

Investigating the efficiency of the branch offices of the Tose'ye Ta'avon¹ bank by the DEA method

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ABSTRACT

The present research was designed and implemented with the aim of investigating the efficiency of the branch offices of the Tose'ye Ta'avon bank by the DEA method. For this purpose, the statistical population of this study was all the branch offices of the Tose'ye Ta'avon bank at the national level. The number of branches under study was estimated 31. The present research in terms of objective is an applied research while the data collection methodology is of a field research type. The library tool for collecting the data as well as the Delphi method was applied for finalization of the information. The information collected was analyzed by using the WINQSB software, where the findings indicated from among all the provinces indicated; 9 branch offices in 2012, 9 branch offices in 2011, 7 branch offices in 2010 and 8 branch offices in 2008 were highly efficient, branch offices of provinces of Kermanshah and Golestan in 2012 and branch offices in the province of Fars in 2009 had a weak efficiency while the rest of the offices were inefficient.

Keywords: Efficiency; Data Envelopment Analysis (DEA); Branch offices; Tose'ye Ta'avon bank

1. INTRODUCTION

Man, from long ago has been thinking of facilitating and promoting his life affairs appropriately. The human efforts have always been directed at maximizing the outcomes with the least amenities available so as to create the value added. It is clear that due to limited resources in access and to make up for this drawback, man has always focused on obtaining outputs with increasing quantity and quality. Measuring the efficiency has always been a main discussion of management. That which strengthens the defensive structure of an economic unit and promotes it over other rivals is a perceptive look whereby the planners of that unit will attempt by creating an appropriate ground to eliminate drawbacks and to promote strong points in the whole system while identifying weak and strong points. This will not be achieved unless by using the methods which will in the end of correctness and free from seduction lead to an identification of efficient and inefficient units. Across the world, banks and generally the banking industry are considered as main elements of the economy in any country. They play a determining role in development and economic growth of the countries by providing various financial and credit services (micro and macro). Presently, the most common way for assessing the branches in domestic banks is to grade them, such that only in

¹Development and Cooperation bank

accordance with the level of the resources, consumptions (outputs) and the like are rated while by considering the intervals defined in each specific bank, rate of the branch will be determined. The result of grading the branches of the banks is approximately the basis for all main decisions. A preparation of organizational charts, sharing investment in regions and provinces and allocation of rewards and in total a macro perspective of the senior managers and banks managers are formed in accordance with the rate of the branches (Doosti and Ebdali, 2008). The Data Envelopment Analysis (DEA) is a linear planning -based method. This method is applied for assessing the relative efficiency of the decision making units which perform similar duties. Banks by attracting peoples' deposits and flowing monetary resources collected will perform their duties. As attraction, allocation and flowing resources are done efficiently, it will prepare a necessary ground for attaining economic growth and development and if the way deposits is attracted and applied inappropriately, not only will economic growth not be achieved but also it will engender in crises in the society. Thus, the question that arises about banks is to what extent of efficiency banks act in an economy (Hadian and Azimi Husseini, 2004). In the past, traditional and empirical methods of efficiency and productivity, introducing proportions easily and merely for research and educational activities were applied. However, these methods were not practically able to express the efficiency and productivity of the units (branch offices) intended. Today, in order to evaluate the efficiency of the systems intended, the mathematical models of operation research which is a set of activities that considers input and output indices simultaneously are applied (Mahmoodi Khoshroo and Ghasemi, 2010). Efficiency and productivity are the most important topics of economics especially for attaining an economic growth. In a market economy, the banking system is one of the most important elements of the country's economy. The growth and prosperity or the economic recession of a country is highly correlated with the quality of banking institutes' performances.

The existing capital in banks is the main resource of purchasing products, services and their granted loans and of creating credits for all the economic units. Thus, the optimum performance of the banks and effective use of the amenities in access to reach their objectives including exploiting capital and its resources will have great influence on different economic activities and overall economic situation of the country. Today, due to an expansion of monetary and financial markets and some major economic and social differences between provinces and various client groups, it is imperative to apply a systematic method in line with investigating the efficiency of the branch offices including the necessities to attain to attract better clients and attract the market. In this chapter, first the nature of the terms applied is going to be explained and then the relevant dimensions will be investigated by the DEA model.

A market-centered identification will allow for the market efforts to be centralized and prepare a situation where even in the area of productive activities, diversity of action and acting in different fields, getting banks far away from access to expertise and affecting an optimum use of the resources and amenities are prevented. In a market-based economy, the banking system has an encumbrance and is one of the most important elements of the economy in every country. Banks can by providing financial capital for economic sectors prepare an appropriate situation for capital investment and cause employment and national production to rise. Even by funding and granting loans, the banks can generate new professional opportunities for the experts and better distribution of income at the national level. To add to this, banks can by keeping the cash flow and facilitation in transferring it be a protector of the personal, state and internal and foreign trading assets. Also, as an agent for administering monetary policies, banks will have a greater role in the economic stability.

Threats and pressures arising from globalization and growing development of non-banking financial and credit institutions in recent years, have led the banks to act to improve their performance in domestic and foreign markets. In this regard, the rational and more efficient solution could specify the banks' situations from a perspective of an overall performance. Should banks perform the processes related with assessing the performance and test their own situations in the market, they will be able to improve their own existing situations while ascertaining the weak and strong points. Experts have maintained that an assessment of traditional performance and subsequent rating the branch offices by traditional ways are done by using the financial indices and financial ratios where this issue has challenged, hence using a system of assessing the performance which is just reliant on financial indices could cause problems for the outfits.

