Efficiency of Kuwaiti Banks: A Comprehensive X-Efficiency Framework

Jamal Ali Al-Khasawneh*, Khiyar Abdullah Khiyar**, and Mohammed Z. Shariff***

This study tracks the nonparametric X-efficiency based measures and compares the efficiency dynamics of conventional and Islamic Kuwaiti banks over the period 1996-2010. The findings show that, in terms of all efficiency measures, Kuwaiti banks kept losing efficiency: a trend that started in 2004 and worsened after the 2008 economic crisis. However, two efficiency stages can be noted: The first trend is indicated for the period 1996-2003, during which conventional banks had clear efficiency superiority over Islamic banks. The second trend, from 2004 until 2010, shows Islamic banks having superiority over conventional banks. This superiority of Islamic banks was mainly due to the loss of efficiency in conventional banks and not to any gained efficiency in Islamic banks.

Field of Research: banks efficiency, data envelopment analysis

1. Introduction

The Kuwaiti banking system witnessed structural economic shocks during the last two decades. The Iraqi invasion of Kuwait in 1990 and the consequent exponential increase in the defense bill in the 1990s, combined with relatively low oil revenues, made the Kuwaiti economy go on a slow-down phase. However, the government’s unlimited support in the aftermath of the first Gulf War was able to re-establish confidence in the financial system, and banks started showing healthy operating signs and positive profitability four years after the liberation of Kuwait. By 2003, luck had coincided with luck; clouds totally cleared when national security concerns became a thing of the past after the collapse of the hostile regime in Iraq and the record increase in oil prices. The period of 2003-2008 represents a booming modern era in the economic history of Kuwait and the Gulf Cooperation Council (GCC) countries. According to the 2004 Financial Sector Assessment Report, issued by the World Bank, Kuwait had made an impressive recovery from the economic damage caused by the 1990-91 war; oil production and exports had been restored, and fiscal and external current account balances since the mid-1990s had reached surpluses to the order of 20% of GDP. The World Bank’s report also indicated

* Department of Economics and Finance, Gulf University for Science and Technology, Kuwait, e-mail: Alkhasawneh.j@gust.edu.kw
** Department of Economics and Finance, Gulf University for Science and Technology, Kuwait, e-mail: Abdalla.K@gust.edu.kw
*** Department of Economics and Finance, Gulf University for Science and Technology, Kuwait, e-mail: Shariff.m@gust.edu.kw
that by the end of 2002, the total assets of financial institutions amounted to more than 200% of nominal GDP, while stock market capitalization reached about 100%.

Considering the uniqueness of the economic history of the state of Kuwait, this paper examines cost, revenue, and profit in the state of Kuwait during the period 1996-2010. Data Envelopment Analysis (DEA) is used to compute absolute efficiencies, which can be used to characterize the efficiency changes in Kuwaiti banks. We believe that the study of the dynamic changes in efficiencies, after critical political and economic shocks in this country, is missing in the literature. Furthermore, there is a unique phenomenon in Kuwait where some conventional banks convert and others are in the process of conversion into Islamic banks. This paper looks at the X-efficiency of Kuwaiti banks divided into two groups of conventional and Islamic banks and found that the period 2004 to 2008 when all banks analyzed together efficiency was going down, but for the same period the efficiency of Islamic banks was increasing. The results of this paper suggest that further studies in this country or any other country should be conducted by dividing banks into the groups according to the philosophy behind those groups, e.g. conventional v/s Islamic, or conventional v/s micro-financing banks etc. This paper is divided into five parts, introduction, literature review, methodology, data analysis, results, and conclusion.

The rest of the paper has been organized as follows: section 2 deals with literature review while section 3 focuses on methodology. Data and variables are provided in section 4 and analysis results is included in section 5. The last section contains conclusion.

