Using Stochastic Frontier Function to Measure Branch Efficiency of Saman Bank in Iran

Sayad Jalil Hosseini Ajdadi Niaki*
Assistant professor, Faculty of Management, Department of Banking, Tehran Branch, Islamic Azad University, Tehran, Iran

Safar Habibzade Shalmani
M.A., Faculty of Management and commerce, South Tehran Branch, Islamic Azad University, Tehran, Iran

Abstract

The aim of this study is to study the performance of Saman bank branches in Iran, and ranking them by using input oriented approach (dual approach) to stochastic frontier function. The study is based on two variables: inputs (labour cost, depreciation expenses, and operational costs) and outputs variables (attracting deposits, and granting loans). The statistical population was consisted of all the branches of Saman bank (N=105) in Iran. Of this, 45 branches in Tehran province were selected using stage sampling. We used financial balance sheets data of the bank branches to collect data. In study of the branches, efficient branches were distinguished from inefficient branches, and efficiency coefficient was measured for each branch; therefore we could rank the branches based on Saman Bank ranking technique (categorizing in groups based on efficiency level). In this regard, Branches of shoemakers Bazar, Ekbatan, Dolat, Ferdous garden, and Dr. Fatemi were categorized among top branches of Saman Bank.

Keywords: economic efficiency, branch performance, branch efficiency, duality, stochastic frontier function, Saman Bank.
1. Introduction

Today, banking industry is very competitive. It has been proved that in competitive situations, institutions remain that are efficient and effective. Success in competitive market requires a high level of performance by improving permanent operations and learning. Managers should be aware of their relative success compared to the competitors, and the best action in relation to their productivity. In other words, they should be aware of their success compared to other similar institutions and previous years. In integrated financial systems and in very competitive situations, banks should be booming for survival and complete success, and gain maximum efficiency. Berger (2001) believes that Branch network is one of the ways by which the banks compete with each other, and maintain or increase their shares of market. Nowadays, while some branches are closed at night due to banks mergers and acquisitions, some other are opened in suitable geographical locations. If the model and the structure of a bank modernization are developed, the bank should know the efficiency of its branch. When the efficiency is determined, bank management, in this situation, should first rank its branch to know that from where the inefficiency is stemmed, and propose some ways to improve the performance (Noulas et al, 2002). When a bank fails to compete in terms of cost control and improvement of the service quality, its survival and continuity of activity seem unlikely in a competitive environment. Awareness of bank performance and timely assessment of it are necessary for subsequent time periods compared to the other banks. The objective of evaluating the performance of a bank is to make sure of properly appropriate use of resources and gaining appropriate return using resources. To be more precise, this objective is to assess the performance of the bank. By investigating and analyzing data and bank outputs, management activities are evaluated, bank’s ability to compete is indicated, and the effect of macro-financial policies on the financial institutions is revealed.

Performance assessment can be defined as assessing efficiency and effectiveness of different activities performed by an institution. According to Helfert (2003), measuring the performance of an institution is very difficult and complex. The reason for its complexity is its dealing with the affairs such as using efficient capital, profitability and efficiency of operation, honoring and reassuring all claims about the institution. Generally, a firm performs its operations by use of resources (inputs), and considering the organizational structure and responsibility centers of a firm, output is used to evaluate the performance. In terms of performance evaluation of performance audit issues, the methods of performance appraisal are raised, and performance auditing is carried out using three criteria including efficiency, effectiveness and economy. New methods for evaluating performance include data envelopment analysis, stochastic frontier method, Balanced Score-Card (BSC) model developed by Kaplan and Norton (1996), as well as traditional methods consisted of a number of financial ratios. In this paper we attempted to conduct a study to evaluate the bank performance in Iran by using economic efficiency index. First we discuss about bank efficiency evaluation methods and reviewing related works, and then we evaluate the performance of Saman Bank Branches using economic efficiency index.
2. Materials and Methods

2.1. Bank efficiency evaluation

Evaluating the efficiency of banks has been made from many years ago in the form of different methods grouped into parametric and non-parametric. Overall, there are 3 proposed techniques for assessing Bank efficiency: financial ratio analysis, data envelopment analysis (DEA), and stochastic frontier method (SFA). In this study we use SFA method. The most important reason is that the objective of SFA is to estimate the production function.