However, modern methods in measuring efficiency draw our attention to a comprehensive approach named the Data Envelopment Analysis (DEA). In DEA, there is no need for distribution function to be determined and no need for hypothesizing. In this case, the DEA, by making and solving the n model will investigate the n performance of the unit and maximize any of the observations in comparison with the efficiency margin (Kurd, 2011). In recent years, as the subject took on more significance in the area of measuring and rating the branches by using the DEA technique, researches have been done in various sectors inside and outside of the country where the following are examples of it:

In a research in which the management efficiency of the Iranian Mellat Banks are at various times assessed by using the DEA technique, 35 management systems of the bank were evaluated in a period of 12 months. Results indicated that efficiency was estimated by the help of the CCR model where 86% of the management systems were efficient in all periods and the average accumulative efficiency of the management systems was 0.452. Some of the management systems were efficient at some times while they proved to be inefficient at some other times. Hence, the inefficient period was recognized wholly. The highest average efficiency of the management systems was related with the 12th month whereas the lowest rate was related with the 4th and 5th and 7th months (Husseinzade Lotfi et al, 2006). In another research, the total productivity of the Iranian Bank of Tose'ye Saderat and the variations of its branch productivity were analyzed by means of the DEA. In this research the full SBM rating (measurement based on ancillary variables) was used for analyzing the overall productivity of the Iranian Bank of Tose'ye Saderat during 1993-2004 while the Malmo Quest productivity index was applied for measuring the productivity growth of its branches during the 2003-2005. The results suggested that the productivity of the bank branches in 2004 was on average one percent while in 2005 it was two percentage points. Also, the bank branches were rated based on productivity growth (Hejazi et al, 2008).

In a research titled "the relation of technical efficiency and "rating" of the branches of trading banks by using the DEA, it was found that in order to assess the performance and rate the branches of the domestic banks, the methods based on transaction volume and level of acquisition of resources are applied while the extent to which banks enjoy inputs (space, amenities, human force and environment) is not taken into account. In this paper which was carried out by Doosti and Ebdali, to have a more realistic understanding, the DEA technique was used in a form of design and implementation of a software system for estimating the efficiency of the branches which is a standard based on inputs and outputs. In this paper, by applying the DEA technique, a method is presented in which drawbacks and shortcomings of the common methods for rating the bank branches are to a great extent eliminated and the results are more exact.

In this assessment where some of the branches form the efficiency margin are recognized as efficient branches and receive the efficiency grade of 100 while the rest of the branches, in proportion to distances they have from efficiency will be scored 0-100. This score indicates the efficiency level of each branch in a period of performance being assessed. The branches receiving 100 in the period of performance have had a better performance than other branches in terms of efficiency; which into say they have applied their own resources and inputs efficiently for producing the outputs while they have had a higher managerial factor in practice. Also, for each of the inefficient branches, one or several sets of the branches are selected as reference branches (Doosti and Ebdali, 2008). In a research with the subject of "measuring the efficiency and rating the branches of Keshavarzi bank by using the DEA in 172 branches of the Bank in Eastern and western Azerbaijan provinces of Iran as well as Ardabil, the efficiency of 172 branches by the assumptions of constant yield and variable to scale in accordance with special properties like performance, range of activities and size of the branch were determined and then the technical efficiency and scale were measured. In the end, for the inefficient units some branches were selected as model and reference branches. Results indicated that the average technical efficiency of the Bank of Keshavarzi branches in district 4 under the conditions of constant yield and variable to scale were 0/81 and 0/94 respectively while the average efficiency to scale was 0/86. In a state of variable to scale yield, the highest average of efficiency among the branches of rural services was 0/98 whereas in a state of constant yield to scale among the main branches it was 0/84 (Haghighi and Nasiri, 2003).

In a research with the subject of investigating the efficiency level of state banks of the province of Isfahan, by using the DEA it was found that efficiency and productivity are the most important factors for development and expansion of economic agencies such that a fulfillment of a favorable level of it is a key for the survival of the agencies in a competition environment of modern economies. Assessment of the banks' performances is of high importance. In this research the efficiency and productivity of 9 state banks in Isfahan was technically measured by using the concept of production function and by the method of non-parametric DEA for a period of 2005-2006 by using the DEAP software. According to the results of this paper with the assumption of constant yield to scale, the production of all the banks except for Bank Maskan was inefficient. Assuming the yield of the variable to the scale, 3 banks of Melli, Maskan and Tose'ye Saderat were efficient (Ebrahimi et al, 2006).

In the paper of "investigation and measurement of the technical efficiency of the selected branches of the Saderat banks of Tehran", the layer DEA was used by an intermediate attitude and the assumption of the yield of the variable to scale was addressed. The DEA method deals with estimation of relative efficiency, hence, it compares the performance of any branch with the performance of the best branches. The selection method is by two ways; first, that the efficiency of branches rated premium, one, two and three are measured in 2004-2007, second the relative efficiency of a branch is estimated which in 2005, 2006 and 2007 possessed the same rate in 2004. Results of measurement indicated that the average trend efficiency of all four grades is equal; such that during 2004-2006 the trend was descending which saw a rise in 2007. Also, by considering the average efficiency standards, number of efficient branches, percentage of efficient branches and minimum efficiency estimated for all four grades during 2004-2007 it was found out that the premium rated branches in 2004 were found to have a good performance. Concerning grade one, two and three branches, the year 2007 was the best year (Sobhani and Karjoo, 2012). In a research regarding the relation with the financial performance of the banks accepted in the Stock Exchange Bourse (application of TOPSIS in the DEA) it has been stated that the

banks' managers are the interested parties for whom the information arising from the analysis of financial performance is of high importance. In this line, they, by considering the valuable financial information will assess the situation of the bank and adopt decisions accordingly. Results from an ideal and anti-ideal view for any decision-making unit fall under the relative closeness index and then decision – making units are rated accordingly.

