International Journal of Finance and Managerial Accounting, Vol.7, No.27, Autumn 2022 IJFMA

Investigating the Effects of Banks' Cost Efficiency on Financial Reporting Quality: Data Envelopment Analysis and GMM Approach

Ali Niazi
PhD Student of Accounting, Faculty of Management and Economics, Science and Research Branch, Islamic Azad University, Tehran, Iran
Lord_niazi@yahoo.com

Hashem Nikomram
Professor, Department of Accounting, Faculty of Management and Economics, Science and Research Branch, Islamic Azad University, Tehran, Iran (Corresponding Author)
Nikomaram@gmail.com

Gholamreza Zomordian
Assistant Professor, Department of Management, Faculty of Management, Central Tehran Branch, Islamic Azad University, Tehran, Iran
Gho.zomorodian@gmail.com

Farhad Hosseinzadeh Lotfi
Professor, Department of Mathematics, Faculty of Basic Sciences, Science and Research Branch, Islamic Azad University, Tehran, Iran
Hosseinzadeh-lotfi@srbiau.ac.ir

Submit: 11/05/2021 Accept: 25/05/2021

ABSTRACT

The performance of economic enterprises is one of the issues that have been evaluated from different aspects in the historical periods of economics. Among these, the concept of cost efficiency has been considered as one of the most basic concepts to express the performance and therefore several studies have tried to explore efficiency index. Nowadays, users' judgment is based on the ability of banks to help solve problems and develop the country's trade. In the banking system, proper performance, non-waste of resources and costs, allocation of cost efficiency as the most important element of success in the competition of banks. Measuring efficiency in the banking industry affects the cost of financial intermediation and the overall stability of financial markets. Therefore, in this study, the effects of Banks' Cost Efficiency on the quality of financial reporting have been measured. In this regard, the data of 12 specialized and commercial banks of the country over the period 2010-2019 have been collected and then measured using the data envelopment analysis approach. moreover, to measure the quality of accounting and financial reporting information, the model of Dechow and Dichev (2002) based on data panel data during the period 2010 to 2019 was estimated by GMM method. We find that the efficiency of doubtful debts cost has a positive and significant impact on the quality of accounting and financial reporting information index. In contrast, the the efficiency of other fixed costs including the efficiency of financial costs, general, administrative and organizational costs and depreciation costs, have a significant negative impact on the quality of financial accounting and reporting information index

Keywords: Efficiency, Fixed costs, Variable costs, Financial accounting and reporting quality.

1. Introduction

In the world economic literature, the role and importance of the financial system and the money and capital markets and, consequently, financial and credit institutions as the executive arms of this system and tools of economic growth and development of countries is quite tangible, so that sustainable economic development without growth and Development of financial markets is not possible. (Feizi and Solukdar, 2014). Financial institutions play a very important and decisive role in resource allocation, economic growth and job creation. having efficient financial companies is necessary for any country to promote and support economic growth.(Azar et al.2014). The banking systems in most of the countries have been negatively affected by the global financial crisis. In such context, the efficiency and cost optimization have become essential for commercial banks. Moreover, the existence of a solid and efficient banking system is a crucial condition for a sustainable economic growth.

The banking system as one of the most important economic sectors of society that has effective role in attracting and directing depositors, providing services to the people and participating in economic, social and cultural development and the inability of this system has many problems. In addition, banks are of special importance among different industries because they can prepare the conditions for investment by providing credits, facilities and participating in various economic projects.(Golbazkhanipour et al.2002).

Due to the limited resources available and the competitive environment ahead, banks should be aware of their performance status and ability to make optimal use of available resources and, if necessary, take the necessary corrective measures. otherwise quickly it will lose the competition and will face many problems. moreover, nowadays we are considering a significant increase in the number of private banks and credit financial institutions in the country, and due to the rapid privatization of banks and the poliferating growth of private banks and financial and credit institutions and competitive conditions , the country's private banks should provide more diverse, faster and more modern services and be able to compete and survive in a wide wave of information and development of special banking services,so they need a proper performance appraisal system to be aware of their situations.

The banking industry is of vital importance in the national and global economy and plays a key role as a depository and lending institution for companies. (Lobo, 2017). The situation of banks and their financial reporting in Iran is also one of the concerns and points that users of financial reports have always paid attention to.(Badri, 2016).

The global financial crisis of 2008-2007 showed how intertwined the banking network's financial system and how likely the losses would spread rapidly from one bank to another. The notion of efficiency can be defined by dissociating what comes from technical origin from what is due to a bad choice, in terms of inputs combination, compared to the price of the inputs. According to Farrell (1957) the technical efficiency measure the way that a firm chooses the quantity of inputs that is used in the production process when the factors' use propositions are given. The technical efficiency which evaluates the way the firm chooses the ratio of the different inputs compared to the market price that is supposed competitive.

The economic efficiency is determined by the combination of the technical efficiency with the allocative efficiency. It refers to the concepts of productivity, performance, quality and profit on the one hand, and of the reduction of the total strength employed and of the costs on the other hand. The concept of economic efficiency will be associated to the criterion of value. Thus, any change inclined to increase the value is considered as an effective change and inefficient in the contrary.(Wautabouna Ouattara 2012).

In other words, economic efficiency indicates efficiency in the way of production and allocation of factors of production. Economic efficiency is also called cost efficiency because whenever we act cost-effectively, the best allocation and the best method of production occurs. (Meybodi, 2000). In fact, financial institutions play a very important and decisive role in resource allocation, economic growth and job creation. The existence of efficient financial companies is necessary for any country to promote and support economic growth. (Roghanian et al., 2012). Also, the banking industry is one of the most complex industries in the world and has a major contribution in the assets and wealth of countries. In the United Kingdom 25 of GDP is generated by the financial services sector. (Paradi et al.2011).

Doubtful debts are one of the controversial topics

in the industry and specialized elements of banks' financial reporting and the relationship between the exercise of authority in reseving for doubtful receivables by bank managers with risk-taking, performance and profit management. In other words, the doubtful receivables allowance is always an interesting field for studying the aspects of exercising management authority in the banking industry, because in calculating capital adequacy, it constitutes a significant percentage of banks' capital and in the face of Credit losses or poor economic status. But regulators and standardizers are constantly debating and examining the procedures for calculating the reserve of doubtful receivables of banks. (China et al.,2016).

So far, several studies have been conducted to evaluate the efficiency of banks and various methods have been used to evaluate the performance of banks. One of these methods is Data Research Analysis (DEA). Data envelopment analysis as a non-parametric approach based on efficiency boundary is a strong and capable method for organizing and analyzing data. Data envelopment analysis is a linear programming method that measures the relative efficiency of a group of congruent decision-making units (Halkos and Salamouris,2004).

Finally, the results of this study can be useful for the management of banks and the country's banking system in order to determine the position of each of the country's banks and also to identify the potential ability of banks to provide services.Taking into account the importance of efficiency, in this study we will focus on the determinants of banks cost efficiency for 12 commercial banks. Therefore, we will be able to identify the way in which in dependent and independent variables and control variables influence the level and the variability of cost efficiency. In our study, we have included observations for commercial banks from Iran over the period 2010 to 2019. The cost efficiency is estimated through the model proposed by Dechow and Dichev(2002).