2.1.1. Stochastic frontier approach

Economists use regression method to assess the efficiency. This method, which is one of the parametric methods, first considers a certain form for the production function. Then, using one of the common function estimation methods in statistics and econometrics, unknown coefficients of these functions are estimated. In this method, to calculate the efficiency, maximum production should be obtained using inputs. Then, having the actual amount of the production of a firm, the efficiency is obtained by dividing the actual amount of the production by maximum production amount. A function obtained using maximum production amount of different firms of a certain industry is called Frontier Production Function (FPF). FPF is one of the sub-sets of parametric methods. Considering the criterion of comparing enterprises, assessing efficiency by use of FPF is divided into different types including Stochastic Frontier Approach (SFA), Thick Frontier Approach (TFA) and Distribution-Free Approach (DFA). a schema of SFA method is shown in Figure 1.

![Figure 1](image_url)

2.1.2. Stochastic Frontier Production Function

Stochastic Frontier Production Function (SFPF) was independently proposed by Aigner et al (1977) and Meeusen and van den Broeck (1977). The original specification involved a production function specified for cross-sectional data which had an error term which had two components, one to account for random effects and another to account for technical inefficiency. This model can be expressed as following:
\[ Y_i = x_i \beta + (V_i - U_i), \quad i=1,\ldots,N \]  
\[ V_i \sim N(0, \sigma_v^2) \]
\[ U_i \sim \left| N(0, \sigma_u^2) \right| \]

Where \( Y_i \) is the output of the \( i \)-th firm; \( x_i \) is a vector of input quantities used by the \( i \)-th firm; \( \beta \) represents a vector of unknown parameters; the \( V_i \) are random variables (stochastic component), and \( U_i \) which are non-negative random variables (inefficiency component).

The difference between two terms of \( V_i - U_i \) is non-normal and asymmetric. The degree of asymmetry depends on the value of \( \lambda = \sigma_u / \sigma_v \). When \( \lambda = 0 \), the function turns into a normal regression with a normal distribution.

### 2.2. Dual approach to stochastic frontier function

Dual approach allows us to use cost function instead of production function. Using cost function, allocative efficiency can be measured as well as technical efficiency which can be used in multi-product firms. Since there is complete information about the prices of both factors of production and product, allocative and economic efficiency can be measured. In this way, SFPF is:

\[ C_i = C(Y_i, W_i, \beta) + V_i + U_i, \quad i=1,\ldots,N \]  

Where \( C_i \) the production cost of \( i \)-th is firm, and \( W_i \) is \( k \times 1 \) vector of the prices of production factors.

It should be noted that the effect of inefficiency is added to the cost function model, while it is removed from the production function model, because cost function represents minimum cost, and production functions shows maximum product. The parameters of the equation can be calculated using econometric methods, and \( Y_i \) and \( W_i \) are considered as outputs. LIMDEP7, FRONTIER4 and STATA10 softwares can be used for estimating cost function. After estimating the cost function, production function can be obtained using Dual approach, and technical and allocative efficiency can be obtained by having cost efficiency (economic efficiency)

\[ \text{economic efficiency} = \text{technical efficiency} \times \text{allocative efficiency} \]  

When the product is exogenous and the factors of production are endogenous, SPFF can be used as an appropriate method for measuring the allocative and technical inefficiency, and multi-product firms as well. The best method to estimate the cost function using single function is max log-likelihood.

