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*Keywords: islamic banks, north africa, efficiency, financial ratios, the method DEA.*

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# The Efficiency of Islamic Banks in North Africa: Analysis with the Non-Parametric Approach DEA (Window Analysis)

Boudabbous Sami [α] & Yosra Elhaj Ali [σ]

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## Introduction

The global economy has the Islamic economy, which is recognized for all the world by the prohibition of RIBA. This concept Arabic translated the interest imposed on the borrowing and lending.

At the beginning of the twentieth century, the Islamic economy has been appeared in order to release the economies of the countries Muslims, but by the time the Islamic banks are also found in non-Muslim countries. The Islamic economy indicates the existence of an economy based on the Islamic doctrine.

An Islamic Bank applies the principles of the Sharia in all their financial transactions, banking and investment. Without doubt, it subject to the supervision of the central bank.

The Islamic banks have its own rules and pillars that make them different from the conventional banks. Historically, the first Islamic Bank was founded in Egypt in 1963 at the initiative of an economist called Ahmad al-NAGGAR.

Islamic finance is based on the conviction of the Riba (wear), the prohibition of Gharar (speculation) and the Maysir (uncertainty), the financing of projects in sectors lawful, the obligation of sharing of profits and losses, and finally the principle of affiliation investments to tangible assets of the real economy. Baller (2005) sees that the Islamic finance earlier as modern because it introduces a new form of "governance partnership".

Islamic finance inspires its foundations of the Islamic law (*Shariah)*, of the finance Anglo-Saxon, of the Koran (*Qur'an),* the Islamic jurisprudence *(Fiqh)* and of the Islamic tradition (*Sunnah)*.

We note that the studies are few who have taken the Islamic banks in North Africa in the study of the efficiency of Islamic banks. We will examine the efficiency of Islamic banks in North Africa via the method DEA by Window Analysis. Our contribution lies in the analysis of the efficiency by ratios to the company of the analysis via DEA by Window Analysis instead the approach DEA standard. This point brings a particular asset to our work.

Our research focuses on the efficiency of Islamic banks in North Africa with the method of analysis by financial ratios and the method DEA. In what follows, we will put the light in the first time on the term efficiency, and then on the studies that deal the efficiency of Islamic banks according to the DEA (specially Window analysis). By the following, we will treat empirically the efficiency of Islamic banks in Africa to north.

## I. A Review of the Literature

The Islamic bank differs from the classic bank by several criteria. The Islamic Bank offers products and of financial operations adapt to the principles of the shariah. These Islamic products are deposits of investment, certificates of investment or savings accounts.

The products of the Islamic Bank meet the needs of the customer. Since, the Islamic Bank offers the client several options such as: murabaha (cost-plus), Musharakah (Joint Venture), Ijara (leasing). Accordingly, this bank has the Islamic options such as letter of guarantee, letter of credit and the cards covered.

Primarily, the Islamic Bank has a board Shariah. This Council is composed of experts in Islamic law in order to consult, in a continuous manner, as regards all the new banking operations.

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Islamic banks have three modes of financing ; the sharing of profits and risks, leasing, the loan Islamic.

*a) The main Islamic instruments*

The mobilization and the use of capital in the Islamic finance are based on different legal concepts to those of traditional banks (Muhammad, 1981).

- **Mudaraba**: it refers to the financing of an investment by the Bank with the sharing of losses and profits according to a predetermined rate.
- **Musharaka Mizaka:** it refers to the co-financing by the Bank and the proponents without forgetting with sharing of losses and profits according to a rate set at the beginning.
- **Kard Hasan:** it refers to a loan without interest but the bank charges real are borne by the borrower.
- **Bay'mu'ajjal** the acquisition of an asset, which presents a need for the client, by the bank then resale to its client with compensation delayed.
- **Bay As-salam:** the acquisition of an asset of the customer by the bank then resale to term to the latter.
- **Ijara:** the acquisition of an asset by the Bank in order to rent to its client in respect of a commitment of sale to term.
- **Murabaha:** the loan without interest in the short term with banking margin defined.
- **Sukuk:** the bond borrowing backed with a leasing contract.

❖ The concept of efficiency

For Allen and Anoop (1996), the term efficiency has a broader meaning than the effectiveness. The term efficiency includes considerations of cost and efficiency.