More exactly, we will be able to identify how the cost- efficiency of doubtful(bad)debts costs, financial costs, general, administrative and organizational costs and depreciation costs have influence the quality of financial accounting and reporting information index. In our opinion, the results are important to understand how the activity of the commercial banks from optimal and efficient use of resourses has evolved. In the economic literature there are various studies that use data envelopment analysis (DEA) to estimate the efficiency of the commercial banks. Hereinafter, we will present the results and objectives of these studies, focusing our attention on those related to the commercial banks from the countries included in our study.

The rest of the article is organized as follows: section 2 reviews the literature on efficiency studies, paying special attention to data envelopment analysis (DEA) and research background. Section 3 presents the methodology framework adopted in this study. Section 4 describes the data and variables. Section 5 displays the empirical results. Finally, section 6 presents the conclusions.

2. Literature review

2.1. Concepts of Efficiency

Man has always tried to achieve the maximum result with the least available facilities and factors. These efforts can be called achieving higher efficiency. According to Adam Smith, the rational man in the market seeks self-interest, and in other words, he wants to maximize his limited resources according to his unlimited desires, and this is the definition of economics. But in another definition of this science, it is said that economics is nothing but achieving the maximum possible result with the least cost. Basically, scarcity and efficiency are two categories of economics, and the importance of economics is due to this scarcity and efficiency. In fact, the goal of economics is to achieve efficiency. (bagherzadeh ,2002) .

Conceptual efficiency is very important but complex. The term was first used in the field of engineering, but in the second half of the nineteenth century, it entered the literature of economics and was widely used. d. Z. Adamowski assume that economic efficiency may be understood as the ratio of output to input, or cost, or vice versa – input to output. [Adamowski,]. Always, the efficiency value was less than the unit or in other words, it was a fraction of the unit. Efficiency is the ratio of the actual return obtained to the expected return (standard or designated) and in other words, efficiency is the ratio of the amount of work done to the amount of work to be done. (Abtahi and Kazemi,2002). Simply efficiency means knowing how to do a job and doing it right

when more useful output is generated for each input unit. In fact, it is the relative efficiency that compares some aspects of a unit's performance to the costs incurred to perform that function. In the realm of economics, the concept of efficiency reflects the optimal allocation of resources. Due to the serviceability of banks' economic activities as well as computational purposes, the word efficiency is defined as follows: The ratio of the minimum possible cost to the realized cost to provide a certain amount of output compared to similar units in that industry.

In general, efficiency is the ratio of outputs to data relative to a specific, predetermined standard. (Campbell,1977). Efficiency can be divided into three categories of technical efficiency, allocative and economic efficiency. Technical efficiency reflects the firm's ability to obtain the maximum output from a given amount of input or to use the minimum input to achieve a given output. In other words, the operator must act on the boundary function to ensure technical efficiency. Allocative efficiency is the ability of the firm to use the optimal ratios of inputs according to their prices and also economic efficiency (cost efficiency) is a combination of technical and allocation efficiency, because it indicates the degree of success of the operator in minimizing production costs which in this article efficiency means cost efficiency.

2.2. Efficiency Estimation Methods

Different methods are used to calculate the efficiency of firms. Efficiency can be defined in two ways (Quillie et al.2005): One is to define efficiency in the sense of reaching the level of a potential product, when each firm can or has not reached it. Such a definition may be technically and theoretically possible, but it is practically impossible to measure it. Second, efficiency is defined in terms of the best actual behavior observed of the firm in the industry. (Sharma,2008).

In other words, companies should be compared with each other with their best performances. This perception of efficiency has made practical methods of measuring efficiency possible and has created the concept of frontier functions. In the frontier analysis method, the boundary is first considered as the frontier of production efficiency or cost, and the activity on the boundary is considered as the best (efficient) performance, and being below it shows inefficiency. There are different methods for determining the efficiency limit, and these methods generally fall into two categories (Coelli et al.,2008). Parametric methods and non-parametric methods. Parametric methods include simple regression analysis and Stochastical Frontier Function and Deterministic Frontier Production Function analysis (Tanner and Sezen2009,). Simple regression requires the use of least squares method to estimate production and cost functions, so it is used to measure the relative efficiency within the sample. In Deterministic Frontier Function method, Deterministic Frontier Production(cost) Function Statistic is considered as a special function form such as Cobb Douglas, Translog and … is estimated by econometric methods.

Frontier function methods are divided into two general groups: Deterministic Frontier methods and Stochastical Frontier methods. What makes the differences in the parametric boundary function methods are the views on the deviation of actual production from potential production. Some attribute this deviation only to inefficiency and mismanagement of the enterprise, and any deviation from production to inefficiency. The other group believes that not all problems are related to the inefficiency of the firm, but also the cause of the accident is considered to be effective in deviating from potential production. (Zangouinejad,2009).

Nonparametric methods are based on mathematical optimization and are used to calculate relative efficiency. The relative meaning in this sentence is very important; Because the efficiency of this method is obtained as a result of comparing the existing firms with each other. If the number of observations is omitted or added, the calculated efficiency value may also be divided into two categories: non-parametric methods, non- Frontier function method (index groups) and Frontier function method (data envelopment analysis). In, Farrell used a method such as measuring efficiency in engineering to measure the efficiency of a production unit. Farrell's case for measuring efficiency included an input and an output that measured the technical and assignment efficiencies and derivatives of the efficient production function. However, he failed to provide a method that incorporates multiple inputs and outputs (Seidel, , Charles, Cooper, and Rhodes developed Farrell's view and proposed a model that could measure efficiency with multiple inputs and multiple outputs. This model was called data envelopment analysis and according to

the names of its providers, it became known as the CCR model. (Zangouinejad,2009)

2.3. Efficiency in data envelopment analysis

Data envelopment analysis includes techniques and methods to evaluate the efficiency or measure the productivity of decision-making units. Data envelopment analysis is in fact a generalization of Farrell's work in inventing the first non-parametric method. Farrell, using the inputs and outputs of the decision-making units and the principles governing them, introduced a set called the possibility of production set and introduced a part of its boundary as a production function. This boundary is also called the efficient boundary and the decision-making units located on this boundary are evaluated as efficient.

Data envelopment analysis provides opportunities to study units with multiple inputs and multiple outputs. The data envelopment analysis method is based on linear algebra and its ability is mostly due to the use of linear programming. Linear programming enables data envelopment analysis to use linear programming problem solving methods and dual theorems, thus identifying the source and amount of inefficiency for each input and output. Data envelopment analysis also creates many opportunities for collaboration between analyst and decision maker. These collaborations can be effective in selecting the input and output of the unit under evaluation and how to operate and model the boundary. (Cooper et al., 2007).