### 2.3. Maximum Likelihood Estimation

Maximum Likelihood Estimation (MLE) can be used for calculating most coefficients of regression models, but prior to this, a probability distribution should be considered for the disrupting sentence. Then, we form a likelihood function or a log-likelihood function, and estimate the coefficients such a way that the function can be maximized using the sample data. Assuming that \( X \) is a set of observed data for a function \( \theta \), likelihood of \( \theta \) is written as:
like(θ) = f(X | θ), X_1, X_2, X_3, ..., X_n
Cobb-Douglas production frontier is as:
y_i = e^{\beta \prod_{k=1}^{K} x_{ik}^{\theta_k} e^{v_i} e^{-u_i}}
This can be written in the logarithm form:
log(y_i) = \beta + \sum_{k=1}^{k} \beta \log(x_{ik}) + v_i - u_i
Where, u_i is a positive value, indicating the inefficiency level of i-th firm. It is assumed that u_i is a random variable with half-normal distribution as follows:
f(u) = \frac{2}{\sigma_u \sqrt{2\pi}} e^{-\frac{u^2}{2\sigma_u^2}}, E(u) = \frac{2}{\pi} \sigma_u, V(u) = \left(\frac{\pi - 2}{\pi}\right) \sigma_u^2
In this case, log-likelihood function is written as:
\log L(\varepsilon | \lambda, \sigma^2) = n \log\left(\frac{\sigma}{\pi}\right) + n \log\left(\frac{1}{\sigma}\right) + \sum_{i=1}^{n} \log\left[1 - \Phi(\varepsilon_i \lambda \sigma^{-1})\right] - \frac{1}{2\sigma^2} \sum_{i=1}^{n} \varepsilon_i^2
where
\lambda = \frac{\sigma_u}{\sigma_v}, \sigma^2 = \sigma_u^2 + \sigma_v^2, \varepsilon_i = log(y_i) - \sum_{i=1}^{k} \beta \log(x_i)

2.4. Previous studies
Ferrier and Lovell (1990) examined the efficiency among 575 institutions which participated in the Federal Reserve System’s Functional Cost Analysis Program in 1984 using econometric method in linear programming. They concluded that both programming and econometric approaches are in agreement on several important issues. Modest scale economies confer a potential cost advantage to large banks. Relative to their marginal cost, banks operate inefficiently with observed cost roughly 20-30% above minimum for all but the smallest size classes. In a study conducted by Berger et al (1993), both input and output inefficiencies were derived from a profit function for US banks. These inefficiencies were decomposed into allocative and technical components in a new way using shadow prices. Larger banks were found to be more efficient than smaller banks, which may offset scale diseconomies found elsewhere. Their Tests of a new concept, ‘optimal scope economies’, suggested that joint production is optimal for most banks, but that specialization is optimal for others. Orea and Kumbhakar (2004) conducted a study to measure the efficiency by estimating a latent class stochastic frontier model in a panel data framework using Spanish banking data. Their results showed that bank-heterogeneity can be fully controlled when a model with four classes is estimated. Ahmad Mokhtar et al (2006) investigated the efficiency of the full-fledged Islamic banks in Malaysia. They measured the technical and cost efficiency of these banks using the Stochastic Frontier Approach. Translog function was used to estimate cost function. Their finding revealed that the average efficiency of the overall Islamic banking industry has increased during the period of
study (i.e. 1997-2003) while the efficiency trend for conventional banks has been stable over time. However, the efficiency level of Islamic banking is still less efficient than that of conventional banks. Resende and Elvira (2007) conducted a study in Porto University in Portugal. They investigated the efficiency performance of the commercial banking sector in Portugal in the period 2000-2004. Their results indicated that almost all the banks were technically efficient. Nevertheless, they were not profit efficient, facing losses of potential profits superior to 50% in 2004 due to over-use of labor and physical capital. According to the available data, they also proposed that a substantial change should be made in the structure of the Portuguese banks. Consequently, banks should invest in capturing resources through a more aggressive commercial policy on deposits.

In another study done by Behr and Tente (2008), the natural estimation method seems to be Maximum Likelihood (ML) estimation because of the parametric assumptions. But simulation results obtained for the half normal model indicate that a method of moments approach (MOM) is superior for small and medium sized samples in combination with inefficiency not strongly dominating noise. Both estimation methods, ML and MOM, are applied to a sample of German commercial banks based on the Bank scope database for estimation of cost efficiency scores. Putuma et al (2010) analyzed profit efficiency of selected mining firms in South Africa over 2003-2006 periods. The estimated model showed the presence of stochastic frontier profit possibilities. All variables that affected profitability of the firm were highly significant. The fourteen firms covered were ranked in terms of their efficiency performance over this period. At 37%, the average profit efficiency of 50% of firms or 7 firms was above the overall average.

2.5. Research method

In terms of methodology, nature and content, this is a descriptive-analytic and econometric-based study, and in terms of goal, this is an applied survey conducted using inductive-deductive approach.