For Windham (1988), "The efficiency is a concept which combines two other since it puts in report the effectiveness for the resources committed to achieve the expected results." Therefore, the efficiency combines the effectiveness and the means employed to achieve the goals of the Bank. In another way, the achievement of the goal with lesser costs generates a bank efficiently. Also, the Bank is called efficiently by report a different bank, if it achieves the best results with the same means. Accordingly, the efficiency is measured by the relationship between the effectiveness and the cost.

The efficiency-x refers to the overall efficiency. The overall efficiency encompasses productive efficiency, the efficiency to the scale, the EFFICIENCY The allocative and/or technical efficiency.

Weill (2006) stresses that productive efficiency is linked to the concept of the production function. The production function refers to the ratio between the quantities of the factors of production X i and the quantities produced y j.

Kopp, Osiewalski, and Steel (1994) emphasize that productive efficiency refers to the ability to produce a specified output at a minimum cost.

Specifically, the efficiency indicates to what point an organization uses its resources well to produce goods and services. Consequently, the term efficiency depends on the resources (human and financial, equipment, materials,…, goods and services products) in order to meet the needs of a "customer".

Amara and Romain (2000) have stressed that the term efficiency means "a production unit is called efficient if, from the basket of inputs that it holds, it produces the maximum output possible."

❖ The forms of efficiency

There are three forms of efficiency: a technical efficiency, a allocative efficiency and a efficiency at scale.

- Technical Efficiency

The concept of technical efficiency finds its origin in the theoretical work of fundamental Debreu (1951), Koopmans (1951) and Farrell (1957).

Koopmans (1951) it is the first which has given a formal definition of the technical efficiency: "a producer is technically efficient if the increase of any output requires the reduction of at least one other output or the increase of at least one input, and if a reduction of any input requires elevation of at least one other input or the reduction of at least one output. ".

According to Weill (2006), the technical efficiency means that an organization is technically efficient if its activities the located exactly on the border of production.

Also, the technical efficiency "returns to the ability to avoid losses by producing as much output that allows the use of inputs or by using the least possible inputs such that the allows the production of outputs" (Harold, Lovell and Schmidt, 1993).

- The allocative efficiency or price

The second form of efficiency it is the efficiency price. An organization is efficient allocativement if she chooses the productive combinations the least expensive, that is to say that it uses the factors of production in the exact proportions, given their market price.

Otherwise, this form designates that the organization reduces its total costs of production, it also promotes the level of this last which is socially optimal (including by a policy of selling prices or pricing, appropriate).

Therefore, the efficiency award allows you to grant a complementary information on performance.

Another side, the inefficiency price results from decisions of production under optimal thanks to estimates of relative prices to outputs or to inputs, therefore the production would be more expensive by



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report a production with the factors of productions in optimal proportions.

Otherwise, an organization is called inefficient allocativement provided that it uses of the factors of production in proportions incorrect in the light of their price.

Pinteris (2002) stresses that the EFFICIENCY The allocative presents the capacity of leaders to choose among the production program the more efficient technically, what engendre the profit the Most High, or the possibility to choose the inputs in the Percentages optimal.

- The efficiency at the scale

The efficiency to scale it is the case of an organization in a situation of perfect competition, and which operates at an appropriate scale, this means that its marginal cost must be equal to the market price of its product (Chaffai, 1989).

Otherwise, an organization is efficiently to the scale on the condition that it realizes to an optimum size given the market where it operates.

By contrast, an organization is inefficient at the scale at the condition that it did not happen to maximize its profit and subsequently its marginal cost will be separate from the price of the market.

❖ Few empirical studies concerning the efficiency of Islamic banks with the DEA method

To study the efficiency of Islamic banks, some researchers make recourse to the method dea with the financial ratios. The existing studies concerning the efficiency of Islamic banks are classified in two groups. The first group includes studies that assess the efficiency of Islamic banks using the financial ratios. Some of these studies have compared their results with conventional banks. The second group of studies focuses on the effectiveness of the banks by approaches for analysis of border.

Brown (2003) has done a research on the efficiency of Islamic banks over a period extending from 1998 to 2001. The sample includes banks belong to the 19 countries of Asia, the Middle East and North Africa. It note that the Islamic banks Iranian, Yemeni and Brunei Darussalam are more efficient that the Islamic banks in Indonesia and Sudan.