Data envelopment analysis has the ability to measure different types of performance such as technical efficiency, cost efficiency, revenue efficiency and deductive efficiency. Data envelopment analysis is a classical non-parametric technique based on mathematical programming that is used to compare the performance evaluation of a set of similar decision units and its significant advantage is that it does not need to determine parametric characteristics (such as production function). It is to obtain efficiency scores. (Siriopoulos, Tziogkidis,2010).The main models of data envelopment analysis are divided into two categories: CCR and BCC, each of which can be studied from two perspectives: input axis and output axis (Azar et al.,). The difference between this model is fixed or variable returns to scale. The CCR model is based on a constant return to scale and tries to increase the efficiency fraction of this unit (zero unit) by selecting the optimal weights for the input and output variables of the unit under study so that the efficiency of other units is too high. One, do not exceed (Emami Mobidi2005). The BCC model assumes a variable return on scale, and this assumption seems logical because business units usually do not operate at an optimal scale (Khajavi et al.2010)

2.4. Research background

Passarosi and Weill (2015) examined the effect of capital adequacy requirements on the cost-efficiency of Chinese banks over 2004 to 2009, which was a period of profound change in minimum capital laws in China. They used both Stochastical Frontier Function and data envelopment analysis methods to estimate efficiency. The results of both methods were confirmatory. They found that such an increase had a positive effect on bank cost-efficiency. However, by influencing the size variable, the variable of ownership type and calculating the interactive effect, they showed that the extent of this effect for banks was influenced by their ownership composition.

Taher et al. (2012) examined the effective factors on the bank and cost inefficiency in ASEAN banking. The results show that 59% of banks in Vietnam have the lowest cost of inefficiency compared to banks in other Asian countries.

Hosseinzadeh Saljuqi and Zakir Herfteh (2021) have proposed a new method for evaluating cost-efficiency and effectiveness, taking into account the internal process and internal departments of the bank branches as well as the interaction and relationship between them. The proposed model can determine the optimal use of resources in each section. While analyzing the characteristics of the proposed model, the effect of the relationship between the segments on cost effectiveness has been determined, which has been studied and compared with each other in two modes of free and fixed communication. In evaluation of efficiency and cost effectiveness of 26 branches of iranian commercial bank, two methods of return on a fixed scale (CRS) and variable (VRS) have been performed and the results have been compared. The results show that a branch that has cost efficiency in both its internal parts will not necessarily be cost effective. This model can provide more accurate information to managers to make decisions by

identifying ineffective factors in bank branches.

Golmoradi et al. (2020) have investigated the effect of factors affecting survival on the cost efficiency of listed banks. For this purpose, first by studying the theoretical foundations and statistical models, the key variables that can affect the survival of banks have been identified and finally their effect on the cost efficiency of banks has been investigated. The results show that improving capital adequacy increases the efficiency of banks. Capital adequacy can have a positive effect on banks' cost efficiency by reducing uncertainty. The study of the effect of non-current receivables on the cost efficiency of banks has shown a negative and significant effect of non-current receivables on the cost efficiency of banks.

Del Angizan and Goli (2018) have studied the relationship between cost efficiency and competition in the Iranian banking industry using data from18 privates and public banks for the period 2004-2006; For this reason, they have used the Translog cost function to estimate the cost-effectiveness of banks and the Boone index to estimate competition. The results of Granger causality show that there is a two-way causality between efficiency and competition in the banking industry, and also the results of model estimation by generalized torque method show that increasing competition increases inefficiency and increasing efficiency reduces competition. Between banks; Therefore, close supervision of the central bank on the arrival of new banks is necessary to improve the efficiency of the banking system and their performance in the field of credit and interest rates on deposits.

Ghayuri Moghadam et al. (2017) calculated the cost-benefit efficiency of Iranian commercial banks and examined the relationship between cost-benefit efficiency with the variables of size, capital adequacy ratio, cost-to-profit ratio and profitability. This research was conducted in two stages. In the first stage, using data envelopment analysis technique, cost-efficiency of 10banks over the period 2004-2006 was calculated and in the second stage, using regression of composite data (panel) to examine the relationship between profit and cost-efficiency. The results show that the surveyed banks are more efficient in terms of profit and benefit than expending or spending resources. Also, another finding of this stage of the research was to provide a solution for inefficient banks in order to move towards the efficiency frontier. In fact, the data envelopment analysis technique identified reference units (among efficient banks) for inefficient banks to determine optimal costs and profits.The results obtained from the implementation of the second phase of the study indicate that the variables of capital adequacy ratio and profitability have no significant effect on cost efficiency, but the variables of cost to profit ratio at the level of errors (5%) have a significant inverse and direct effect on cost efficiency, respectively. These results mean that banks that are more willing to control costs are more cost-efficiency, and larger banks have larger-scale savings.

Nemati and Tabatabai (2016) have investigated the determination of factors affecting cost inefficiency in private banks. The statistical population of this study is all private banks in the country, which according to the availability of information and data required over the period in 9 banks (Eghtesad novin, Parsian, Pasargad, Saman, Sarmaye, Tejarat, melat, Workers' Welfare and Iranian exports) have been selected. The results of this study show that the banks in the sample experience an average inefficiency of 69.5 %. The specific factors of each company play a more prominent role than the variables of economic growth and inflation in relation to cost inefficiency in banks.

Faragh and Abtahi (2013) have studied the cost efficiency of Bank Melli in Yazd province using data envelopment analysis method in the branches of Bank Melli Iran in Yazd province as one of the largest and oldest banks in Iran. In this study, efficiency is calculated by data envelopment analysis method index. According to the results of this study, in terms of cost efficiency, 14 branches have been the maximum efficiency. The average cost efficiency of Bank Melli branches in Yazd province was 0.6. On the other hand, according to the results of this study, 53 branches were more than 50% efficient and 37 branches were less than 50% efficient. This study also shows that the cost efficiency of Bank Melli branches in 2011 was skewed to the right, which indicates that most of the branches of Bank Melli in this province had higher than average cost efficiency.

3. Methodology

Following the experimental studies, the model of the present study is as follows

(1)

$$\frac{NDA_{it}}{TASST_{it-1}} = \beta_{0,i} + \beta_1 CEFXCST_{it} + \beta_2 SIZE_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 LOANTDEP_{it} + \beta_6 PRFTMRGN_{it} + v_{it}$$

(2)

$$\frac{NDA_{it}}{TASST_{it-1}} = \eta_{0,i} + \eta_1 CEVCST_{it} + \eta_2 SIZE_{it} + \eta_3 ROA_{it} + \eta_4 LEV_{it} + \eta_5 LOANTDEP_{it} + \eta_6 PRFTMRGN_{it} + h_{it}$$

(3)

$$\frac{NDA_{it}}{TASST_{it-1}} = \lambda_{0,i} + \lambda_1 CENPLCST_{it} + \lambda_2 SIZE_{it} + \lambda_3 ROA_{it} + \lambda_4 LEV_{it} + \lambda_5 LOANTDEP_{it} + \lambda_6 PRFTMRGN_{it} + z_{it}$$

(4)

$$\frac{NDA_{it}}{TASST_{it-1}} = \theta_{0,i} + \theta_1 CEFCST_{it} + \theta_2 SIZE_{it} + \theta_3 ROA_{it} + \theta_4 LEV_{it} + \theta_5 LOANTDEP_{it} + \theta_6 PRFTMRGN_{it} + f_{it}$$

