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Measuring the Relative Efficiency of Bank Melli Iran Branches (A Case Study of Bank Melli Branches in Kerman)

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Abstract: *The efficiency of banking industry is used to both minimize cost commissions and to provide higher qualitative services. More efficient financial institutions will lead to lower expenses of interest-based loan and other facilities. In this study, we applied the Data Envelopment Analysis method to estimate technical efficiency of 130 branches of Melli Bank of Kerman province. To this purpose, the technical efficiency of Melli Bank branches of Kerman province was estimated in 3 groups, group 1 including branches with degrees of 1, 2 and 3, group 2 including branches with degree of 4 and group 3 including branches with degrees of 5 and 6. According to the results, under the condition of variable return of scale with output orientation, the technical efficiency for group 1, 2 and 3 were estimated 77%, 92% and 83% respectively. The main conclusion is that the 3 groups of Melli Bank branches of Kerman province could increase their production as much as 23, 8 and 17 percent. Optimum allocations of its resources (increasing technical efficiency), reforms on management styles. Also the results of this study indicates that 11, 27 and 25 percent of branches with degrees of 1, 2 and 3 has the decreasing return to scale, so that, decrease in size of production scale and decrease in production inputs can be used as effective policy.*

Key words: *Technical efficiency, return to scale, Melli Bank Kerman, Data Envelopment Analysis (DEA)*

INTRODUCTION

In economy, efficiency means maximum output by utilizing certain amount of input. This concept is of prime importance for developing countries, because they are faced with shortage of input, production factors and technology and as a result, efficient utilization of resources is quite vital for these countries. Among different industries, banking industry is of special importance, because it facilitates access to economic growth and development. The well-being of this industry reflects the well-being of country's economy. Therefore, the efficiency of banking industry is a matter of concern for bank managers, country's economic authorities and the public in general as bank customers.

On one hand, competitive pressures push bank managers to choose appropriate scale, and on the other hand, economic authorities, bank managers and the public focus their attention on banking efficiency. Higher efficiency means lower bank charges/costs, lower interest rates and better services. This is of prime importance as it leads to lower investment cost which is considered as one of the production factors in developing countries. Thus, banking industry efficiency and pinpointing the influencing factors are crucial issues.

2. Research background and literature

Economics is the allocation of limited resources to the unlimited needs of the humankind. Basically, economic subjects revolve round the scarcity and shortage of resources. Economic could be measured by its power in launching products and rendering services through optimized utilization of scarce resources. Optimized utilization of resources helps countries grow, as it leads to efficiency and productivity which bring about high growth rates. Economic studies show that countries who have emphasized more on efficiency than increasing natural and physical resources, have maintained higher growth rates.
A look at emerging industrial countries in their path towards growth reveals the fact that they have experienced 4 stages:
1) Industrial self-sufficiency or import substitution stage by relatively simple technology-based investment on consumer goods
2) Export development stage for goods in demand by global market
Majority of products were similar to stage 1 goods but of higher quality.
3) The stage for establishing heavy industries, chemical industries and petrochemical industries A gradual move towards high technology industries from capital-intensive, intermediate industries.
4) Free trade stage and moving towards knowledge-based products to enter into global export competition
The secret of success of these countries in each stage, rests in focus on efficiency and productivity. Therefore, paying attention to efficiency and productivity and factors influencing their enhancement creates a condition wherein economy, development and welfare flourish (Maybodi, 2010).
On the other hand, today sustainable development has appeared as an ideal for all communities. Though particular problems have caused third world countries to focus on development rather than sustainability, it must be noted that elimination of the gap between developed and developing countries seems to be impossible without a sustainable development process. Since sustainable development is required to satisfy community needs without sacrificing the needs of coming generations, appropriate exploitation of resources is of great significance (Motavaseli, 2008). Studies show that economic growth in most Asian countries is gained by increasing the two major inputs of; rate of investment and employment. At present, taking into account the existing problems for the supply of capital and employment opportunities, planning authorities must focus on development approaches. One of these approaches is economic development through increasing the efficiency of Total Factor Productivity (TFP) (Imami & Maybodi, 2010). There is a close relationship between efficiency/productivity and community's level of welfare (Ace et al., 2012); therefore, efficiency is to some extent expressive of their economic performance and level of development.