2.5.1. Statistical population and sampling

The statistical population of this study is consisted of all the 105 branches of Saman Bank. In the current study, to measure the economic efficiency of the branches, two main samples were selected using multi-stage sampling method.

First stage: Since Saman Bank has a computerized and advanced financial system, in the first stage, its branches were selected as an appropriate environment for the research.

Second stage: because of the size and number of branches in Tehran, this province was selected as the sample. Saman bank operation in 2010 was performed by 51 branches in all over the country, and by 54 branches in Tehran province. The number of the branches of Saman bank is presented in table 1 based on the grade.
Table 1. Frequency of Saman Bank branches

<table>
<thead>
<tr>
<th>Branch group</th>
<th>Nationwide</th>
<th>Tehran province</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top branches</td>
<td>3</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>Group 1 branches</td>
<td>8</td>
<td>5</td>
<td>62</td>
</tr>
<tr>
<td>Group 2 branches</td>
<td>43</td>
<td>16</td>
<td>37</td>
</tr>
<tr>
<td>Group 3 branches</td>
<td>51</td>
<td>30</td>
<td>58</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>54</td>
<td>51</td>
</tr>
</tbody>
</table>

After selecting the bank in the first stage and the province in the second stage, data concerning the main sample was extracted from the accounting system of Saman bank. A preliminary study was conducted on the data received from 54 branches, and 9 branches were removed from the sample due to their incomplete data.

2.5.2. Data collection

The main tool for data collection in this study is the direct observation of financial balance sheets data of the bank branches. A complete list of variables and factors affecting the measurement of efficiency in the branches of Saman bank was assessed based on the specialized texts, reports and prepared documents. Then, the validity of data was assessed statistically.

2.5.3. Research variables

Outputs:
Different branches of a commercial bank produce two main outputs which are: attracting people’s deposits, and granting loans to the applicants. Attracting deposits is one of the most important outputs of the bank. In terms of deposits, regardless of types of the existing deposits including loan and investment, total balance of the deposits in the branch is considered until at the end of 2010.3.20. Another output of the bank is to offer credits and credit services. This is achieved by applying the output factors. In terms of facilities, the total balance of the loans granted to the applicants at the end of fiscal year i.e. 2010|3|20 without considering types of existing loans is considered. The volume of the letter of credits and guarantees in Saman bank is increasing and both letter of credit and guarantee can be considered as the outputs of the bank. Since all the branches do not have these two outputs, there is limitation in this method (all the observations should have same inputs and outputs), and incomes of these types of services are almost negligible, as a result, practically, these two outputs are overlooked in this study. So, the main outputs are defined as follows:

\[ Y_1 = \text{the cumulative balance of deposits per branch} \]
\[ Y_2 = \text{the cumulative balance of granted loans per branch} \]

Inputs:
As it was mentioned before, banks, such as other economic firms, use the factors of capital and labor, to offer service and earn income. As a result, factors of production are introduced as three variables including physical capital as quasi-fixed input, workforce and other financial factors.
Since in economic efficiency assessment, the price of the product factors (inputs) has been entered into the model and there is complete information about the price of factors of production and the product in the headline of the costs of banking accounting system, the headlines of cost of the bank branch are used to evaluate the price of the factors of production. It should be noted that data related to the costs of each branch of Saman bank is extracted from the Saman bank accounting system in the fiscal year ended 2010.3.20.

2.5.4. Calculation of the vector of inputs

Considering that the cost of each branch can be summarized under three general headings including (1) cost of the depreciation on fixed assets, (2) operational costs, and (3) labour costs, the price of production factors is obtained as below:

\[ W_1 = \frac{\text{The cost of depreciation on fixed assets per branch}}{\text{Total cost of fixed assets per branch}} \]  
\[ W_2 = \frac{\text{Labour costs per branch}}{\text{Number of staff per branch}} \]  
\[ W_3 = \frac{\text{Operational costs per branch}}{\text{Area per branch}} \]

It should be noted that the most important part of the operational costs of each branch is the costs used for renting a place for the branch or for maintaining and repairing the assets of the branch. Consequently, the branch area is used to determine the price of the input factors, and it is analyzed such a way that use of how much cost is paid for every square meter of useful area. In this study, \( Z_i \) is considered as the peripheral variable which is defined as:

\[ Z_i = \frac{\text{Employees with bachelor’s degrees and above per branch}}{\text{Total number of staff per branch}} \]