(5)

$$\frac{NDA_{it}}{TASST_{it-1}} = \rho_{0,i} + \rho_1 CEPBLCST_{it} + \rho_2 SIZE_{it} + \rho_3 ROA_{it} + \rho_4 LEV_{it} + \rho_5 LOANTDEP_{it} + \rho_6 PRFTMRGN_{it} + m_{it}$$

(6)

$$\frac{NDA_{it}}{TASST_{it-1}} = \theta_{0,i} + \theta_1 CEDCST_{it} + \theta_2 SIZE_{it} + \theta_3 ROA_{it} + \theta_4 LEV_{it} + \theta_5 LOANTDEP_{it} + \theta_6 PRFTMRGN_{it} + a_{it}$$

where

$\frac{NDA_{it}}{TASST_{it-1}}$:Quality of accounting and financial reporting information variables for bank i in year t;

To measure the quality of accounting and financial reporting information variables, it is necessary to measure optional accruals. In this study, following Verdi (2006) and Biddle, Hillary and Verdi (2008), the quality of reporting, the ability of financial statements to transfer information about the company's operations and in particular the forecast of expected cash flows to investors are defined been. As mentioned in the Financial Reporting Concepts of Iranian Accounting Standards: "Making economic decisions by users of financial statements requires evaluating the ability of the business unit to generate cash and time and the certainty of its creation." Determining the capacity of a business unit to make payments such as the payment of salaries and benefits to employees, payment to suppliers of goods and services, payment of financial expenses, making investments, repayment of loans and distribution of dividends between the owners. "assessing the ability to generate cash is facilitated by focusing on the entity's financial position, financial performance, and cash flows and using them to forecast expected cash flows and measure financial flexibility."

In addition, cash flows are a key element of capital budgeting, and are especially important in this study that examines the financial reporting applications for corporate investment. According to the view that accruals improve the information value of earnings by reducing the effects of volatile fluctuations in cash flows (,Dechow and Dichev 2002; McNichols,2002), the quality of working capital accruals as a substitute for quality Financial reporting is considered (Verdi, 2007). The quality of accruals is calculated based on the following equation. This model is presented by Dechow and Dichev (2002):

(7)

$$\frac{\mathrm{TCA}_{it}}{TASST_{it-1}} = \theta_0 \frac{\mathrm{CFO}_{it-1}}{TASST_{it-2}} + \theta_1 \frac{\mathrm{CFO}_{it}}{TASST_{it-1}} + \theta_2 \frac{\mathrm{CFO}_{it+1}}{TASST_{it}} + \varepsilon_{it}$$

where in;

$TASST_{it-1}$:Total assets of period t-۱(beginning of period t) for Bank i.

CFO_{it} :The operating cash flow of Bank i in year t..

TCA_{it} :The current accruals of Bank i in year t are measured as follows:

$$TCA_{it} = \Delta CA_{it} - \Delta CL_{it} - \Delta CASH_{it} + \Delta STDEBT_{it} + \Delta TP_{it}$$

where in;

ΔCA_{it} :Change in current assets of Bank i in year t;

ΔCL_{it} :Change in the current liabilities of Bank i in year t;

$\Delta CASH_{it}$:Change in the cash balance of the bank i in year t;

$\Delta STDEBT_{it}$:Change in short-term loans within the current liabilities of Bank i in year t;

ΔTP_{it} :Change in tax payment of bank i in year t;

ε_{it} :The disruption component of the bank model in year t has the same absolute value.

$CEFXCST_{it}$:Fixed cost efficiency index for the bank i in year t;

$CEVCST_{it}$:Variable cost efficiency index for the Bank i in year t;

$CENPLCST_{it}$:Cost efficiency of doubtful receivables (fixed cost) for Bank i in year t;

$CEFCST_{it}$:Financial cost efficiency index (fixed cost) for Bank i in year t

;$CEDCST_{it}$:Depreciation cost efficiency index (fixed cost) for Bank i in year t;

$CEPBLCST_{it}$:Index of public, administrative and organizational costs (fixed costs) for the bank i in year t;

$SIZE_{it}$:Size index (logarithm of total value of company assets) for the Bank i in year t;

ROA_{it} :Return on assets for the Bank i in year t;

LEV_{it} :Leverage ratio (ratio of total debt to total assets) for Bank i in year t;

$LOANTDEP_{it}$:Ratio of loan balance to deposit balance for Bank i in year t;

$PRFTMRGN_{it}$:Net profit margin for the bank i in year t;

ε_{it} ،v_{it}، h_{it} ،z_{it} ، ،f_{it}، m_{it}The disruption components are model for the bank i in year t. Models (1) to (6) with GMM regression approach have been estimated for 12 banks during the period 2010-2020 .

4. Measuring cost-efficiency through data envelopment analysis

Since in the data envelopment analysis approach in allocating only one cost item, the amount of allocation efficiency is equal to one, in relation to the efficiency of each fixed cost item, cost efficiency is calculated. The results of cost efficiency are reported in Table (1). The bank's fixed costs include general, administrative and organizational costs, depreciation costs, financial costs and the cost of doubtful debts. Also, variable costs include the total interest paid to depositors and commission costs.

Table (1): Cost efficiency during the period 2010-2020

Type of efficiency		Cost efficiency					
year	**Bank**	**General, administrative and organizational costs**	**Depreciation cost**	**Financial expenses**	**Cost of doubtful debts**	**Total fixed costs**	**Variable costs**
2010	Eghtesad novin	0.072	0.106	0.910	0.745	0.107	0.091
	Ansar	0.130	0.031	0.710	0.778	0.150	0.054
	Dey	0.028	0.861	0.340	0.762	0.030	0.136
	Parsian	0.315	0.129	0.250	0.942	0.344	0.240
	Pasargad	0.107	0.008	0.500	0.802	0.162	0.052
	Post bank	0.030	0.884	0.360	0.902	0.043	0.182
	Tejarat	0.537	0.001	1.000	0.800	0.535	1.000
	Hekmat iranian	0.163	0.035	0.340	1.000	0.269	1.000
	Sina	0.083	0.219	0.230	0.800	0.199	0.263
	Saderat	1.000	0.004	1.000	0.874	1.000	0.164
	Karafarin	0.041	1.000	0.920	1.000	0.071	0.190
	Mellat	0.935	0.093	0.580	0.930	1.000	0.358
2011	Eghtesad novin	0.097	0.112	0.780	0.710	0.104	0.302