Sufian and Noor (2009) have analyzed the efficiency of Islamic banks between 2001 to 2006. The banks belong to the 16 countries of Asia, the Middle East and North Africa (MENA). They emphasize that the Islamic banks of the MENA region compared to the Islamic banks Asian.

Nor Hayati et al. (2011) have assessed the efficiency of Islamic banks between 2003 and 2009 in 25 countries. They stressed that the Islamic banks located in high-income countries are more efficient than the other banks.

The first study concerning the efficiency of Islamic banks with the non-parametric approach DEA is Yudistira (2003).

Brown and Skully (2005) examined the effectiveness of 36 Islamic banks belong to 19 different countries. They have found that at the regional level, Islamic banks of the Middle East were the most effective and then Asia and Africa.

Johnes et al. (2009) stress according to its study on the Gulf countries between 2004 and 2007 that, via the method DEA, the conventional banks are more efficient than the Islamic banks.

In contrast, Grigorian and Manole, (2005) noted that conventional banks do not exceed the Islamic banks in the scores of efficiency.

We note that the studies on the efficiency of Islamic banks are rare who have taken the Islamic banks of the countries of North Africa. This point brings a particular asset to our work.

## II. The Methodology

The methods used for the determination of the efficiency of financial institutions and banks can be classified into two groups: the methods parametric and non-parametric methods.

Berger and Humphrey (1997) have proposed two empirical methods to measure efficiency. The first method is called induced parametric by Aingner and Al(1977) and the second is nonparametric induced by Charnes er et al., (1978).

For our work, we will choose the non-parametric method dea with the method of analysis by the financial ratios in order to examine the efficiency of Islamic banks in North Africa.

*a) Data Envelopment Analysis (DEA)*

The non-parametric method DEA is also called DMUs (decision-making units). This method allows you to evaluate the performance of the firms on the basis of multiple outputs and inputs.

Otherwise, the method allows DEA to assess the efficiency of the firms by transforming inputs (resources) in outputs (benefits).

The method DEA (DMU) has been extended by Charnes et al. (1978, 1981) in order to assess the efficiency of a U.S. federal program for the allocation of resources to schools. Via the time, the use of the DEA is widespread in the other public organizations. The DEA method gives a score to the efficiency of organizations.

Banker et al. (1984) show that the measure of the efficiency in the search for Charnes et al (1978) can be decomposed into two: the technical efficiency and the efficiency of scale.

The score for the efficiency of each firm is counted by report to a border of efficiency. The firms that are located on the border have a score of 1 (or 100%). Therefore, the firms that have a lower score to



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100% are located under the Border, and it is impossible to find firms on the border of efficiency.

The firms that are located on the border of efficiency are used of peers (or benchmarks) to inefficient firms. These peers are attached to the best practice visible. Therefore, the method DEA is a technique of benchmarking.

In another way, the firms that are located under the Border (have a lower score to 100%) have a margin for improvement of their performance.

The DEA technical is a method linear programming. This method limits the comments via plans to build a border. The organizations that reside on this border are efficient, on the other hand, the organizations which are located under this border are inefficient. The organization which is located in the border of efficiency does not reflect that it produces a maximum level of outputs from a given level of inputs although this situation means that this organization presents the best practice of the production of outputs and constitute a reference for the other organizations.

The approach Window analysis is an extension of the DEA method which has been introduced by Klopp (1985). The approach Window analysis gives a vision on the trend (the increase or decrease) of the efficiency in the time (Charnes et al., 1994 and Cooper et al., 2007). In this approach, each unit of decision is distinct from a duration of time to another.

i. *Description of the data and definition of variables*

The data used come mainly from the annual financial statements issued by the banks of our sample.

The period covered by our study extends from 2010 until 2014 (five years). Our period of study relates to eight banks are located in North Africa operational throughout this period, namely:

1. BZ : Bank Zitouna (Tunisian bank).
2. The Bank Al Baraka (Tunisian bank).
3. BAMIS : Mauritanian bank.
4. The Bank Al Baraka (Algerian bank).
5. The Bank Alsalam (Algerian bank).
6. the Islamic Bank of Faisal of Egypt.
7. the Islamic Bank of Faisal of Sudan.
8. The Bank Al Baraka of Egypt.

ii. *Definition of variables*

In order to measure the efficiency of Islamic banks in North Africa we use the analysis by ratios. The founding studies concentrated on the analysis of the efficiency of the banks have had recourse to certain ratios in order to examine the efficiency of banks (Farrell, 1957).