2.6. The statistics function

The overall form of the statistics function is as have shown in equation (2) which is a type of multivariate regression with certain conditions. In the current study, the form of Cobb-Douglas function is used which is as the following log-function:

\[ \ln(TC) = \alpha + \beta_1 \ln(W_1) + \beta_2 \ln(Y_i) + \beta_3 (Z_i) + (V_i + U_i) \]  

The parameters of the equation \( \alpha \) and \( \beta \) can be calculated using econometric methods. In this stage, \( \text{max log-likelihood} \) is used to determine the standard deviation of the dependent variable, which can be explained by the independent variables as a criterion for measuring the explanatory power of the regression.

2.7. The used software

In this study, STATA10 software is used to estimate the cost function.
3. Results and discussion
The analysis of the results of implementing the model is presented in three sections:
(1). Estimating the frontier cost function (minimum cost function in efficient conditions) for each branch in 2010 and testing the possibility of the cost reduction at a certain level of outputs
(2). Calculating efficiency for each branch
(3). Ranking the branches based on the economic efficiency index

3.1. Estimating Cost Function
To estimate the frontier cost function (FCF), the above-mentioned variables including total cost of per branch, the cumulative balance of deposits, the cumulative balance of loans (local and foreign currencies) and cost of production factors are entered into the model. Then, using STATA v. 10, the parameters of the model are obtained, and the overall model of the FCF is obtained using appropriate cost function (Cobb-Douglas function). Goodness of fit is met using Z statistic for each independent variables. Figure 2 shows the output of software.

![Figure 2. Maximum Likelihood Estimation results](image-url)

The general model of FCF is as follows:

\[ \ln(TC) = 5.161 + 0.0896\ln(D) + 0.0733\ln(L) - 1.9087Dep + 0.0486OC - 0.00186WL + 0.4143Edu \]

\( P > |Z| \) (0.00) (0.10) (0.02) (0.00) (0.00) (0.51) (0.24)

Where \( \ln(TC) \) is the natural logarithm of total cost (million Rials), \( \ln(D) \) is the natural logarithm of the deposits volume (million Rials), \( \ln(L) \) is the natural logarithm of granted loans, \( Dep \) is depreciation expenses (in percent), \( OC \) is operational cost (million Rials per square meter), \( WL \) is...
the average wage level per each workforce (million Rials per person) and $Edu$ is the staff’s educational level.

As can be seen,

$$\sigma_u^2 = -2.807$$  \hspace{1cm} (Prob>|z|=0.011) \hspace{1cm} \sigma_u = e^{\frac{-2.807}{2}} = 0.2457$$

Max log-likelihood is significantly non-zero (prob 0.00<0.05). This test suggests that all the variables (outputs and cost of factors) were able to explain the dependent variable significantly. Z-test was performed on standard deviation and showed that its value can be considered non-zero with 98% confidence level. This means that the branches of Saman bank significantly differ from each other in terms of efficiency, and have distance from the efficiency level of the product. That is, the branches are inefficient. So, it can be stated that the main hypothesis of the research, which suggests that it is possible to reduce the costs of the branches of Saman bank, is realized. The coefficients can be interpreted as follows:

- The coefficients of workforce are not significant. This is probably due to the closeness of the staff’s wage level to each other which leads to insignificancy of the coefficient. In any case, the coefficients indicated that in the existing range of the wages, changes in wages cannot significantly increase total costs.

- With 76% confidence level, it can be said that an increase in educational level in the branch can increase the costs of the branch. This relationship is theoretically justifiable; because staffs with higher educational degree usually have higher wages but their efficiency in doing banking affairs do not significantly differ from staffs with lower education degrees. Therefore, the increase in the wages of the staffs with higher educational degrees is expected to enhance the costs of the branch. Per 1% increase in the number of staffs with higher education, the costs of the branch are increased by approximately 41%.

- With 99% confidence level, it can be stated that an increase in the operational costs can leads to an increase in the costs of the branch. One million rials increase in the prices of the operational cost leads to an increase in the costs of the branch by 486%.