Type of efficiency		Cost efficiency					
year	Bank	General, administrative and organizational costs	Depreciation cost	Financial expenses	Cost of doubtful debts	Total fixed costs	Variable costs
	Ansar	0.131	0.043	0.460	0.686	0.150	0.079
	Dey	0.037	0.501	0.810	0.706	0.039	0.189
	Parsian	0.215	0.071	1.000	0.818	0.231	0.403
	Pasargad	0.153	0.007	0.840	0.708	0.251	0.347
	Post bank	0.027	1.000	0.100	0.778	0.029	0.508
	Tejarat	0.576	0.001	0.780	0.726	0.640	1.000
	Hekmat iranian	0.079	0.027	0.760	1.000	0.098	1.000
	Sina	0.070	0.093	1.000	0.708	0.221	0.432
	Saderat	0.818	0.005	0.900	0.803	0.810	0.257
	Karafarin	0.079	0.645	0.960	0.971	0.096	0.465
	Mellat	1.000	0.033	0.610	0.743	1.000	0.594
2012	Eghtesad novin	0.065	0.093	0.000	0.570	0.097	0.355
	Ansar	0.069	0.039	0.000	0.575	0.075	0.345
	Dey	0.044	0.222	0.000	0.597	0.047	0.383
	Parsian	0.130	0.088	0.000	0.789	0.144	0.632
	Pasargad	0.103	0.005	0.000	0.550	0.315	0.550
	Post bank	0.022	1.000	0.000	0.921	0.053	0.881
	Tejarat	0.340	0.000	0.000	0.903	0.622	1.000
	Hekmat iranian	0.023	0.051	0.000	1.000	0.031	0.578
	Sina	0.047	0.077	0.000	0.944	0.054	0.565
	Saderat	1.000	0.002	0.000	0.661	1.000	0.444
	Karafarin	0.082	0.456	0.000	0.973	0.102	1.000
	Mellat	1.000	0.030	0.000	1.000	1.000	1.000
2013	Eghtesad novin	0.068	0.268	0.129	0.536	0.105	0.543
	Ansar	0.088	0.115	0.093	0.531	0.091	0.645
	Dey	0.088	0.360	0.054	0.596	0.148	0.624
	Parsian	0.101	0.269	0.212	0.626	0.111	0.605
	Pasargad	0.110	0.015	0.048	0.483	0.138	0.861
	Post bank	0.063	1.000	0.103	0.713	0.065	0.832
	Tejarat	1.000	0.001	1.000	1.000	1.000	1.000
	Hekmat iranian	0.034	0.112	0.104	1.000	0.039	0.590
	Sina	0.035	0.231	0.075	0.681	0.066	0.568
	Saderat	1.000	0.006	0.062	0.572	1.000	0.591
	Karafarin	0.084	1.000	0.037	0.804	0.100	1.000
	Mellat	0.642	0.084	0.056	0.626	1.000	0.711
2014	Eghtesad novin	0.064	0.346	0.000	0.180	0.068	0.574
	Ansar	0.095	0.147	1.000	0.289	1.000	0.670
	Dey	0.080	0.443	0.000	0.229	0.080	0.649
	Parsian	0.096	0.336	0.001	0.781	0.101	0.680
	Pasargad	0.128	0.021	0.000	0.812	0.176	0.923
	Post bank	0.072	1.000	0.001	0.251	0.072	0.948
	Tejarat	1.000	0.002	0.004	0.325	1.000	1.000
	Hekmat iranian	0.023	0.228	0.000	0.218	0.030	0.535
	Sina	0.040	0.284	0.001	1.000	0.043	0.695
	Saderat	1.000	0.008	0.000	0.910	1.000	0.685
	Karafarin	0.097	1.000	0.000	1.000	0.098	1.000
	Mellat	0.740	0.093	0.000	0 0.157	0.740	0.868
2015	Eghtesad novin	0.087	0.307	0.018	0.767	0.068	0.014
	Ansar	0.112	0.112	1.000	0.622	1.000	0.012
	Dey	0.139	0.421	0.025	0.729	0.080	0.443
	Parsian	0.081	0.349	0.052	0.620	0.101	0.045
	Pasargad	0.144	0.020	0.021	0.762	0.176	0.100
	Post bank	0.054	1.000	0.049	0.868	0.072	0.022
	Tejarat	1.000	0.002	0.226	1.000	1.000	0.518

Type of efficiency		Cost efficiency					
year	**Bank**	**General, administrative and organizational costs**	**Depreciation cost**	**Financial expenses**	**Cost of doubtful debts**	**Total fixed costs**	**Variable costs**
	Hekmat iranian	0.080	1.000	0.544	1.000	0.030	0.057
	Sina	0.026	0.494	0.722	0.611	0.043	0.224
	Saderat	1.000	0.006	0.028	0.604	1.000	0.013
	Karafarin	0.106	1.000	0.018	0.974	0.098	0.015
	Mellat	0.627	0.161	0.047	0.739	0.740	0.036
2016	Eghtesad novin	0.086	0.297	0.188	0.682	0.089	0.582
	Ansar	0.147	0.087	1.000	0.620	0.163	0.490
	Dey	0.320	0.167	0.267	0.696	0.327	1.000
	Parsian	0.085	0.423	0.198	0.615	0.096	0.528
	Pasargad	0.183	0.023	0.114	0.676	0.192	1.000
	Post bank	0.057	0.986	0.229	0.973	0.059	0.555
	Tejarat	1.000	0.003	1.000	0.904	1.000	0.717
	Hekmat iranian	0.138	1.000	1.000	1.000	0.179	1.000
	Sina	0.027	0.354	1.000	0.614	0.029	0.546
	Saderat	1.000	0.007	0.169	0.610	1.000	0.469
	Karafarin	0.097	1.000	0.073	1.000	0.097	0.765
	Mellat	0.650	0.175	0.135	0.771	0.649	0.803
2017	Eghtesad novin	0.096	0.262	0.049	0.529	0.099	0.502
	Ansar	0.158	0.086	0.065	0.605	0.166	0.501
	Dey	0.204	0.178	0.049	0.578	0.211	0.442
	Parsian	0.085	0.454	0.040	0.530	0.091	0.500
	Pasargad	0.195	0.022	0.013	0.723	0.232	1.000
	Post bank	0.076	0.896	0.044	0.850	0.078	0.508
	Tejarat	0.934	0.002	0.125	0.584	0.947	0.617
	Hekmat iranian	0.288	0.708	0.074	1.000	0.333	1.000
	Sina	0.035	0.246	1.000	0.523	0.036	0.464
	Saderat	1.000	0.007	0.189	0.554	1.000	0.412
	Karafarin	0.115	1.000	0.020	1.000	0.116	0.694
	Mellat	1.000	0.191	0.037	0.783	1.000	0.795
2018	Eghtesad novin	0.088	0.095	0.037	0.439	0.093	0.668
	Ansar	0.063	0.070	1.000	0.534	0.070	0.688
	Dey	0.131	0.085	0.046	0.424	0.134	0.427
	Parsian	0.032	0.334	0.044	0.381	0.036	0.476
	Pasargad	0.075	0.019	0.014	0.547	0.088	1.000
	Post bank	0.068	1.000	0.103	0.808	0.071	1.000
	Tejarat	0.847	0.000	0.464	0.501	0.885	0.868
	Hekmat iranian	0.137	0.247	0.070	1.000	0.336	1.000
	Sina	0.016	0.172	1.000	0.410	0.019	0.609
	Saderat	1.000	0.002	0.372	0.465	1.000	0.487
	Karafarin	0.038	1.000	0.019	1.000	0.041	0.907
	Mellat	0.387	0.114	0.039	0.599	0.393	0.902
2019	Eghtesad novin	0.155	0.035	0.059	0.504	0.159	0.731
	Ansar	0.057	0.126	0.012	0.895	0.061	1.000
	Dey	0.143	0.172	0.102	0.670	0.146	1.000
	Parsian	0.077	0.176	0.055	0.443	0.083	0.452
	Pasargad	0.126	0.013	0.032	0.510	0.150	1.000
	Post bank	0.020	1.000	0.077	0.918	0.020	0.887
	Tejarat	0.661	0.001	0.165	0.592	0.826	0.833
	Hekmat iranian	0.089	0.119	0.062	1.000	0.090	1.000
	Sina	0.013	0.154	1.000	0.503	0.015	0.672
	Saderat	1.000	0.003	0.416	0.722	1.000	0.853
	Karafarin	0.040	1.000	0.024	1.000	0.042	0.862
	Mellat	1.000	0.028	0.052	0.708	1.000	0.964