Recent studies have made call to ratios of profitability, efficiency, cost as (Qureshi & Shaikh, 2012), and we are going to add the ratios of risk.

The ratios are summarized in the table below.

| The name of the variable | Definition |
|---|---|
| The Cost Ratio 1 | Personal load / Total Assets |
| The Cost Ratio 2 | Interest expenses / Total Deposit |
| The ratio of cost 3 | (provisions+Capital) / Total Assets |
| The risk ratio 1 | Credit Total / Total Assets |
| The ratio of risk 2 | Total deposits / Total Assets |
| The ratio Profit | Profits / Total of assets |
| The income ratio | Commissions / Total Assets |

*b) Analysis by the Financial Ratios*

Moreover, we will classify the Islamic banks in North Africa according to the average of the Ratios by year.



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*Table 1 :* The classification of banks according to the average of the Ratios by Year

| Year | Average Cost Ratio 1 | Average Cost Ratio 2 | Average Cost Ratio 3 | Average Risk ratio 1 | Medium risk 2 | Income Average | Average ROA |
|---|---|---|---|---|---|---|---|
| 2010 | 0,004472597 | 0,020095872 | 0,025268348 | 0,346814442 | 0,657706655 | 0,003466211 | 0,371675601 |
| 2011 | 0,006403111 | 0,041468257 | 0,026844798 | 0,35294257 | 0,599608611 | 0,004134146 | 0,270895782 |
| 2012 | 0,007051709 | 0,021868407 | 0,027176397 | 0,415325066 | 0,720776866 | 0,004031999 | 0,218954483 |
| 2013 | 0,009581117 | 0,023986968 | 0,026999372 | 0,444916175 | 0,769735534 | 0,009973922 | 0,180868064 |
| 2014 | 0,005968795 | 0,07855045 | 0,027772832 | 0,373368299 | 0,622325447 | 0,00621009874 | 0,234009666 |

According to the table above, we find that the Islamic banks in North Africa have experienced an increase in the ratios of the cost 1, which is explained by the increase in personal charges with a percentage fort that the increase in the total of active across the five years of our study.

The ratio of the cost 2 has experienced an increase in 2011 and 2014 and almost the ratios are equal between 2010, 2012 and 2013. Therefore, the expenses of interests have experienced an increase with a strong proportion that the increase in total filings in 2011 and 2014.

The ratio of the cost 3 has experienced a slight increase from one year to another. Then, the capital, the total of assets and provisions have experienced a slight increase except in 2013 these variables have experienced a slight decrease.

Islamic banks in North Africa have experienced an increase in the Risk ratio 1 between 2010 and 2013, which is explained by the increase in the total of credit by Report the total of the deposits. But, this ratio has seen a decrease in 2014 by Report 2013.

In addition, the ratio of Risk 2 experienced a decrease between 2010 and 2011. And then this ratio has experienced an increase except in 2014 Islamic banks in North Africa a decrease in the ratio of risk.

The ratio of income has experienced an increase between 2010 and 2013.