- With 99% confidence level, it can be stated that an increase in the rate of depreciation leads to cost reduction. Since depreciation is a part of the costs, the increased rate of depreciation is expected to lead to an increase in costs. To the contrary, estimates show an opposite effect. This means that one percent increase in the rate of the depreciation leads to about 2% reduction in the costs of the production unit. This effect, which was estimated in different equations, led to the same results.

As a whole, if an increase in the rate of depreciation reduces the asset prices more than efficiency, the prices will be decreased. This relationship existed in the branches of Saman bank. That is to say, depreciation reduced the assets prices more than their efficiency. This characteristic is related to the assets and the products of the branch. Movable and immovable assets may basically do not have a strong relationship with the products of the branch including deposit or loans. The only significant depreciation, which harms the relationships with the customers, can lead to reduced production.
3.2. Measuring the branch efficiency

Cost efficiency is calculated according to the preceding description using the equation \( \exp(u_i) \) for each branch. The minimum and maximum cost efficiency is one and infinite, respectively. Therefore, the closer the cost efficiency is to 1, the better performance it has. In fact, the amount of the cost efficiency indicates the ratio of the actual cost of each branch to its marginal cost (minimum cost for each branch). The results of estimating the frontier function and the efficiency for each branch in 2010 are presented in table 2.

Table 2. Efficiency results for Saman bank branches

<table>
<thead>
<tr>
<th>Branch code</th>
<th>Name of the branch</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>801</td>
<td>Africa</td>
<td>1.494887</td>
</tr>
<tr>
<td>802</td>
<td>Markazi</td>
<td>1.472071</td>
</tr>
<tr>
<td>804</td>
<td>Ferdous Garden</td>
<td>1.083873</td>
</tr>
<tr>
<td>805</td>
<td>Pasdaran</td>
<td>1.155216</td>
</tr>
<tr>
<td>806</td>
<td>Bazar</td>
<td>1.414269</td>
</tr>
<tr>
<td>807</td>
<td>Sadeghieh</td>
<td>1.355096</td>
</tr>
<tr>
<td>808</td>
<td>Tee Aghdasieh</td>
<td>1.127116</td>
</tr>
<tr>
<td>809</td>
<td>Mirdamad</td>
<td>1.187924</td>
</tr>
<tr>
<td>810</td>
<td>Dr. Fatemi</td>
<td>1.092166</td>
</tr>
<tr>
<td>811</td>
<td>Sa’adat Abad</td>
<td>1.130024</td>
</tr>
<tr>
<td>812</td>
<td>Jannat Abad</td>
<td>1.278326</td>
</tr>
<tr>
<td>813</td>
<td>Dolat</td>
<td>1.07971</td>
</tr>
<tr>
<td>814</td>
<td>Vanak square</td>
<td>1.14675</td>
</tr>
<tr>
<td>815</td>
<td>Iran Zamin</td>
<td>1.185242</td>
</tr>
<tr>
<td>816</td>
<td>Arikeh Iranian</td>
<td>1.170587</td>
</tr>
<tr>
<td>817</td>
<td>Yaft Abad</td>
<td>1.148392</td>
</tr>
<tr>
<td>818</td>
<td>Rey City</td>
<td>1.193243</td>
</tr>
<tr>
<td>819</td>
<td>Roomi Bridge</td>
<td>1.117608</td>
</tr>
<tr>
<td>820</td>
<td>Northern Africa</td>
<td>1.212157</td>
</tr>
<tr>
<td>821</td>
<td>Jam-e-Jam</td>
<td>1.195909</td>
</tr>
<tr>
<td>822</td>
<td>Pirouzi</td>
<td>1.135156</td>
</tr>
<tr>
<td>823</td>
<td>Velenjak</td>
<td>1.485608</td>
</tr>
<tr>
<td>824</td>
<td>Azarbaijan</td>
<td>1.145906</td>
</tr>
<tr>
<td>825</td>
<td>Ekbatan</td>
<td>1.073417</td>
</tr>
<tr>
<td>826</td>
<td>Argentina sq.</td>
<td>1.213412</td>
</tr>
<tr>
<td>827</td>
<td>Mellat-E-Ekbatan</td>
<td>1.503067</td>
</tr>
<tr>
<td>828</td>
<td>Gheitarie</td>
<td>1.271777</td>
</tr>
<tr>
<td>829</td>
<td>Mola-Sadra</td>
<td>1.325053</td>
</tr>
<tr>
<td>830</td>
<td>Seyed Jamal Asad abadi</td>
<td>1.20807</td>
</tr>
<tr>
<td>831</td>
<td>Ghazvin square</td>
<td>1.168981</td>
</tr>
<tr>
<td>832</td>
<td>Dr. Beheshti</td>
<td>1.269403</td>
</tr>
<tr>
<td>833</td>
<td>Northern Kargar</td>
<td>1.680791</td>
</tr>
<tr>
<td>834</td>
<td>3rd sq. of Tehran Pars</td>
<td>1.120977</td>
</tr>
<tr>
<td>835</td>
<td>Valtas - Saei park</td>
<td>1.180377</td>
</tr>
<tr>
<td>836</td>
<td>1st sq. of Tehran Pars</td>
<td>1.268814</td>
</tr>
<tr>
<td>837</td>
<td>Shoemakers Bazar</td>
<td>1.071552</td>
</tr>
<tr>
<td>838</td>
<td>Elahieg</td>
<td>1.12088</td>
</tr>
</tbody>
</table>
3.3. Ranking the branches