5. Mmeasuring the quality of financial accounting and reporting information

This study emphasizes the cost-efficiency of fixed costs, which include the costs of doubtful receivables, financial costs, depreciation costs, and general, administrative, and organizational costs. Based on this, with emphasis on cost efficiency, various types of fixed costs have been developed and tested.

The first hypothesis of the study is as follows:

- The cost-efficiency of doubtful debts cost based on analysis of data envelopment analysis affects the quality of accounting and reporting information.

To test the above hypothesis, model (3) was specified. In the model, the main independent variable was the cost-effectiveness of the costs of doubtful debtes. The results of estimating pattern (3) are presented in Table (2).

In the estimated table, the value of Sargan statistics is statistically significant and therefore the estimated model is sufficiently valid and the tools used are sufficient. According to Table (2), the cost efficiency of doubtful debts costs has a positive and significant impact on the quality of accounting and financial reporting information index. Accordingly, the quality of accounting information and financial reporting decreases as the cost-efficiency of doubtful debts increases. It is natural to increase these costs in the sense of inefficiency in credit rating customers and default risk assessment.

The result can be explained through that fact that a doubtful debts costs is a sign of higher credit risk. Maudos and de Guevara (2004) and Lepetitet al. (2008) make reference to the fact that banks will increase the net interest margin if the credit risk is higher. The influence that the doubtful debts costs variables included in the model have on inefficiency reveals important conclusions. Surprisingly, the results indicate that a higher domestic credit provided by banking is related to higher inefficiency.

In our opinion this result can be explained by the fact that a high domestic credit which may lead to lower interest margins. Also, banks could reduce the loan standards in their attempt to increase the market share. On the other hand, a higher level of financial intermediation will lead to lower inefficiency variability. A high real doubtful debts costs will lead to an increase in the banks´ inefficiency level and also to an increase of the variability of the inefficiency effect. Thus, the increase of doubtful debts costs will have a negative effect on the loans demand and will decrease the efficiency of the commercial banks. A similar result was also obtained by Sanchez et al. (2013). Banks with an increased credit risk, namely a higher ratio of NPLs in total loans, are more inefficient. The result is in line with expectations, if we take into account that non performing loans generate additional costs for banks. A positive relation between the credit risk and inefficiency was identified also by Lensinket al. (2008), Fries and Taci (2005), Sun and Chang (2011).

Therefore, it is necessary to reduce its size. Among the control variables, the effect of bank size variable (SIZE) on the quality of accounting and financial reporting information is not statistically significant, but the effect of return on assets (ROA) and leverage ratio (LEV) and the ratio of loan to deposit balance (LOANTDEP) on the financial reporting quality index is negative and statistically significant.

The Return on Assets (ROA), bank size , the loans to total assets ratio, the nonperfit margin , leverage ratio and the ratio between loans and deposits are control variables.

The ROA and the NPM are measures of bank profitability. Basically, banks with a high profitability rate should be more efficient. Moreover, the two rates are commonly used in the literature to describe the performance of the banks (de Haas and van Lelyveld, 2006; Xu, 2011). Net loans to total assets ratio is a measure of loan specialization. Freixas (2005) posits that a high rate provides informational advantages, which reduce intermediation costs and improve profitability. However, Heffeman and Fu (2010) state that very high ratios could also reduce liquidity and increase the number of marginal borrowers that default. Fries and Taci (2005) consider that loans to customer deposits ratio is a measure of the efficiency of the financial intermediation process. Thus, a very low ratio could indicate banks´ incapacity to transform deposits into loans. Nonperforming loans to gross loans ratio is a measure of credit risk. A high rate indicates bigger costs for the banks and implicitly, a decreased efficiency. Berger and DeYoung (1997)

state that in order to reduce the level of the nonperforming loans, banks make higher expenses related to: monitoring, negotiating workout arrangements, seizing and disposing of collateral, diverted senior managerial focus. Naturally, banks with a higher non performing loans rate are more inefficient.Equity to total assets ratio is a measure of solvency risk. Its effect on efficiency is rather vague. On one hand, banks with higher ratio benefit from lower borrowing costs, being perceived as more reliable, but they can also ignore potentially profitable investment opportunities. On the other hand, a lower ratio can indicate capital adequacy problems (Heffernan and Fu, 2010).

The second hypothesis of the study is as follows:

- The cost-efficiency of financial data analysis based on data envelopment analysis affects the quality of accounting and reporting information.

To test the above hypothesis, model (4) was specified. In the model, the main independent variable was the cost-efficiency of financial expenditures. The results of estimating pattern (4) are presented in Table (3). In the estimated table, the p value of Sargan statistics is statistically significant and therefore the estimated model is sufficiently valid and the instruments that used are sufficient.

According to Table (3), the cost efficiency of financial expenses has a significant negative impact on the quality index of financial accounting and reporting information. Accordingly, the quality of financial accounting and reporting information increases as the cost-ffectiveness of financial expenditures increases.

Among the control variables, the effect of bank size variable (SIZE) on the quality of accounting and financial reporting information is not statistically significant, but the effect of return on assets (ROA) and leverage ratio (LEV) and the ratio of loan to deposit balance (LOANTDEP) on the financial reporting quality index is negative and statistically significant. But the effect of net profit margin (PRFTMRGN) on the quality of financial reporting is also positive and statistically positive.

Table 2: Estimation of pattern (3) to test the first hypothesis

Dependent variable	**NDA/TASST(-1)**			
probability level	**Coefficient**	**Standard deviation**	**t-statistic**	**probability level**
NDA(-1)/TASST(-2)	-0.2946	0.0100	-29.5641	0.0000
CENPLCST	2.0437	0.1838	11.1219	0.0000
SIZE	-0.0250	0.2614	-0.0955	0.9242
ROA	-85.4706	35.5735	-2.4026	0.0189
LEV	-14.4623	3.2341	-4.4718	0.0000
LOANTDEP	-0.2468	0.0232	-10.6463	0.0000
PRFTMRGN	4.4228	0.2230	19.8328	0.0000
Instrument rank				12.0000
Sargan's test				7.9117
Prob(J-statistic)				0.1612

Table 3: Estimation of pattern (4) to test the second hypothesis

Dependent variable	**NDA/TASST(-1)**			
Variable	**Coefficient**	**Standard deviation**	**t-statistic**	**probability level**
NDA(-1)/TASST(-2)	-0.3611	0.0057	-63.6956	0.0000
CENPLCST	-1.6868	0.4595	-3.6709	0.0005
SIZE	-0.1661	0.3577	-0.4643	0.6438
ROA	-71.7754	13.4067	-5.3537	0.0000
LEV	-20.6799	5.0282	-4.1128	0.0001
LOANTDEP	-0.2741	0.0666	-4.1142	0.0001
PRFTMRGN	3.2484	0.8638	3.7608	0.0003
Instrument rank				12.0000
Sargan's test				7.1458

Prob(J-statistic)	0.2100

The third hypothesis of the study is as follows:

- The cost efficiency of public, administrative and organizational costs based on data envelopment analysis affects the quality of accounting and reporting information.

