measure the production profitability & mediator
efficiency in order to combine the outcomes to accomplish the complex proceeding indicator for each branch. Sathye (2003) concluded that Private Banks are less efficient & government owned banks are more efficient & the growth rate of public banks is more than that of private banks.

Islamic & commercial banking both are equally efficient but research found that Islamic banking sector is more competent & efficient than commercial banking. Fundamental as well as quality accounting measures can be used for the determination of performance & competency of Islamic banking [see, Sarker, 1999; Bashir, 1999, 2003; Hassan & Marton, 2003].

The efficient banks have negative (inverse) relationship between bad debts & bank efficiency. Bank deterioration takes place due to lower cost efficiency & high ratios of problem loans. According to Leaven and Majnoni (2003) risk can be assimilated into efficiency through composition of loan loss provender. Paradi, et al (2004) pointed that means of inability of banks can be identified & disclosed by reducing transaction cost & equally produced services without using extra resources. Efficiency is an economic terminology which depends upon the relationship between input & output variables of a company.

Banks are financial institutions with several inputs & outputs whose relationship determine the efficiency of banks. After using Data Envelopment Analysis, Altunbas et al (2000) found that after minimizing risk & problem loans the average technical efficiency of whole banking sector can be increased from 78.1% to 89.4 % & average scale efficiency can be improved from 92.8 to 96.6% & both efficiencies can be helpful in improving the aggregate efficiency from 74.2% to 86.3%. Kuen et al. (2007) concluded that the bank branches operate efficiently on the whole although there is still room for improvement.

Special emphasis was how to present the DEA results to manage-
ment so as to provide guidance to them on what to manage & how to accomplish the changes. Canbas et al. (2005) & Thomson (1991) pointed that the inability & failure of banks play vital role in disclosing the causes of inability & failure in order to induce the regulatory authority to overlook & govern the banks efficiently & on the other side by distinguishing b/w competent & suffering banks can minimize the occurring cost of banks by controlling the cost to state.

According to Berger (1993), there are two problems first problem is that financial ratios are considered as invalid measure of efficiency because they do not control prices of input and another problem is that the use of cost-to-asset ratio indicates that all assets have equal cost of production and cost of allocation.

The use of simplest ratios is unable to differentiate between X-efficiency and scope efficiency gains and scales. Farrell (1957) refers to the efficiency of maximum level of output that is produced through given level of total inputs. Smirlock (1985) and Evanoff and Fortier (1988), concludes that banks with large market shares are predicted to acquire higher and significant profits due to lower gross costs.

Bush (2002), Drakos (2002), and Fries and Taci (2005) indicated that the interference of competitor or foreign banks establish atmosphere which induced the integrated banking system to enhance its efficiency and to be more efficient immediately in both positive and negative directions.

Kumar & Charles (2011) research proves that the classification based on single period data can variate startlingly and alters more than one time consequences are accomplished, such that tax favor and advantages, unfavorable net charges, and alteration fees, classification is unable to exactly illustrate banks with continuing procedures.
Data Source and Methodological Framework

One of the most important - but at the same time most controversial - elements of the DEA model development is the definition of the input and output variables used. Defining inputs and outputs depends on how one looks at the activities of a bank branch. Generally, on a bank branch level, a distinction is made between the production perspective and the intermediation perspective. From a production perspective, a bank branch uses physical resources (such as labor, capital and space) and transforms them into transactions of different types. In the intermediation perspective, a bank branch acts as an intermediary collecting funds in the form of deposits and transforming them into loans and other income earning activities. Although there are other perspectives, most studies on a bank branch level can be situated within the production efficiency and intermediation efficiency perspectives.

In this study, we used different input and output variables which have different impact on efficiency of daily banking business. Data is collected from both secondary and primary data sources. To measure the efficiency we gathered complete data of year 2010 (Starting from Jan 1 and ending on Dec 31) from reliable sources for variables used in our research. We used 7 inputs and 8 outputs variables. To measure the customer satisfaction, questionnaire is used in which simple questions were asked to customer to know their opinion about the services provided by the bank. Table 1 shows the outputs variables and their outcome as on 31-12-2010 (NBP Main branch Abbottabad).
Table 1: Outputs of the variables

<table>
<thead>
<tr>
<th>OUTPUTS</th>
<th>Result as on 31-12-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest income</td>
<td>96.703 million</td>
</tr>
<tr>
<td>Gross advances/loans</td>
<td>399.344 million</td>
</tr>
<tr>
<td>Other income</td>
<td>213.262 million</td>
</tr>
<tr>
<td>Net profit</td>
<td>110.973 million</td>
</tr>
<tr>
<td>No. of daily transactions</td>
<td>932</td>
</tr>
<tr>
<td>NPL</td>
<td>3.205 million</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>70</td>
</tr>
<tr>
<td>Average disposal</td>
<td>15 minutes/transaction</td>
</tr>
<tr>
<td>Personal expenses</td>
<td>30.405 million</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.

Table 2 shows the inputs variables used in research and their results as on 31-12-2010 (NBP main branch Abbottabad).