Currently, there is not any system for ranking the branches, and the studied bank attempts to rank each of the branch using the criterion of customer orientation. So, to determine the authorities of each branch in terms of granting credits to the customers, the management of the Saman bank annually, tries to categorize the branches into four levels including top group, group 1, group 2 and group 3. In this study, using the criterion of saman bank, the branches are ranked at four mentioned levels and based on the cost performance of each branch (economic efficiency). Table 2 shows the ranking results.

<table>
<thead>
<tr>
<th>Level</th>
<th>Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>Shometakers Bazar, Ekbatan, Dolat, Ferdous garden, Dr. Fatemi</td>
</tr>
<tr>
<td>Group 1</td>
<td>Terminal 2 of Mehrabad Airport, Roomi Bridge, 3rd sq. of Tehran Pars, Tee Aghdasieh, Sa’adat Abad, Pirouzi, Shahran, Azarbaijan, Vanak sq., Yaft Abad, Pasdaran, Qhavzin sq., Arike Iranian, Monirieh, Saei Park, Iran Zamin, Mirdamad, Rey City, Jam-e-Jam, 30th tir</td>
</tr>
<tr>
<td>Group 2</td>
<td>Seyed Jamal Asad Abadi, Northern Africa, Argentina Sq., Nazi Abad, 1st sq. of Tehran Pars, Dr. Beheshti, Gheitarieh, Jannat Abad, Ferdous Blvd.</td>
</tr>
<tr>
<td>Group 3</td>
<td>Mola Sadra, Sadeghieh, Rah-Ahan town, Nabovat sq., Bazar, Markazi, Velenjak, Africa, Ekbatan, Northern Kargar</td>
</tr>
</tbody>
</table>

4. Conclusion

In the current study, using Stochastic Frontier Method and the approach of focusing on the factors of production, economic efficiency was examined. First, frontier cost function was estimated for each branch. Then, by comparing it with the actual cost of each branch, the efficient part of the each branch was obtained. The results of the frontier cost function showed that the branches of Saman bank significantly differed from each other in terms of efficiency, and had distance from the efficient level of the production. It means that the branches significantly had inefficiency. Generally, the results of the frontier cost function indicated that:

- In the field of salaries, changes in salaries did not lead to a significant increase in total costs.
- Increased operational costs led to an increase in the costs of the branches.
- Increased rate of depreciation led to cost reduction. Since depreciation is a part of cost, the increased rate of depreciation was expected to lead to increase the costs. To the contrary, the estimates showed an opposite effect. If the increased rate of depreciation decreases the asset price more than the efficiency drop, the costs will be reduced. This relationship significantly
existed in the branches of Saman bank. It means that depreciation decreased the price of assets more than their efficiency. Therefore, it can be concluded that the branches of Saman bank can decrease their average cost and increase the efficiency using a better combination of the factors of production without increasing them such as using electronic system more, offering services, etc.
References