Results indicated that from the perspective of the ideal decision making unit, Bank Karafarin, Bank Mellat and Bank Parsian have the least distance while Bank Saderat has the highest distance with ideal and from the perspective of the anti-ideal decision making unit, Bank Saderat has the least distance and Bank Karafarin has the highest distance with anti-ideal (Rostami et al, 2011). In a research titled "assessment of efficiency of the branches of Bank Eghtesade Novin with a combination of nervous network method and DEA" it has been mentioned that with the appearance of new technologies and the internet in recent years, competition between banks has risen considerably. An efficiency estimation of the branches of Bank Eghtesad Novin in 2007 and 2008 has been the subject of this paper. By studying the results concluded, guidelines could be presented for increasing efficiency at inefficient branches. One of these guidelines is about the branches which though have been successful in attracting deposits and the degree of their deposits residue has seen a rise 2008 than 2007, their efficiency has not been improved. The reason is lower residue of the facilities compared to the residue of their deposits. These branches by means of granting more facilities could increase their own efficiency (Mehrabian et al, 2011). In another study, the estimation of the Iranian banking system efficiency was addressed by using the comprehensive DEA method. The sample under investigation in the research includes 6 trading, Melli, Saderat, Tejarat, Sepahan and Refahbanks and 4 special banks of Maskan, Tose'ye Saderat and San'at and Ma'dan. The period under investigation was three years from 1997-1999. The results indicated that Melli, Keshavarzi and Sanat and Ma'dan were relatively efficient from a technical and economic perspective while Bank Tose'ye Saderat had a relative technical efficiency only. Bank Mellat was seen the most technically inefficient bank while Bank Tejarat was found to be most inefficient bank in terms of economic and specialized performance among the ten banks under study (Hadian and Azimi Husseini, 2004). In a method presented by the paper "efficiency of the Greek trading banks with the approach of DEA" it has been proposed the efficiency of the banks should be investigated without inputs and only by using the outputs. Findings revealed that there is an extended variation in efficiency and increased efficiency is fulfilled as the number of small banks becomes diminishes. Also, as assets increase, efficiency will too increase (Halkos, 2004). In another paper, the performance of the Nigerian banks was analyzed by using the DEA method. There, by using the non-parametric DEA in a sample of Nigerian banks in a 5-year period, efficiency was measured. Under the assumption of constant yield to the scale of average efficiency, all the banks showed stable improvement in a five year old period.

Although the improved efficiency seemed lower in the third year the average three year period for all the banks showed a constant improvement. After considering the assumption of the variable yield to the scale, the efficiency score remained significantly constant though it was lower in some cases (Tanko, 2008). In another paper the efficiency of the Bulgarian banking system was analyzed by using the traditional approach and DEA. In this paper, the expansion trends of the Bulgarian banking system were assessed by focusing on dynamism and efficiency of the banking system. Results indicated that firstly, the foreign banks compared to domestic and provincial banks act better due to some technical and managerial privileges, secondly big banks compared to small banks, due to reduced economic and performance costs are more efficient (Nanoski et al, 2007). In another research, an assessment

of Malaysian banks' efficiency was analyzed and the DEA method was applied for estimating the overall efficiency, scale and gross technical efficiency for the trading banks of Malaysia in a time period of 2000-2006. Results indicated that the inefficiency of domestic banks is in correlation with the gross technical inefficiency not with scale inefficiency. To the contrary, the inefficiency of the foreign banks is related with the scale inefficiency than gross technical inefficiency. Results of the analysis suggested banks in recent years have been more efficient with different access (Taher et al, 2009). In another research the efficiency determinants of Tunisian banks was investigated by DEA. The paper aimed to study the efficiency of trading banks of Tunisia in a time period of 1996-2010. Findings revealed that the bank's cost-related efficiency was %41. The participation of the market in terms of bank deposits and participation in risky activities, particularly in the area of credits affect negatively their efficiency. In addition, state banks compared to private banks have shown to be more efficient (Ayadi, 2013).

2. DEA FUNDAMENTAL MODELS

There must be a distinction between two takeaways of efficiency; first, efficiency means to reach the threshold of potential technical amenities where each agency could have or have not reached it, such a definition could be possible theoretically; but its measurement is impossible in practice; the second procedure is as the best observed practical behavior by agencies active in the industry. Thus, agencies upon their performance (not with a framework inaccessible in practice) could be compared. This takeaway is the key towards the practical methods of measuring efficiency, which is linked with the concept of marginal functions. To achieve marginal functions, there are two parametric and non-parametric ways. In non-parametric way, the comprehensive analysis or (Data Envelopment) developed for the first time, by Charles, Cooper and Rodrigues is applied. In this way, the efficient marginal curve-determined through a set of points with linear planning- is created and then, after a process of optimization it is determined whether the agency intended is placed on a line of efficiency or outside of it. Hence, the efficient and inefficient agencies are distinguished.

The first studies being parametric, performed by Eanger and Chaw which is divided into two absolute statistical parametric and statistical parametric methods. The absolute statistical parametric method includes production function and a part of one way error that would define the position of the agency on, over or under the marginal line and reflects the inefficiency. In this method, the reason why there is a difference between the actual production and marginal production of the agency is solely the technical inefficiency. The function of statistical absolute marginal production is estimated by two ways of maximum likelihood (MLE) and minimum common squares (OLS). In the two statistical parametric methods, the reason why there is a difference between the actual and marginal production is, in addition to technical inefficiency is the agent of haphazard. Here, in this method, to gauge the technical efficiency of the agencies, the haphazard marginal production function is used. The haphazard marginal production function was independently presented by Eanger, Lavel and Schmitt and Myosin and Van den berg. The main model includes a definite production function for periodic data and a two part compound error sentence. A part of the error sentence is indicative of the haphazard factors and the latter is a part of technical inefficiency.

3. TYPES OF DEA PARADIGM

DEA paradigms are generally: CCR and BCC paradigms

CCR paradigm:

This paradigm is a constant return to scale and seeks by selecting the optimum weights for the input and output variables of the unit under investigation to increase a fraction of efficiency of this unit (zero unit) in such a way that the efficiency of other units will not violate a margin of over one.

This paradigm has been raised in two input and output modalities and in three fraction, multiplier and envelopment forms. Later, we address the various forms on the nature of inputs. In accordance with the property of the envelopment form, the CCR paradigm on the nature of inputs with an envelopment form was selected for this writing. Hence, in this part, we deal with an explanation of this form of CCR on the nature of inputs. In analyzing the data envelopment, a dual multiplier form will always result in a form of envelopment while should we write a dual multiplier form of CCR, the CCR envelopment form like the following:

CCR model:

$$\text{Min } \theta + \epsilon \left[\sum_{i=1}^m S_i^- + \sum_{r=1}^s S_r^+ \right]$$

s.t

$$y_{rp} = \sum_{j=1}^n y_{rj} \lambda_j - S_r^+ \quad , r = 1, \dots, s$$

$$\theta x_{ip} = \sum_{j=1}^n x_{ij} \lambda_j + S_i^- \quad , i = 1, \dots, m$$

$$\lambda_j \geq 0 \quad j = 1, \dots, n$$

$$S_r^+, S_i^- \geq 0 \quad r = 1, \dots, s, \quad i = 1, \dots, m$$

As seen in this paradigm, a selection of each allowable vector λ will create high margin for the output and a low margin for DMU and contrarily, the limitations relevant with $j \lambda \geq 0$ will present an optimum choice for being relevant with $\min \theta = 0$. The envelopment paradigm presents a set of guidelines. These guidelines will allow for the convex combination created for each inefficient unit and the extent to which these efficient units are involved to be specified in these combination $j\lambda$.