3. Research Methodology

Kind of method

There are many methods in Applied Research which carry different titles according to their peculiarities, questions and conditions. They include: historical, descriptive, survey, correlational, field, case, comparative and experimental, etc. (Sanjari, 2012).
Choosing research method depends on the subject and executive possibilities. Therefore, research method could not be chosen unless the objective and the scope of research is known (Naderi & Seif Naraqi, 2011). Descriptive/explanatory method is used to record and analyze the condition "as is" and to orderly describe the situation actually and objectively (Sanjari, 2012).
Correlational method studies the extent of correlation of different variables based on ratios. It focuses on the changes of an attribute in relation to another. Here, the researcher tries to investigate the changes of some factors in relation to others (Sanjari, 2012). The present study is an applied one, since it covers all the Melli Bank branches of Kerman province and the results could be practically used. It is a combination of correlational and mathematical models. I.e. as to its aim, it is applied and as to its essence, it is analytical.

Statistical population and sample

It is a set of required items which are similar in terms of at least one attribute which is distinguished from other groups (Azar & Momeni, 2009). In other words, it points to items and/or event about which the researcher intends to study (Delavar, 2003). Statistical population of this study covers all the Melli Bank branches of Kerman province which amount to 132 branches according to information in the year 2011. The supervising branch was omitted due to its heterogeneity with other branches.
Statistical sample is a smaller set which represents the main body and possesses like characteristics (Khaki, 2009). Here as the method is data envelopment and all members of the group have to be included, there was no need for sampling.

Research Variables

A- Definitions

Managerial efficiency: Means diligence, endeavor, resourcefulness, employee's diligence and the right combination of production factors help boost efficiency of the institution (Maybodi, 2010).
Technical efficiency: An institution is said to be technically efficient when its production is on the boarder-line production function. I.e. it could produce the maximum output from the minimum quantity of inputs (Maybodi, 2010).
Scale efficiency: This is due to causes in yield in proportion to scale, so that any changes on its size will alter the unit as to be less efficient (Maybodi, 2010).
Efficiency: Is shown by the index of efficiency which is based on the comparison of a unit during two periods or two units at one time (Maybodi, 2010).
Data Envelopment Analysis: It is a linear, nonparametric method based on the estimation of production frontiers to measure productive efficiency of decision making units (Maybodi, 2010).

B- Evaluation

Depending on the method used in research, different output and input are utilized. Usually Data Envelopment Analysis method is used when more than one variable is considered as output or when no particular function is to be regarded. Otherwise, econometric and stochastic frontier analysis methods are utilized. Since three outputs and four inputs are used in this study, the right method to estimate and compare efficiency of branches appeared to be DEA. According to internal and external studies which follow, outputs and inputs are as below:
Outputs: Total facility, cash assets, investments, and other contributions (including fees, income, and other non-interests' income)
Inputs: Administrative and general expenses (other than depositors' profits), fixed assets (buildings and equipment) and total deposits (short-term and long-term borrowings, short-term and long-term deposits) and the number of personnel
Efficiency measurement: Efficiency measurement of a unit is a relative concept and has to be carried out through a comparative index. One of the methods is to compare the item under study with other efficient decision making units (DMU) having similar condition. In fact, the method introduced by Farrell indicates an efficient frontier in units which have better performance so that the efficiency of other units could be comparatively specified. Of course, it must be noted that presentation of the basic theory of this method goes four years back to Shepherd (Shepherd, 2000). Frontier production function could be obtained by the two parametric and non-parametric methods. Frontier production function shows the highest level of inputs possible. In fact, these methods present two different approaches for calculating production as quant curve. Higher efficiency could be acquired by minimizing the extent of input utilization (input oriented) or maximizing output (output oriented) at a certain level of input or a combination of the two methods (non-oriented).