To test the above hypothesis, model (5) was specified. In the model, the main independent variable was the cost efficiency of public, administrative and organizational costs. The results of model estimation (5) are presented in Table (4). In the estimated table, the value of Sargan statistics is statistically significant and therefore the estimated model is sufficiently valid and the instruments that used are sufficient.

According to Table (4), the cost efficiency of general, administrative and organizational costs has a significant negative impact on the quality of accounting and financial reporting information index. Accordingly, the quality of accounting and financial reporting information increases as the cost-effectiveness of public, administrative, and organizational costs increases. Considering the result of finding, costing affects significantly the efficiency. the presence of costing resulting from the allocation of fund can contribute to the bank's efficiency. in other words, the efficiency of costing distributed, the more efficient is the bank in allocating the resources it has. It means that, when the costing is higher, the bank's ability of making the resource, the costing, is more efficient. It is because the high costing results in high profit, so that the bank's performance, in this case the efficiency of fund allocation, will be good.

Among the control variables, the effect of bank size variable (SIZE) on the quality of accounting and financial reporting information is not statistically significant, but the effect of return on assets (ROA) and leverage ratio (LEV) and the ratio of loan to deposit balance (LOANTDEP) on the financial reporting quality index is negative and statistically significant. But the effect of net profit margin (PRFTMRGN) on the quality of financial reporting is also positive and statistically positive.

The fourth hypothesis of the study is as follows:

- The efficiency of depreciation costs based on data envelopment affects the quality of accounting and reporting information.

To test the above hypothesis, model (6) was specified. In the model, the main independent variable was the cost efficiency of public, administrative and organizational costs. The results of estimating pattern (6) are presented in Table (5).

In the estimated table, the value of Sargan statistics is statistically significant and therefore the estimated model is sufficiently valid and the instruments that used are sufficient.

According to Table (5), the cost efficiency of depreciation costs has a significant negative impact on the quality index of accounting and financial reporting information. Accordingly, the quality of accounting information and financial reporting increases as the cost-effectiveness of depreciation costs increases. In our opinion, the decrease of the cost efficiency index is a consequence of the effects of the global financial crisis that has affected the commercial banks.

Among the control variables, the effect of bank size variable (SIZE) on the quality of accounting and financial reporting information is not statistically significant, but the effect of return on assets (ROA) and leverage ratio (LEV) and the ratio of facility to deposit balance (LOANTDEP) on the financial reporting quality index is negative and statistically significant. But the effect of net profit margin (PRFTMRGN) on the quality of financial reporting is also positive and statistically positive.

Table 4: Estimation of pattern (5) to test the third hypothesis

Dependent variable	**NDA/TASST(-1)**			
Variable	**Coefficient**	**Standard deviation**	**t-statistic**	**probability level**
NDA(-1)/TASST(-2)	-0.3615	0.0042	-85.7428	0.0000
CENPLCST	-5.5730	0.8888	-6.2703	0.0000
SIZE	-0.2543	0.2690	-0.9451	0.3478
ROA	-84.8417	7.8338	-10.8303	0.0000
LEV	-17.0743	4.8432	-3.5254	0.0007

Dependent variable	NDA/TASST(-1)			
Variable	**Coefficient**	**Standard deviation**	**t-statistic**	**probability level**
LOANTDEP	-0.2451	0.0286	-8.5708	0.0000
PRFTMRGN	4.1284	0.2232	18.4948	0.0000
Instrument rank				12.0000
Sargan's test				7.3276
Prob(J-statistic)				0.1974

Table 5: Estimation of pattern (6) to test the fourth hypothesis

Dependent variable	NDA/TASST(-1)			
Variable	**Coefficient**	**Standard deviation**	**t-statistic**	**probability level**
NDA(-1)/TASST(-2)	-0.5056	0.0069	-73.6879	0.0000
CENPLCST	-10.8379	0.3154	-34.3600	0.0000
SIZE	0.3418	0.2005	1.7045	0.0926
ROA	-131.2051	21.6137	-6.0705	0.0000
LEV	-27.7502	8.1042	-3.4242	0.0010
LOANTDEP	-0.0623	0.0250	-2.4897	0.0151
PRFTMRGN	4.8041	0.2528	19.0003	0.0000
Instrument rank				12.0000
Sargan's test				5.5716
Prob(J-statistic)				0.3502

6. Conclusion

Given the growing expansion of the banking industry around the world, including Iran, and given the vital importance of optimal allocation of financial resources, which falls within the scope of the banking system, The aim of this study was to investigate the effects of banks' cost-efficiency on the quality of accounting and reporting information in the banking industry of the country (as a case of banks listed on the stock exchange and OTC). Examining the efficiency of the bank is of fundamental importance in the sense that the improvement in the performance of the bank indicates a better allocation of financial resources and therefore provides an increase in investment and consequently contributes to growth. To measure cost efficiency by data envelopment analysis method, data of 12 banks during the period 2010-2019 were used. Also in this study, to measure the quality of accounting information and financial reporting, the Dechow and Dichev 2002 model was estimated based on data panel data during the period 2010-2019 using the GMM method. Estimation of the model related to measuring the quality of accounting and financial reporting information by Dechow and Dichev (2002) showed that about 23.26% of normal accruals depend on the past values of these items. Also, the operating cash flow of the current period and a recent period has a negative impact on ordinary accruals, but the operating cash flow of a future period also has a positive and significant effect on ordinary accruals.

According to the results, the cost efficiency of doubtful debts costs has a positive and significant impact on the quality of accounting and financial reporting information index and with increasing cost efficiency of doubtful debts cost, the quality of accounting information and financial reporting deteriorates. This is because doubtful receivables show the weakness of the bank's management in credit rating customers and increase the risk of default, and basically bank managers are reluctant to provide information about doubtful receivables accurately and transparently in financial statements. In contrast, cost efficiency Other fixed costs in banks, including the efficiency of financial costs, general, administrative and organizational costs and depreciation costs have a negative and significant impact on the quality index of financial accounting and reporting information and with increasing cost efficiency financial costs, depreciation costs and general, administrative and organizational costs The quality of financial accounting and reporting information increases.