Table 2: Inputs of the variables

<table>
<thead>
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</tbody>
</table>

Table 3 shows daily business activities of NBP main branch Abbottabad.
Table 3: Daily Activities of the Bank

<table>
<thead>
<tr>
<th>Activity</th>
<th>Average time</th>
<th>Weight assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>cheque payment</td>
<td>12 minutes</td>
<td>38%</td>
</tr>
<tr>
<td>deposit of cash/cheque</td>
<td>10 minutes</td>
<td>20%</td>
</tr>
<tr>
<td>demand draft issuance</td>
<td>15 minutes</td>
<td>2%</td>
</tr>
<tr>
<td>cheque book issuance</td>
<td>15 minutes</td>
<td>5%</td>
</tr>
<tr>
<td>opening of account</td>
<td>15 minutes</td>
<td>5%</td>
</tr>
<tr>
<td>statement of account</td>
<td>10 minutes</td>
<td>5%</td>
</tr>
<tr>
<td>balance enquiry etc</td>
<td>5 minutes</td>
<td>5%</td>
</tr>
<tr>
<td>Government payments</td>
<td>15 minutes</td>
<td>5%</td>
</tr>
<tr>
<td>Government Receipts</td>
<td>15 minutes</td>
<td>10%</td>
</tr>
<tr>
<td>Utility bills</td>
<td>10 minutes</td>
<td>5%</td>
</tr>
</tbody>
</table>

Assumed Business Time

- 9 AM to 5 PM (30 minute break for lunch and prayers).
- Working Days (26 days a month, 312 days a year).

Assumptions

- Self own premises; no rent of the building is paid.
- Cost of building, land, furniture, machinery and equipment is not taken into account.
- Depreciation on fixed asset is taken as Operative expense.

Figure 1 shows the conceptual framework of the study.
Results of Data Envelopment Analysis

Table 4 shows the results of Data Envelopment Analysis BCC Model which have been used to calculate for constant returns to scale (CRS) to variable returns to scale in order to analyze the technical efficiency scores of ten selected banks of Pakistan. On the basis of DEA results, the DMUs having efficiency score greater than or equal to 1 (≥1) are considered as most efficient. On the other hand, DMUs having efficiency scores less than 1 i.e., (<1) are considered as less efficient and inefficient. Therefore, the average scores of pure technical efficiency of ten selected DMUs varies from 0.63 to 1.000 in 2010. However, the comparison of average efficiency scores of 1.000 indicate that NBP Abbottabad Branch and MCB Bank Limited were the most technologically efficient banks in year 2010 whereas NBP Manshera, Allied Bank, Albaraka Bank, Bank Al Habib Limited, Askari Bank Limited, Habib Bank Limited, Standard Chartered Bank, United Bank Limited, MCB Bank were technically inefficient banks in the year 2010.
Table 4 Data Envelopment Analysis

<table>
<thead>
<tr>
<th>DMU, s in the efficiency frontier input oriented technical efficiency CRS. DMU, s under evaluation.</th>
<th>DMU,s in Efficiency Frontier Efficiency</th>
<th>DMU,s in Efficiency Frontier</th>
<th>DMU,s in Efficiency Frontier Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBP Manshera</td>
<td>0.780</td>
<td>NBP Main Br.Manshera</td>
<td>1.000</td>
</tr>
<tr>
<td>NBP Abbottabad</td>
<td>1.000</td>
<td>NBP Main Br.Abbottabad</td>
<td>1.000</td>
</tr>
<tr>
<td>Allied Bank</td>
<td>0.670</td>
<td>Allied Bank Barah Tower Br.</td>
<td>1.000</td>
</tr>
<tr>
<td>Albaraka Bank</td>
<td>0.630</td>
<td>Albaraka Bank Abbottabad branch</td>
<td>1.000</td>
</tr>
<tr>
<td>Bank Al Habib Limited</td>
<td>0.750</td>
<td>Bank Al Habib Limited</td>
<td>1.000</td>
</tr>
<tr>
<td>Askari Bank Limited</td>
<td>0.830</td>
<td>Askari Bank Limited</td>
<td>1.000</td>
</tr>
<tr>
<td>Habib Bank Limited</td>
<td>0.950</td>
<td>Habib Bank Limited</td>
<td>1.000</td>
</tr>
<tr>
<td>Standard Chartered Bank</td>
<td>0.678</td>
<td>Standard Chartered Bank</td>
<td>1.000</td>
</tr>
<tr>
<td>United Bank Limited</td>
<td>0.960</td>
<td>United Bank Limited</td>
<td>1.000</td>
</tr>
<tr>
<td>MCB Bank</td>
<td>1.000</td>
<td>MCB Bank Limited</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Figure 2 shows the trends of average technical efficiency scores of decision making units for year 2010. The decision making units which have higher average efficiency i.e equal to 1 and greater than 1 are considered to be most efficient as compared to others. The trends of the efficiency scores indicates that NBP Abbottabad and MCB Bank limited were the most technically efficient branches in 2010.
Conclusions

This research study is conducted in order to estimate the relative technical efficiency of 10 selected Pakistani commercial banks through implementation of Data Envelopment Analysis. The results of the study indicates that after estimation of efficiency under constant returns to scale two banks are comparatively efficient and 8 banks are comparatively less efficient.

The less efficient banks have need to improve their overall system i.e well equipped technological system and best utilization of all input resources in order to meet the challenging environment and their competitors. They become efficient by overcoming all deficiencies in future.
References


General of Training & Research Academy (Dot), FBR, Lahore, Pakistan.