4. Findings

4-1. Measurement of efficiency by Data Envelopment Analysis (DEA)

This approach was introduced by Rhodes in his dissertation under his advising professor Cooper in 2006 (Rhodes et al.) and actually became the applied version of Farrell method. It acquires frontier production function based on linear planning technique, also called linear planning. This is a non-parametric method and does not need to determine the shape of the function for its estimation. Thus, the model is less exposed to regression specification error.

4-2. Data Envelopment Analysis

Models such as CCR and BCC are based on the two assumptions of input minimization and the constant of the output (s) (CCR model) or the fixed inputs and the maximization of output (s) (BCC model) (Assume the input and output orientation) but DEA is the mix of two above hypotheses and is the third general model of DEA. This model presents the difference between input and output subject to equal limitations and the effectivity of each must be less or equal to 1 (Volker, 2012). For better perception of model look at shape. In the right side model additive is presented and in the left side model CCR is presented.

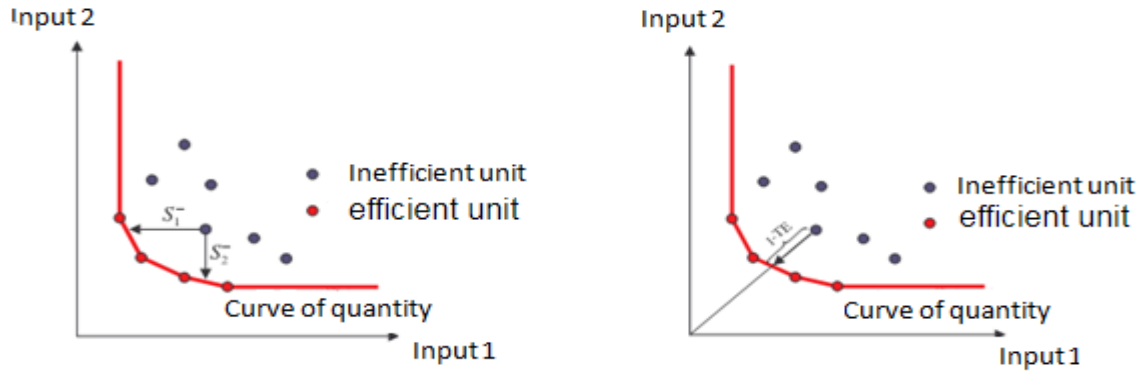

Figure 1

Comparison of the CCR Model and the Additive Model (Afonso et al., 2005)

The DEA model was introduced for the first time by Charnes, Cooper, Golany, and Seiford which is described below for the measurement of the specific DMU in VRS mode (Charens et al., 2003):

$\text{Max } Z = \sum_{i=1}^{k} S_j^+ + \sum_{r=1}^{s} S_r^-$

S.t

$xih = \sum_{j=1}^{n} x_{ij} \lambda_j + Si+,\ i = 1,\ldots,k,$

$yrh = \sum_{j=1}^{n} y_{rj} \lambda_j - Sr^-,\ r = 1,\ldots,s,$

$\sum_{j=1}^{n} \lambda_j = 1,$

$\lambda j \geq 0\ ,\ Si+ \geq 0\ ,\ Sr^- \geq 0$

As $\lambda j \in \{0, 1\}$, it means that variables for all of the j have two values. Variable λj for making a convex border is visible for inputs and outputs and the xij and yrj variables are respectively the input i and the output of r from the decision maker j. The variable s- is the variable of the shortage corresponding to the inputs, and s + is the corresponding product shortage variable. In fact, when the model maximizes the deficiency variables Sj and Sr, simultaneously the inputs are minimized and the outputs are maximized (Volker, 2012).

Obviously, the program above is a coherent integer program and can be considered as a computable model for a two-factor DEA or an idealized planning model (GP) with one-way permissible deviations (Sueyoshi, 2000). In fact, this model incorporates both the incoming and outward trends in a model. The DEA model is expanded to measure the productivity level of a particular DMU based on its relative performance comparison with other DMUs model.

The units under study in the additive model are considered to be effective when the value of the objective function equals zero (when the gap between the unit and the current unit is zero). Note that no performance measurement is performed on the aggregate model. Instead, direct inputs and individual leads are searched through the lack of search variables. Therefore, there is no distinction between strong and weak efficacy (volker, 2012).