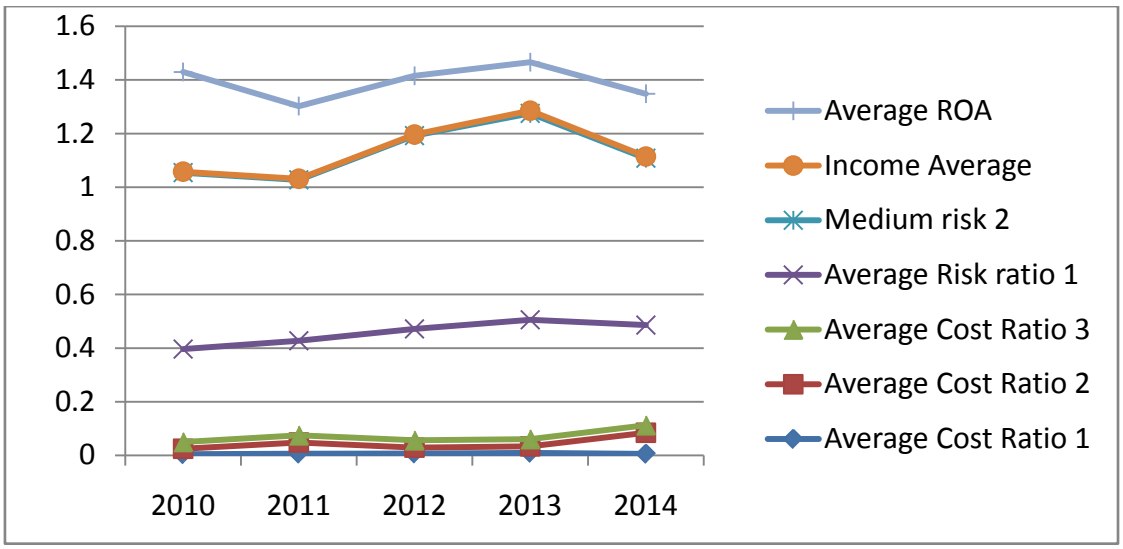
According to these results, we note that, in 2010, the average of the ratio of Risk 2 (total Depot / total assets) occupies the first rank with a percentage of 65.77%, then the average of the ratio of profit (ROA) is located in the second level.

Islamic banks in North Africa have experienced an increase in the Risk ratio and the cost ratio during the period 2010-2013, which creates a slight decrease of income and profit. This increase of the Ratios costs and risks is explained by a strong increase in expenses and expenditure by Report The increase in deposits and total assets.

By against the Islamic banks catch up with their situation in 2014 and record an increase performance ratios and a parallel decrease of risk ratios and ratios of costs. Therefore, the Islamic banks are more efficient in 2014.



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*The Graph 1 :* The variation of financial ratios between 2010 and 2014

According to the graph, the ratio Profit (ROA) of Islamic banks in North Africa has experienced a decrease in 2011. Then, this ratio has seen an increase in 2012 and 2013. By contrast, this ratio has seen a decrease but with a percentage remains greater than the year 2010.

The Cost Ratio 3 has experienced an increase in 2011, then a decrease in 2012. Subsequently, we observe a slight increase in 2013. But, in 2014, the ratio of cost 3 increases to exceed the levels in the last three years.

The Cost Ratio 2 has seen an increase in 2011, then a decrease in 2012. Subsequently, this ratio increases slightly to achieve in 2014 a level superior to other years.

The risk ratio 2 has seen a decrease in 2011, then an increase in 2012 and 2013. But, this ratio of risk has been decreased in 2014. Therefore, the Islamic banks in North Africa have experienced a decrease in average of the Risk ratio 2 in 2014 with a decrease of average of the ratio of profit and the ratio of income.

The risk ratio 1 has seen a slight increase in 2011, 2012 and 2013. But, this ratio has seen a decrease in 2014.

Also, the ratio of income has experienced a slight decrease in 2011, then he starts to increase in 2012 and 2013. In 2014, the ratio of income has seen a remarkable reduction but with an average greater than the year 2010. This variation is explained by the decrease in the banking commissions.

The Cost Ratio 1 has experienced a slight variation from one year to another. This ratio has seen an increase in 2011,2012 and 2013, then a decrease in 2014. This decrease is explained by the decrease in the personal charges.

*Table 2 :* The classification of banks according to the average of the Ratios by bank

| | Average cost 1 | Average cost 2 | Average cost 3 | Medium risk 1 | Medium risk 2 | Income Average | Profit Average |
|---|---|---|---|---|---|---|---|
| B1: Albaraka Tunis | 1 | 7 | 1 | 2 | 2 | 2 | 2 |
| B2: Bamis Mouritanie | 2 | 4 | 3 | 5 | 3 | 4 | 8 |
| B3: Zitouna Tunis | 3 | 6 | 6 | 3 | 4 | 5 | 1 |
| B4: Albaraka Algeria | 4 | 8 | 8 | 8 | 1 | 8 | 7 |
| B5:Alsalam Algeria | 5 | 1 | 5 | 7 | 6 | 7 | 5 |
| B6: Faisel Islamic Bank of Egypt | 6 | 2 | 7 | 1 | 8 | 1 | 3 |
| B7: Albaraka Egypt | 7 | 5 | 4 | 4 | 7 | 6 | 4 |
| B8: Faisal bank (Sudan) | 8 | 3 | 2 | 6 | 5 | 3 | 6 |



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According to this table, the Bank Zitouna occupies the first rank in ratio of profit, and then the bank Al Baraka occupies the second rank. In contrast, the Bank Wava Mauritanian Islamic ranks last in between the Islamic banks in North Africa.