These guidelines will create a high margin that would envelop all the observations, making them objective as the data envelopment analysis. Hence, the main privilege of the envelopment form is an answer type which is given for the efficiency of various units. The answer of the envelopment form on the input nature will directly show a relative extent of efficiency of the unit under investigation while the answer obtained equals one for a unit; which is to say the unit under investigation or DMU is efficient and in case, its amount is smaller than one, DMU or the unit under investigation is inefficient.

3. 1. BCC paradigm

This paradigm has been named after the first letters of the names of its creators, i.e. Bencker Charles, and Cooper. Contrary to the CCR model which is an assumption based on

constant return to scale, in the BCC model the assumption is return of the variable to scale. Use of the return of the variable to scale will engender a more accurate analysis to be presented, by estimating the technical efficiency based on the efficiency amounts arising from scale and efficiency resulting from management. For making the input-oriented and output-oriented models in the main model of BCC, the same basics of the CCR model is applied. In the input – oriented model, by reducing the inputs, the level of efficiency will increase, but in the output-oriented model, as outputs increase, efficiency will to increase. The BCC model is like the following with an input-oriented form:

3. 2. BCC model

$$\text{Min}\theta + \epsilon \left[\sum_{i=1}^m S_i^- + \sum_{r=1}^s S_r^+ \right]$$

s.t

$$y_{rp} = \sum_{j=1}^n y_{rj} \lambda_j - S_r^+ \quad , r = 1, \dots, s$$

$$\theta x_{ip} = \sum_{j=1}^n x_{ij} \lambda_j + S_i^- \quad , i = 1, \dots, m$$

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

$$\lambda_j \geq 0 \quad j = 1, \dots, n$$

$$S_r^+, S_i^- \geq 0 \quad r = 1, \dots, s, \quad i = 1, \dots, m$$

3. 3. Some of the privileges of the DEA method

In this method, the unit of measurement is not sensitive and inputs could have various units. DEA is a managerial method which measures the efficiency of the units relatively and presents managerial guidelines. The DEA method deals with a comparison of the units with one another and abstains from a pure idealism. The DEA method will just specify efficiency and does not have the weak points of other systems of measurement seeking a type of absolutism, while efficiency in one paradigm is an achievable quantity.

3. 4. DEA paradigm limitations in comparison with other paradigms

Because, DEA is mathematical and pure numerical technique, hence, measurement errors might follow major changes, thus, after identifying the efficient unit, the units and outputs should be controlled again and confidence be made. This method is a pure mathematical technique and is based on a linear planning which does not have the ability to compare the qualitative variables of the decision making units. If only one of the inputs and outputs of the decision making units changes, fundamental changes will arise in the degree of the efficiency of the decision making units. An overall consensus on the selection of the inputs and outputs is not available. (Dashtinezhad, 2012:5).

4. METHODOLOGY

Objectively speaking, scientific researchers are divided into three fundamental, developmental and applied categories. The current research, because aims to expance knowledge to be applied in a specific hypothesis are considered an applied research. Based on how data required are acquired, scientific research are divided into two descriptive (non-experimental) and experimental categories. The experimental method is applied for establishing a cause and reason relation between two or several variables. The descriptive research too includes methods whose aim is to describe the conditions and circumstances under consideration. Thus, the current paper is a descriptive research. Descriptive researches are divided into several categories by themselves where this research is a survey type research. A variable includes everything that could accept various values. These values can at different occasions be different for a person or a thing or that it can be different at one time for people and various things.

Input and output variables under consideration and their definitions are as follow:

System inputs: System inputs are crude information taken from inside or outside of the environment and cannot be invoked by this very initial form.

1. Number of personnel: In the human force sector, a number of high profile forces and higher education have special advantage each. Thus, the branches' personnel cost as an input which is a function to the number and combination of human force is selected in this sector. This index will show the number of branches' personnel, and their records and education in a form of one advantage. The human force of any organization is the largest capital of that organization and the more they receive motivation, the more they will be in the service of their respective organizations, thus contributing to the maximizing the returns. The aim of estimating the index is to compare the personnel situation at different branch offices and to apply it as an input index.
2. Costs: The costs' input index is an advantage for each branch estimated by considering the current costs of the branches, including depreciation costs (repair and maintenance), costs of administrative necessities, utilities costs and costs incurred by public postponed claims. No organization will achieve its own predetermined goals without incurring costs of its resources, but how these costs are incurred is of high importance. Of course, there are costs at the branches (equipping the branch) that could be called investment, because they themselves will attract resources and their depreciation during several years.
3. Number of the branches under superintendence: This index aims to measure the extent to which any branch office enjoys the branches and amenities like terminals, administrative equipment and foundation. This index will help the level of the existing capabilities in any branch in terms of amenities to be recognized and to be applied in making the branch offices efficient and maximizing their efficiency score in future periods. In accordance with the level of population and potential financial resources of any city, branches could be established therein while they can be under the control and supervision of the management of the branch office in the provinces.

System outputs: System outputs are input information on which a set of processing has been done and have become usable.

1. Deposits: All the sums deposited in the banks by persons including real and legal people as different deposits which include visual and non-visual deposits and deposits

out of the main range and deposits of people. (Saving, current, long term and short term deposits and other deposits).