Based on the proposed model (BCC model) for estimating technical efficiency in branches of National bank of Kerman province, the results obtained from model solving for three groups are as follows.

Table 1 Summary of research findings on the estimation of technical efficiency of branches 1 to 6

	Group 1	Group II	Group III
Number of branches	46	44	40
Average technical performance score	0.833	0.77	0.924
The standard deviation of the performance score	0.170	0.207	0.117

Maximum performance score	1	1	1
Minimum performance score	0.477	0.392	0.571
Number of effective branches	17	13	26
Number of branches is inefficient	29	31	14

By sorting out the results of the technical efficiency obtained from the data envelopment analysis, it is determined exactly which branch has performed better than the other one. In fact, the results of data envelopment analysis have provided us with an indicator for comparing efficient and inefficient branches, which can be especially useful for decision makers and supervisors of instrumental branches.

Discussion and conclusion

So far, many studies have been conducted in terms of efficiency types and many improvements have occurred in this field as well. Efficiency in economy has wider application in many countries which has been an affecting factor to achieve their growth objectives in various fields and has played a role as deterministic factor. The purpose of efficiency is optimal usage of production factors that in a scientific manner with production costs reduction ultimately result in improving welfare of people involved in this process. International attention to the efficiency on one hand, and considering it in politics of economic development programs on the other hand reflect politicians and administrators' attention to importance and necessity of performance. In general, efficiency calculating in economic issues is possible in parametric and non- parametric methods.

Data envelopment analysis is a non-parametric linear programming method to measure performance with estimation of the production frontier. This method calculates an organization's efficiency in a group in terms of organization with the best function in the same group. Efficiency measuring using this method is a cross-sectional study and in specific time (i.e. a financial year), measuring branches efficiency provides efficiency comparison possibility between them. Technical efficiency reflects a branch ability to obtain maximum output of an input set. Assuming the same technology for all the branches, lack of inputs wasting in production of a certain amount of output is regarded. Technical efficiency is due to production scale and based on technical relation, not costs and charges. So, in order to promote their function, bank must increase customers number via increasing activity specially propaganda and providing new services proportional to their needs in available area and subsequently provide them with income growing and high profit.

Results showed efficiency level average for three groups 1, respectively 77% with a standard deviation of 0.2 in range of 0.2 to 1, 92% with a standard deviation of 0.11 in range of 0.57 to 1 and 83% with a standard deviation of 0.17 in range of 0.47 to 1. The results showed that average technical efficiency estimated for branches are close to some extent and suggests proximity of the technology level applied between groups and technology estimated to cover frontier function. Branches that are low in efficiency can be a point of promising to decision makers. Because along with evolution of organizational structure, bank outputs for such branches can be promoted using the current resource inventory. Improving technical efficiency to a branch depends on improved allocation of used inputs and improving overall efficiency depends on improving the organizational structure, procedures and decision-making process.

Finally, some points must be mentioned. First, in this study the method applied to estimate branches efficiency measured relative performance rather than absolute performance. In other words, in this method how to operate a branch can be measured in presence of other branches. So, branch pattern presented above might not work absolutely. As a result, branches with maximum efficiency scores can promote their function, too. If more similar branches' information be available, efficiency level is indicated better and more accurate. Efficient branches are suitable relative reference to increase efficiency of inefficient units. Branches which employ greater amounts of inputs to produce one unit of output can

make their function closer to reference branches function and thereby reduce the consumer input surplus, and increase their efficiency. Secondly, ignoring the premise of technology homogeneity in studied branches can effectively influence the creation and development of fluctuations about technical efficiency calculation among the branches.

Ultimately, improving branches efficiency must be combined with a deep understanding of the environmental which in the phenomenon occurs. Technical performance is not a separate entity that under any circumstances and regardless deep attention to its link, have formation and survival possibility and this is of social phenomenon features that variables are involved in a complex network of continuous interaction and results of these extensive network interactions by changing elements of network components are subject to change. So, in order to deep understand the performance, understanding the environment and context in which this phenomenon arises and powers arrangement in the environment and a deep understanding of the extensive interactive network are strategic necessities.

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