The Bank Al Baraka of Algeria occupies the last row for the cost ratio 3 and the cost ratio 2. By contrast, the BANK AL Baraka (Tunis) occupies the first rank for the cost ratio 3. Also, this bank occupies the first rank for the cost ratio 1. But, the Bank al-Salam of Algeria occupies the first rank for the cost ratio 2.

The Bank Al Baraka of Algeria holds the rank first in term the risk ratio 2. On the other hand, the Islamic Bank Faisal of Egypt occupies the last row between the Islamic banks in North Africa.

The Bank Faisal Islamic of Egypt occupies the first rank at the level the ratio of income. Therefore, this bank has a percentage the largest of the commissions (by Report the total of active) by report the other banks in North Africa.

The Islamic bank Faisal of Egypt occupies the first rank for the ratio of risk 1. In against part, the BANK AL Baraka of Algeria occupies the last row.

c) *The results of estimates of score of efficiency by the method (DEA)*

In the framework of this method, technical efficiency (and) a measure of the ability to produce the maximum amount of goods with a given level of factors of production, or the capacity to use the minimum of factors of production to produce a given quantity of goods. Technical Efficiency decomposes also in pure efficiency Technical (EFA) and the efficiency of scale (EE), which are determined by the model with yields of scale variables. This last efficiency measure the level of returns to scale in which the Bank operates (increasing returns to scale or decreasing).

The model is estimated using the Stata software and the results are presented in the table below.

*Table 3 :* The scores of efficiency of Islamic banks in North Africa

| | Technical Efficiency | Technical Efficiency pure | Efficiency of Scale |
|---|---|---|---|
| B1: Albaraka Tunis | 61.3% | 90.5% | 67.7% |
| B2: Bamis Mouritanie | 58.4% | 66.8% | 87.5% |
| B3: Zitouna Tunis | 82.9% | 84.8% | 97.7% |
| B4: Albaraka Algeria | 69.74% | 72.02% | 96.77% |
| B5:Alsalam Algeria | 100% | 100% | 100% |
| B6: Faisel Islamic Bank of Egypt | 84.8% | 100% | 84.8% |
| B7: Albaraka Egypt | 87% | 88.8% | 97.9% |
| B8: the Islamic Bank Faisal (Sudan) | 79.83% | 81.64% | 97.7% |
| Average | 77.99% | 85.57% | 91.11% |

The Islamic bank al-Salam of Algeria has the most high score of technical efficiency between the Islamic Banks of North Africa. Therefore, the Bank al-Salam presents the bank the more technically efficient between the Islamic banks in North Africa.

According to the table, this Bank St well managed. The Bank Algerian Islamic al-Salam is located in the border of efficiency does not reflect that it produces a maximum level of outputs from a given level of inputs although this situation means that this Bank presents the best practice of the production of outputs and constitutes a reference to the other banks in North Africa.

The Bank Zitouna (Tunisian Bank), the BANK AL Baraka (Tunisian Bank), the BAMIS: Mauritanian bank, the BANK AL Baraka (Algerian bank), the Islamic Bank of Faisal of Egypt, the Islamic Bank of Faisal of Sudan and the Islamic Bank of Egypt AL Baraka are located under the Border. Therefore, they are of Islamic Banks inefficient in North Africa.

According to the table, in the second row, we find the Islamic Bank Al Baraka of Egypt with a score of 87%. In contrast, the Bank Wava Mauritanian Islamic occupies the last row. Then, this bank is much less efficient with a score 58.4%.

The Bank Egyptian Islamic Al Baraka has a pure efficiency of 88.8% and an efficiency of scale of 97.9%. This bank evolves in a situation of decreasing returns to scale (DRS). In progressing the way in which the Bank is managed, 11.2% (100 - 88.8) of *inputs* can be saved. By adjusting the size of the Bank, the consumption of*inputs* may be reduced to 2.1% (100 - 97.9).