2. Payment facilities: This part includes types of facilities and loans granted. Granting facilities constitutes a main part of banks' operation and this part of banking activities is economically important. Payment facilities are the credit or loans the bank provides the client with while granting the facilities will constitute a main part of banks' operation. As said this part of activities is economically important.
3. Branches fees: Banks by means of facilities they pay, receive interest and also, in this regard they provide some various services for which they receive sums called fees.
4. Services: Another dimension of modern banking, in addition to deposits and granting facilities that would result in transference of capital from one part to the latter is its service aspects. In this part, a weighted aggregate is considered under the index of services as the branch outputs in its performance in the area of services provided to clients.

5. RESULTS

One DMU is 100% efficient based on the existing evidence, if and only if the performance of other DMUs does not indicate data and outputs of the unit can be improved and meantime, other data and outputs of that unit cannot be aggravated. Some marginal points whose relative efficiency is estimated 100% might be with "weak efficiency", because their ancillary variables are non-zero. The mentioned units can be specified through the following models:

Min E

St:

$$\begin{aligned} \sum x_{ij} \lambda_j - x_{i0} E + S_i &= 0 & , & \quad i = 1, 2, \dots, m \\ \sum y_{rj} - y_{r0} - S_r &= 0 & , & \quad r = 1, 2, \dots, t \\ \lambda_j \geq 0, \text{ Mark free } E & & , & \quad j = 1, 2, \dots, n \end{aligned}$$

In a state where $E = 1$, if $S_i > 0$ the unit intended consumes more data compared to the compound virtual units and if $S_r > 0$, the outputs of the compound virtual unit is more than the unit intended (DMU_0). Thus, in this state, the DMU_0 efficiency is not genuinely one. The DMU_0 performance is 100% efficient, if and only if $E = 1$ and all the ancillary variables $S_i^{-*} = S_r^{+*} = 0$. The DMU_0 performance is weak, if and only if $E = 1$ and $S_r^{-*} = 0$ or $S_i^{+*} = 0$.

Thus, on this basis in 2012, the branch offices in Tehran, Semnan, Ghazvin, Ghom, Mazandaran, Markazi, Northern Khorasan, Alborz, Southern Khorasan, in 2011, in branch offices of Tehran, Khoozestan, Semnan, Ghom, Lorestan, Mazandaran, Northern Khorasan, Alborz, in 2010, branch offices of Tehran, Ghom, Kerman, Lorestan, Mazandaran, Northern Khorasan and Alborz, and in 2009, the branch offices of Eastern and western Azarbaijans, Tehran, Kerman, Golestan, Lorestan, Mazandaran and Northern Khorasan were super-efficient while branch offices of Kermanshah and Golestan in 2012 and branch offices in Fars in 2009 were weak and the rest were inefficient. According to the second hypothesis of the research, the managers of the branch offices should by meticulous expertise and successful planning in the least time possible proceed to the promotion of their own units.

However, based on research findings, the inefficient units could be made efficient by making costs purposeful, employing expert personnel, increase of resources, paying

purposeful facilities and also reducing the claims postponed. Based on the findings, branch offices of Tehran, Alborz, Ghom, Mazandaran, northern Khorasan, southern Khorasan, Ghazvin, Markazi, in 2012, branch offices of Semnan in 2011 and 2012, branch offices in Khoozestan in 2011, those of Lorestan in 2009, 2010 and 2011, branch offices in Kerman in 2009, 2010 and hose in Western Azerbaijan, Ardabil, and Eastern Azerbaijan in 2009 were among the top efficient branch offices.

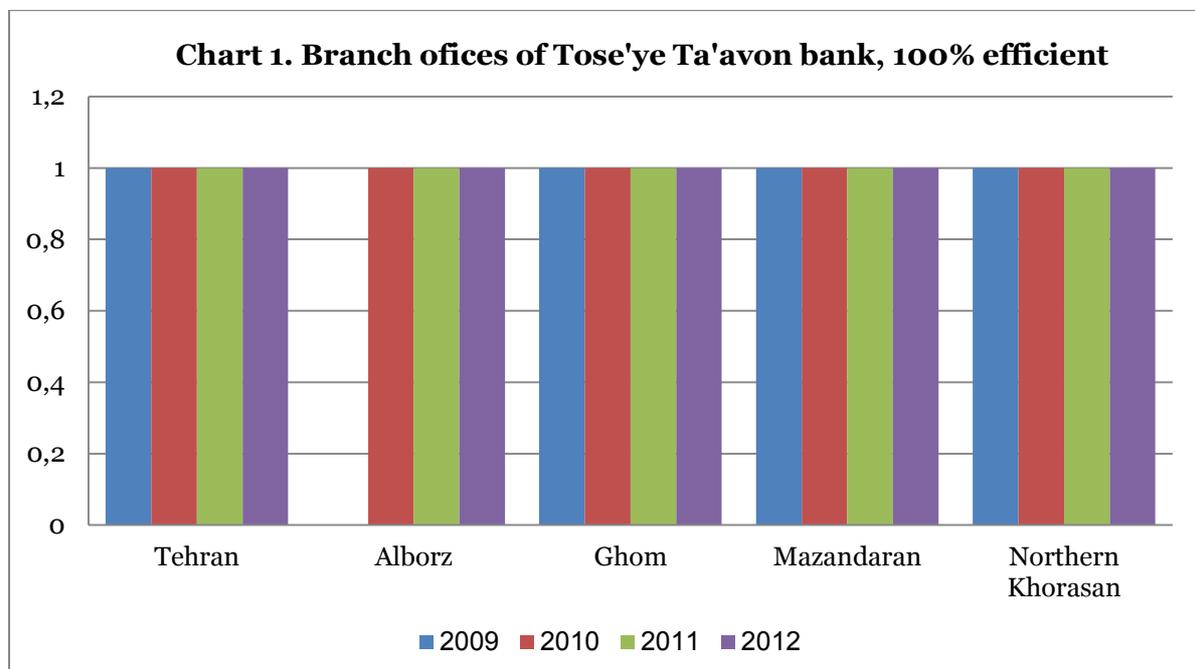
However, the branch offices in 2011 and branch offices in 2010 were found to be weak in terms of efficiency. Branch offices of eastern Azerbaijan, Isfahan, Booshehr, Kohgiloye and Boyer Ahmad and branch offices of southern Khorasn, Ghazvin , and Markazi in 2009, 2010 and 2011, branch offices of Semnan in 2009 and 2010, branch offices of Kermanshah in 2009, 2010 and 2011, branch offices in Khoozestan in 2010, 2009 and 2011, branch offices of Lorestan in 2011, branch offices of Kerman in 2011 and 2012, those in western Azerbaijan, Ardabil, eastern Azerbaijan in 2010, 2011 and 2012, those in Shiraz in 2010, 2011 and 2012 and those in Hamadan in 2009 were among the average inefficient.