These three types of fixed costs associated with

banking are inevitable. Because banks require branches, software, and other assets for banking operations, these assets are subject to depreciation expense. Also, manpower and administrative-operational processes are the most important resources of the bank for banking operations. In addition, banks can finance from the central bank or other banks to eliminate daily imbalances or the allocation of facilities and credit. This financing is pursued today in the form of interbank market operations. None of these three types of fixed costs are an undesirable phenomenon and are necessary for banking operations. But doubtful receivables expence are an undesirable phenomenon and are the result of poor management performance in the field of granting facilities and loans. The main effect of bad loans on banks is the fact that increasing bad loans limit the financial growth of banks. This consequence is as a result of the fact that bad loans deprive banks of the needed liquidity and limit their capability to fund other potentially viable businesses and make credit facilities available to individuals. Karim et al. (2010) argues that there are a lot of other viable businesses that the bank cannot explore as a result of the fact that its funds are caught up in bad loans.

The findings of this study provide insights to banking market stakeholders as well as regulators and standardizers to revise the current model for calculating the reserve of doubtful receivables. There may be many interrelated problems but the most basic ones which are so obvious and interrelated revolve around trying to be profitable, solvent and liquid. Profitability is the proof of an effective and well managed business. Credit risk is widely recognised. The literature has revealed that the most common cause that leads the banks to bankruptcy is credit risk. Indeed, over the year banks are also increasingly facing credit risk (or counterparty risk) in various financial instruments other than loans, including acceptances, interbank transactions, trade financing, foreign exchange transactions, financial futures, swaps, bonds, equities, options, and in the extension of commitments and guarantees, and the settlement of transactions.

Indeed, credit risk can lead to financial crisis. Financial institutions are subject to a number of risks such as credit risk, operational risk, and liquidity risk (Foot, 2002). These risks are related to each other and it is rather difficulty to isolate one from others in practice. Although credit risk has always been of primary concern to these institutions, its importance became paramount during the recent financial crisis. The financial crisis exposed the shortcomings of existing credit risk management systems, and several firms saw significant losses resulting from failure of their counterparties to deliver on contracts. As Demirgüç-Kunt and Detragiache (1998) argued, fast financial liberalizing worsens the risk and fragility of the whole financial system. They believe that financial crisis will take place when serious credit risk occurs. Credit risk is the consequence of inappropriate connections between different parties. Research conducted by Stiglitz and Weiss (1981) and Esstrella and Mishkin (1996) illustrates that the borrower could easily obtain more information of the project they have invested than the lenders do. This, therefore, raises negative selection and moral hazards in the credit market. Information asymmetry could lead to the credit risk. In the literature, it has been well-argued that serious competition in the market could also lead to commercial banks' credit risk.

It is important to note that credit rating institutions that have the title Banks that have not been centralized by the central bank or have been listed on the stock exchange before or during the research period were not included in the community of this article, but it should be remembered that these institutions represent a significant part of the country's money market and research. Regarding them, it is considered a necessity. The unavailability of data and financial statements of the mentioned institutions was one of the main limitations of this research and despite the desire of researchers, the achievement of the mentioned cases was not achieved. Lack of access to information also applies to some state-owned banks and is one of the major limitations of the study.

Based on the results of this study, the following suggestions are presented:

- Bank managers are advised to take effective steps in this direction in order to reach the limit of cost efficiency by using cost management and control techniques such as standard costing, activity and cost based costing, value engineering and other items.
- The managers of banks are advised to reconsider the calculation of the reserve of doubtful receivables, considering that doubtful receivables are considered an undesirable

phenomenon and the result of improper performance of management in the field of granting facilities.

- Also, increase the efficiency of fixed costs, increase the cost efficiency of financial costs, depreciation costs and general, administrative and organizational costs should be considered and the cost efficiency of doubtful receivables should not be considered, but instead It should focus on reducing doubtful receivables.

Rreferences

* Charnes, A., Cooper, W., Rohdes, E., " Evaluation Program and Managerial Efficiency: An Application DEA to Program Follow Through " ; Management Science , No. 6, 2009, pp. 668 – 697
* Coelli T, Rao DSP, O'Donnell CJ, Battese GE. 2005. An Introduction to Efficiency and Productivity Analysis. Springer-Verlag: New York.
* Delhangizan, Sohrab, Goli, Younes. (۱۳۹۷). Investigating the relationship between competition and cost efficiency in the Iranian banking industry. Monetary Economics, 25(15), 104-81.
* Emami Meybodi, Ali, (2000), Principles of measuring efficiency and productivity (scientific and applied), Tehran: Institute of Business Studies and Research.
* Faragh, Nader and Abtahi, Seyed Yahya, 2013, Cost Efficiency Analysis of Bank Melli Yazd Province Using Data Envelopment Analysis Method, Second National Conference on Sustainable Development in Arid and Semi-Arid Areas, Abarkooh.
* Freixas, X., 2005.Deconstructing relationship banking. InvestigacionesEconómicas, 29, 3-31.
* Golmoradi, Hassan, Golzarianpour, Siavash, Ali Akbar, Shiva. (2020). Investigating the effect of survival determinants on the cost efficiency of the country's stock exchange banks. Quantitative Economics Quarterly, 17 (4), 111-89
* Ghayuri Moghadam, Ali, Alipour, Safdar, Nemat Elahi, Zaeimeh, Asghari, Iraj. (2016). Determining the cost and profit efficiency of banks using data envelopment analysis technique and examining its determining factors. Empirical Accounting Research, 7(3), 100-81.
* Halkos George, and Salamouris D. (2004). Efficiency measurement of the Greek commercial banks with the use of financial ratios: A Data Envelopment Analysis approach, Management Accounting Research, 15(2): 201-224
* Heffernan, S. A., Fu, X., 2010. Determinants of financial performance in Chinese banking. Applied Financial Economics, 20, 1585-1600.
* Hosseinzadeh Seljuqi, Frank, Zakir Harfteh, Elham. (1400). Evaluating the cost-effectiveness and efficiency of network systems, a case study: bank branches. New research in decision making, 6 (1), 42-22-
* Mihai Niţoia, Cristi Spulbara, An Examination of Banks' Cost Efficiency in Central and Eastern Europe Procedia Economics and Finance 22 (2015) 544 – 551
* Nemati, Mehrdad, Tabatabai, Seyed Ali Akbar. (2015). Determining the Factors Affecting Cost Inefficiency in Banks (Case Study: Banks Listed in Tehran Stock Exchange, Financial Economics, 10(36), 146-123.
* Pessarossi, P., & Weill, L. (2015). Do Capital Requirements affect Cost Efficiency? Evidence from China. *Journal of Financial Stability*, 19, 119-127.
* Sharma, S.; Sharma, J. (2008). A study of stress and cope-up strategies of service sector employees. Indian Management Studies Journal, 12: 19-35. 100. Sisson, K
* Siriopoulos, C., Tziogkidis, P. (2010). How Do Greek Banking Institutions React After Significant Events? A DEA Approach, Omega Journal, Special Issue in Empirical Research in the EU Banking Sector and the Financial Crisis, 38: 294-308
* Wautabouna Ouattara American Journal of Economics 2012, 2(1): 37-46 DOI: 10.5923/j.economics.20120201.05.