The Islamic bank Faisal of the Sudan has a pure efficiency of 81.64% and an efficiency of scale of 97.7%. This bank evolves in a situation of decreasing returns to scale (DRS). In progressing the way in which the Bank is managed, 18.36% (100 - 81.64) of *inputs* can be saved. By adjusting the size of the Bank, the consumption of*inputs* may be reduced to 2.3% (100 - 97.7).

The Bank Egyptian Islamic Faisal has a pure efficiency of 100% and an efficiency of scale of 84.8%. This bank evolves in a situation of decreasing returns to scale (DRS). This bank is well managed. By adjusting



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the size of the Bank, the consumption of*inputs* can be reduced by 15.2% (100 - 84.8).

The Tunisian Bank Al Baraka has a pure efficiency of 90.5% and an efficiency of scale of 67.7%. This bank evolves in a situation of decreasing returns to scale (DRS). In progressing the way in which the Bank is managed, 9.5% (100 - 90.5) of *inputs* can be saved. By adjusting, the consumption of*inputs* can be reduced by 32.3% (100 - 67.7).

The Algerian bank Al Baraka has a pure efficiency of 72.02% and an efficiency of scale of 96.77%.in progressing the way in which the Bank is managed, 27.98% (100 - 72.02) of *inputs* can be saved. By adjusting the size of the Bank, the consumption of*inputs* may be reduced to 3.23% (100 - 96.77).

The Tunisian Bank Zitouna has a pure efficiency of 84.8% and an efficiency of scale of 97.7%. In progressing the way in which the Bank is managed, 15.2% (100 - 84.8) of *inputs* can be saved. By adjusting the size of the Bank, the consumption of*inputs* may be reduced to 2.3% (100 - 97.7).

The Islamic Bank Al Mauritanian Wava has a pure efficiency of 66.8% and an efficiency of scale of 87.5%. This bank evolves in a situation of increasing returns to scale (IRS). In progressing the way in which the Bank is managed, 33.2% (100 - 66.8)of *inputs* can be saved. By adjusting the size of the Bank, the consumption of*inputs* can be reduced by 12.5% (100 - 87.5).

Islamic banks which are the Islamic Bank Al Mauritanian Wava, the Algerian bank Al Baraka, the Tunisian Bank Zitouna, the Islamic Bank Faisal (Sudan), the BANK AL Baraka Egypt can advance their performance. These Islamic banks must analyze the practices of banks Al Baraka (Tunis), Al Salam (Algeria) and Faisal (Egypt) which are identified as his peers of reference. To be a peer (or a *benchmark*), the Islamic Bank must have a pure efficiency of 100%.

The Score Average TE during the entire period of study (2010-14) is equal to 77.99%, which indicates that the Islamic banks in North Africa would have been able to produce the same quantity of output achieved with only 77.99% of the inputs used to where a loss of 22.01% of resources.

## III. Conclusion

Throughout this chapter, we are trying to put the light on the term efficiency, the instrument of the Islamic Bank and the studies which deal with the efficiency of Islamic banks with the method DEA. The overall efficiency decomposes in technical efficiency, efficiency, pure and the efficiency to scale.

Empirically, we are trying to examine the efficiency of Islamic banks in North Africa with Algeria, Tunisia, Egypt, Sudan and Mauritania (there is no Islamic banks in Libya and Morocco). In Mauritania the Second Islamic bank has closed its doors by the central bank. Our sample consists of eight Islamic banks and the period of study is spread between 2010 and 2014. To test the efficiency of Islamic banks in North Africa we appeal to the method of analysis by financial ratios and the method DEA (a method non parametric).

Empirically, we find a score of technical efficiency (TE) medium during the entire period of study (2010-14) is equal to 77.99%, which indicates that the Islamic banks in North Africa would have been able to produce the same quantity of output achieved with only 77.99% of the inputs used to where a loss of 22.01% of resources.

The limits of our work are the reduced number of Islamic banks in Afique in the north because of the policy adopted long time, also the period of study is short since there are banks open their doors newly. We choose just the banks which are totally Islamic.

Our work can be a point of departure for research regarding the Islamic banks in the Arab world or well on the ground in Africa.

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## Annexs

The variables of inputs and outputs of the DEA method

| Inputs | Outputs |
|---|---|
| Interest expenses | Total Vote |
| The commissions | Personal load |
| Capital assets | Total of assets |
| Provisions | Deposit Total |



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