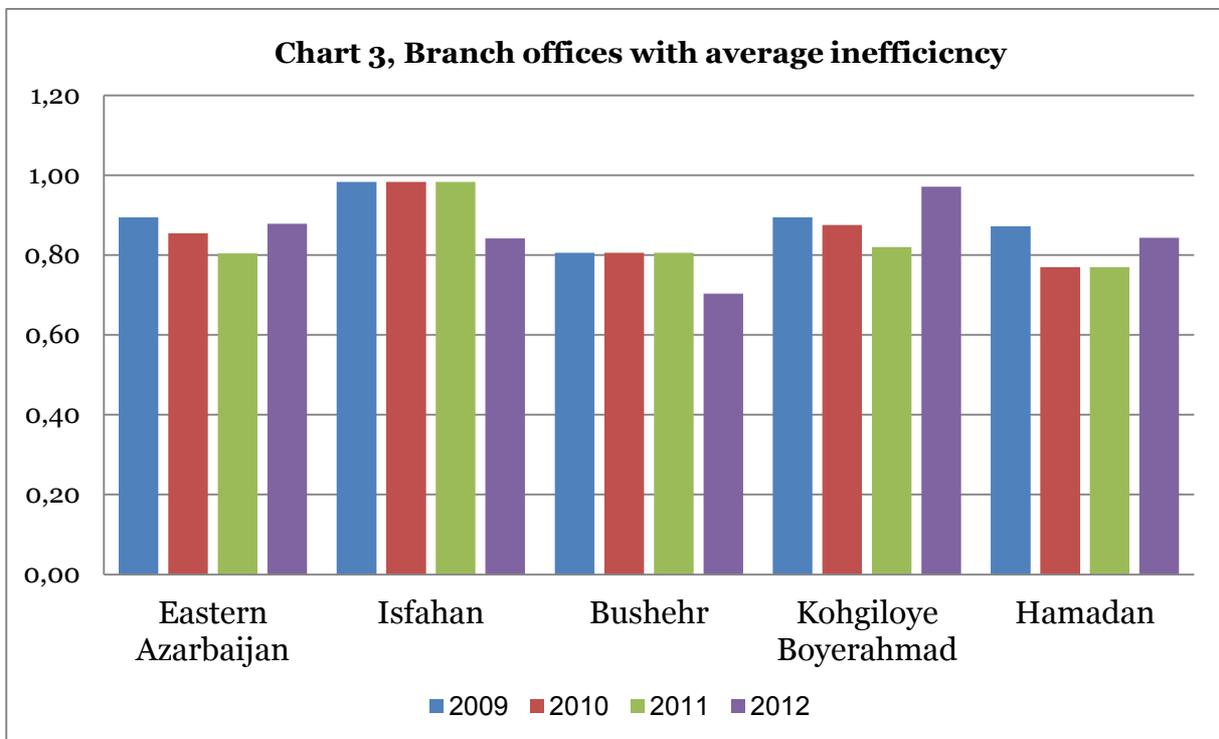
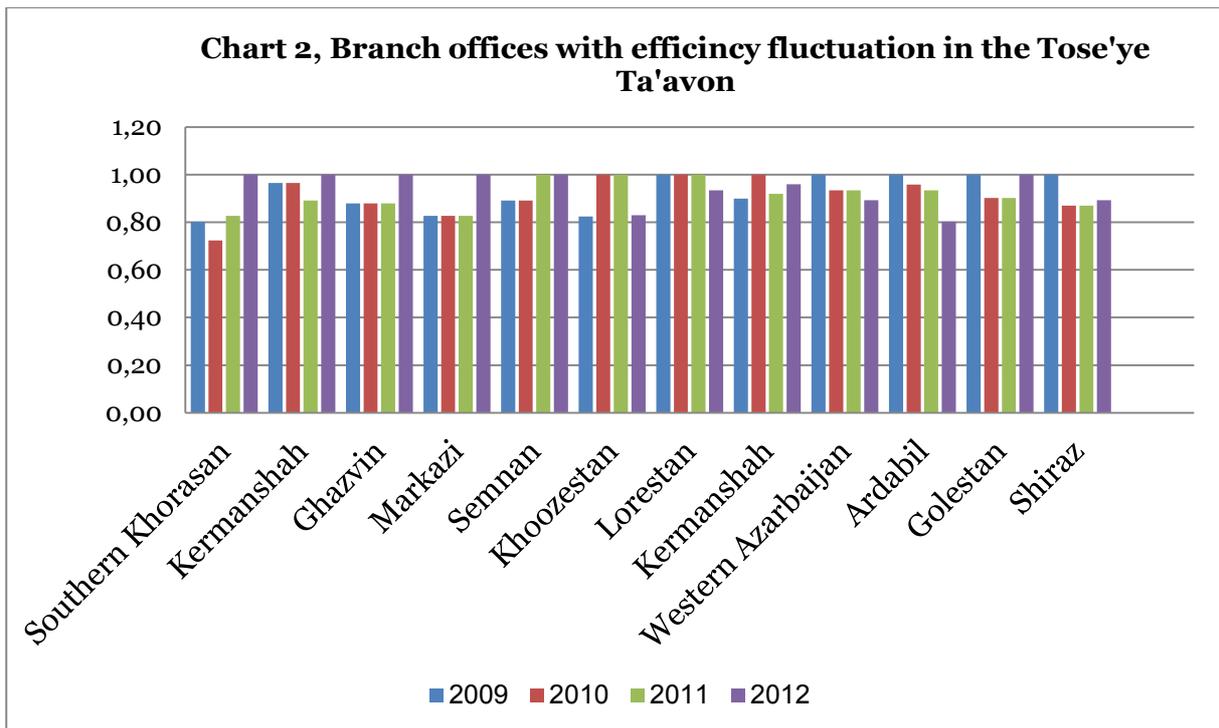
Branch offices of Ilam, Chaharmahal and Bakhtiari, Zanjan, Kurdistan, Guilan, Razavi Khorasn, Sistan and Baluchistan, Yazd and Hamadan in 2010 and 2011 were among the weak inefficient branch offices. In accordance with the DEA method results, it is recommended inefficient offices which have an ascending return to scale, increase their own inputs and the offices whose return is descending towards scale, diminish their inputs. The inefficient branch offices, efficient office should be followed so that performance is made better. All the branch offices should compare their existing amounts with favorable amounts and estimate its return and to economize by the same amount while applying the resources. Managers at inefficient branch office should identify their weak and strong points and try to move towards efficiency by increasing or shrinking the expert forces or training the existing personnel and by reducing the costs incurred.

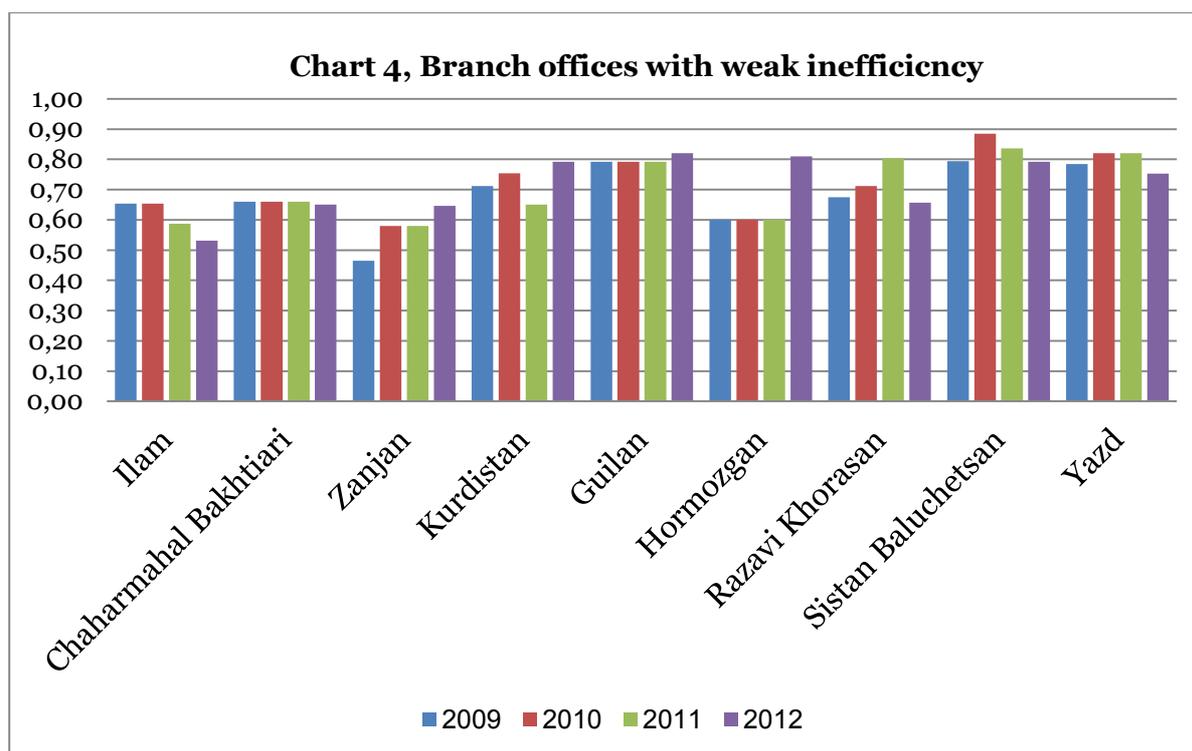
Table1. Results relating to the efficiency of the branch officesof Bank Tose'ye Ta'avon by assuming the significance of the inputs and outputs being constant.

Province name	2009 results			2010 results			2011 results			2012 results		
	CCR	CRS	VRS									
Eastern Azerbaijan	0.88	0.88	0.89	0.83	0.83	0.85	0.79	0.79	0.80	0.85	0.85	0.88
Western Azerbaijan	1.00	1.00	1.00	0.89	0.89	0.93	0.92	0.92	0.93	0.88	0.88	0.89
Ardabil	1.00	1.00	1.00	0.94	0.94	0.96	0.84	0.84	0.94	0.80	0.80	0.80
Isfahan	0.88	0.88	0.98	0.82	0.82	0.98	0.81	0.81	0.98	0.78	0.78	0.84
Ilam	0.63	0.63	0.65	0.60	0.60	0.65	0.55	0.55	0.59	0.52	0.52	0.53
Bushehr	0.76	0.76	0.81	0.76	0.76	0.81	0.74	0.74	0.81	0.70	0.70	0.70
Tehran	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Chaharmaha Bakhtiari	0.56	0.56	0.66	0.63	0.63	0.66	0.65	0.65	0.66	0.60	0.60	0.65
Razavi Khorasan	0.66	0.66	0.68	0.69	0.69	0.71	0.69	0.69	0.80	0.64	0.64	0.66
Khuzestan	0.80	0.80	0.82	0.92	0.92	1.00	0.88	0.88	1.00	0.79	0.79	0.83
Zanjan	0.44	0.44	0.47	0.48	0.48	0.58	0.47	0.47	0.58	0.60	0.60	0.65
Semnan	0.86	0.86	0.89	0.88	0.88	0.89	1.00	1.00	1.00	0.99	0.99	1.00
SistanBaluchestan	0.73	0.73	0.79	0.88	0.88	0.89	0.81	0.81	0.84	0.79	0.79	0.79

Fars	0.94	0.94	1.00	0.88	0.88	0.87	0.85	0.85	0.87	0.87	0.87	0.89
Ghazvin	0.85	0.85	0.88	0.78	0.78	0.88	0.86	0.86	0.88	0.92	0.92	1.00
Ghom	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Kerman	0.89	0.89	0.90	0.97	0.97	1.00	0.89	0.89	0.92	0.92	0.92	0.96
Kurdistan	0.68	0.68	0.71	0.71	0.71	0.75	0.60	0.60	0.65	0.79	0.79	0.79
Kermanshah	0.93	0.93	0.97	0.94	0.94	0.97	0.87	0.87	0.89	1.00	1.00	1.00
Kohgiluyeh Boyerahmad	0.88	0.88	0.89	0.84	0.84	0.88	0.79	0.79	0.82	0.90	0.90	0.97
Golestan	1.00	1.00	1.00	0.82	0.82	0.90	0.89	0.89	0.90	1.00	1.00	1.00
Guilan	0.68	0.68	0.79	0.79	0.79	0.79	0.77	0.77	0.79	0.79	0.79	0.82
Lorestan	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	1.00	0.93	0.93	0.93
Mazandaran	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Markazi	0.78	0.78	0.83	0.75	0.75	0.83	0.77	0.77	0.83	0.89	0.89	0.89
Hormozgan	0.57	0.57	0.60	0.54	0.54	0.60	..564	..564	0.60	0.81	0.81	0.81
Hamadan	0.85	0.85	0.87	0.76	0.76	0.77	0.75	0.75	0.77	0.84	0.84	0.84
Yazd	0.77	0.77	0.78	0.80	0.80	0.82	0.79	0.79	0.82	0.75	0.75	0.75
Northern Khorasan	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.92	1.00	0.91	0.91	1.00
Southern Khorasan	0.79	0.79	0.80	0.70	0.70	0.72	0.78	0.78	0.83	1.00	1.00	1.00
				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00







6. CONCUSION AND RECOMMENDATIONS FOR FUTURE RESEARCHES

Efficiency, rating and grading the banking system are differing concepts that are interchangeable in a common procedure of the banks. Hence, transparency by the central bank for recognizing these concepts and identifying the best methods for their measurement seems necessary. In line with a dissemination of using the DEA in assessing the performance of the branch offices of the banks (grading and assessing the efficiency), economic efficiency measurement in addition to measuring technical efficiency could be applied for transparency of the economic situation. It is recommended an information system be established for recognizing the capabilities of the banking and monetary operations in the banking activities areas based on the national geography, known as the banking geography. This system is critical in accurate and appropriate identification of the amounts of the indices.

It is recommended that in the future researches in addition to the factors raised such factors as population, etiquette, and popular beliefs are considered.

References

- [1] Ebrahimi, S., Akbari, N., Mosrinajad, Sh., & Asadiaboalverdi, A. (2006). Investigating the extent of efficiency among the state banks by using the DEA method, *Quarterly of economic investigations*, 3(4): 75-93.
- [2] Hejazi, R., Anvarirotami, A., & Moghadasi, M. (2008). analyzing the overall productivity of Iran's bank of Tose'ye Saderat and growth of its productivity by using the DEA method, *Industrial management journal*, 1(1): 39- 50.
- [3] Haghightat J., & Nasiri, N. (2003). Investigating the banking system with the application of the DEA method, (case study: Keshavarzi bank), *Research-scientific quarterly, economic research*, 3: 9-10.

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- [4] Husseinzade Lotfi, F., Dinandari, A., Jahanshahlo, Gh., Nikomaram, H., & Bartakitaleghani, V. (2006). Assessing the superintendence of the Iranian Mellat banks in different time periods, an analysis of the DEA method, *Journal of applied mathematics*, Lahijan branch, 3(8): 85-93.
- [5] Dashtinezhad, M. (2012). Analysis of the efficiency of the companies accepted in the Stock Exchange Bourse by using the DEA method, *Periodical of management research papers*, 5: 65- 74.
- [6] Doosti, S., & Ebdali, A. (2008). Relation between technical assessment and grading the Trading banks branches by using the DEA, *Research periodical publication and economic researches*, 47(16): 63- 93.
- [7] Dadgar, Y., & Niknemat, Z. (2007). Application of the DEA model in evaluating the efficiency of the economic units, case study: superintendence of Tejarat banks, two *research and scientific quarterlies of economic researches*, 4(7): 11-54.
- [8] Rostami, M., Ghasemi, J., Eskandari, F. (2011). Assessing the financial performance of the banks accepted in the Stock Exchange Bourse (Application of TOPSIS in DEA), *Journal of Accounting*, 4(8): 19-30.
- [9] Sobhani, H., & Karjoo, H. (2012). Investigating and measuring the technical efficiency of selected branch offices of Saderat banks in Tehran, *Research periodical and economic policies*, 20(62): 195- 211.
- [10] Mahmoodi Khoshroo O., Ghasemi A. (2010). Investigating the efficiency of Kurdistan's municipality offices by using the DEA method, *Journal of industrial management of the faculty of Humanities at the Sanandaj university*, 5(13): 103-119.
- [11] Mehrabian S., Saatimotadi, S., & Hadi, A. (2011). assessing the efficiency of Eghtesade Novin offices with a combination of nervous networks and DEA, *Research operation and its applications (applied mathematics)*, 8(4): 29-39.
- [12] Hadian E., Azimi Husseini A. (2004). Estimation of efficiency of the Iranian banking system by using the DEA, *Journal of Iranian economic researches*, 20: 1- 25.
- [13] Ayadi, I. (2013). "Determinants of Tunisian Bank Efficiency: A DEA Analysis", *International Journal of Financial Research*, 4:128-139.
- [14] George, E. Halkos, D., & Salamouris, S. (2004). "Efficiency measurement of the Greek commercial banks with the use of financial ratios: a data envelopment analysis approach", *Management Accounting Research*, 15(2): 183-193.
- [15] Muhammad, T. (2008). A DEA Analysis of Bank Performance in Nigeria", online at <http://mp.ra.Ub.Uni-muenchen.De/33560/>.
- [16] Nenovsky, N., Chobanov, P., Mihaylova G., Koleva, D. (2007). Efficiency of the Bulgarian Banking System: Traditional Approach and Data Envelopment Analysis", Agency for Economic Analysis and Forecasting and University of National and World Economy.
- [17] Tahir I. M., Abu Bakar N. M., Haron S., *International Journal of Business and Management* 4 (2009) 11-25.