2. Literature Review

In this section, we present some of the relevant literature related to the GCC region and Middle East and North Africa countries (MENA). Darrat et al. (2003) found that Kuwaiti banks fail to optimally utilize a significant proportion of their resources. The sources of bank inefficiency appear to be both allocative (regulatory) and technical (managerial) in nature. The results also indicate that larger banks in Kuwait are less efficient than smaller ones, although all banks have improved their efficiency levels and experienced some gains in productivity, indicating that the loss of efficiency is due mainly to pricing decisions. Hassan et al. (2004) investigated the efficiency of the Bahraini banking sector. Their findings indicate that the cost inefficiency is due mainly to technical inefficiency rather than allocative inefficiency, while the major source of the total technical inefficiency for Bahraini banks is pure technical inefficiency (input waste) and not scale inefficiency. Srai (2009) indicated that banks in the Gulf region are relatively more efficient at generating profits than at controlling costs, and that conventional banks are more efficient than Islamic banks. Furthermore, the findings demonstrate a consistent increase in profit efficiency since 2000, while showing decreasing cost efficiency since 2004.

Al-Delaim et al. (2006) employed DEA to measure the relative cost efficiency of 24 Islamic banks from 14 countries. Overall findings indicate that most Islamic banking institutions are efficient and the rest are on the way to improving their efficiency. Kabir (2006) investigated the efficiency of Islamic banks around the world. The findings indicated that, on average, Islamic banks are less efficient than conventional banks in
terms of all efficiency measures. Using DEA, Fadzlan et al. (2007) analyzed the comparative performance of foreign and domestic Islamic banks in Malaysia. The authors found that foreign banks exhibit higher technical efficiency compared to domestic Islamic banks. Furthermore, the results show that technically more efficient banks are larger in size, have greater loans intensity, and on average have less non-performing loans. In a study carried out by Kamaruddin et al. (2008), the cost and profit efficiency of fully-fledged Islamic banks and the Islamic window operations of domestic and foreign banks in Malaysia were analyzed using DEA. The findings indicated that Islamic windows outperform Islamic banks in the term of cost efficiency and profitability. Ariss (2010) indicated that Islamic banks are more efficient in terms of financing activities but still less competitive (they have a small market share) than conventional banks. In another study carried out by Abdul-Majid et al. (2010), it was found that Islamic banks in different countries had no advantage over other conventional banks, as Islamic banks suffered poor allocative efficiency, which is a determinant or subcomponent of cost efficiency. Because of fundamental differences in the objectivity and operations of Islamic banks and conventional banks, we decided to investigate the efficiency of banks by dividing them into two groups' namely conventional banks and Islamic banks. So far all studies have analyzed all banks taken together. In this study we analyzed banks by dividing all Kuwaiti banks into two groups. To generalize our results for all Islamic banks this study needs to be replicated for other countries where significant number of banks can be classified as Islamic banks.

3. Methodology

3.1 The Non-parametric Data Envelopment Analysis

Charnes, Cooper, and Rhodes (1978) coined the term 'data envelopment analysis' (DEA). There has since been a multitude of works that have applied and extended the DEA methodology. DEA constructs a frontier based on the sample data rather than using an assumed production function. This non-parametric approach shows how a particular decision making unit (DMU) operates relative to other DMUs by providing a benchmark for the best practice technology based on the DMUs in the sample. Because DEA makes no assumptions about inefficiency distributions, it is subject to data problems and inaccuracies created by accounting rules (Isik, 2000). However, DEA works better than the parametric approach when the sample size is small.

Following Rangan et al. (1988), Berger et al. (1992), Elyasiani and Mehdian (1992), Fare et al. (1994), Grabowski et al. (1993), Leightner and Lovell (1998), Wheelock and Wilson (1995), Isik and Kabir (2003), and others, DEA is used in this paper to measure U.S. banks' efficiency scores. This choice is motivated by the small sample size during some years of our data set. Some other reasons for this choice are: 1) most studies that have used both Stochastic Frontier Approach (SFA) and DEA have found that both approaches preserve the efficiency ranking of the DMUs (see Isik and Kabir, 2002, 2003; and Al-Sharkas et al. (2008). Since the purpose of this paper is to use the efficiency scores to rank merging banks according to their efficiency characteristics, we use DEA rather than SFA; 2) the non-parametric DEA is the better choice when the industry has experienced a series of reforms and/or shocks because we can assume variable returns to scale (which is not an option in SFA); and finally, and most importantly, 3) under DEA,
profit efficiency scores can be broken down into more basic components (cost efficiency, revenue efficiency, etc.). However, cost efficiency can be estimated by summing input prices rather than output quantities. Consider n DMUs, where each DMU uses m inputs to produce s outputs. The general form of the cost minimization problem is then:

\[ \min \sum_{i=1}^{m} p_i x_i^* \]

\[ \text{s.t.} \]

\[ \sum_{j=1}^{n} \lambda_j x_{ij} \leq x_i^* \quad i = 1,2, \ldots, m; \]

\[ \sum_{j=1}^{n} \lambda_j y_{rj} \geq y_r \quad r = 1,2, \ldots, s; \]

\[ \lambda_j, x_i^* \geq 0 \]

\[ \sum \lambda_j = 1 \quad \text{Assuming (VRS).} \]

Where \( p_i \) is a vector of input prices for the \( j \)-th DMU and \( x_i^* \) is the cost minimization vector of input quantities for the \( j \)-th DMU, given the input prices and the output levels.

The first constraint places a restriction on the input side, requiring the use of inputs in a linear combination at the efficient frontier to be less than or equal to the use of the inputs by the \( i \)-th bank. The second constraint shows that the observed outputs of DMU \( i \) must be less than or equal to a linear combination of outputs, \( x_i^* \), of the DMUs forming the efficient frontier. The third constraint assures the feasibility of the solution. The fourth constraint imposes the VRS assumption. The only way to derive a more cost efficient DMU is by getting it closer to the efficient frontier. This can be achieved by using input equal to \( X^* \) rather than \( X \), holding the output fixed (the bold horizontal arrow shows this choice). Finally, the cost efficiency of the each DMU can be obtained as follows:

\[ \frac{\sum_{i=1}^{m} p_i x_i^*}{\sum_{i=1}^{m} p_i x_i} = \frac{\text{Minimum virtual cost}}{\text{Observed cost}} \leq 1, \quad (2) \]

where the cost efficiency value will be equal to one for the DMUs that lie on the efficient frontier. The cost efficiency scores take values in the range (0,1).

### 3.2 Estimation of Revenue Efficiency

Using the same considerations as in the previous section, we can obtain the revenue efficiency (RE) scores for each DMU. The revenue maximization problem maximizes the vector of output quantities, \( y^* \), in the first step. Then, the revenue-maximizing problem is calculated as follows:
max \sum_{r=1}^{s} q_r y^*_r \\
\text{s.t.} \sum_{j=1}^{n} \lambda_j x_{ij} \leq x_i \quad i = 1,2,\ldots, m; \quad (3) \sum_{j=1}^{n} \lambda_j y_{ij} \geq y^*_r \quad r = 1,2,\ldots, s; \quad \lambda_j, y^*_r \geq 0 \quad \sum_{j=1}^{n} \lambda_j = 1 \quad \text{Assuming (VRS)}.

where $q_r$ is a vector of output prices for the $j$-th DMU, and $y^*_r$ is the maximization vector of output quantities of the DMUs forming the efficient frontier. The first constraint indicates that the use of the inputs in a linear combination of efficient DMUs must be less than or equal to the use of inputs of the $j$-th DMU. The second constraint shows that the observed outputs of the $j$-th DMU must be less than or equal to the linear combination of the DMUs forming the efficient frontier. The last two constraints are well defined in the previous section. After solving the above problem, we can obtain $RE$ as follows:

$$RE = \frac{\sum_{r=1}^{s} q_r y_r}{\sum_{r=1}^{s} q_r y^*_r} \quad (4)$$

where $\sum_{r=1}^{s} q_r y_r$ is the observed/actual revenue of the DMU, and $\sum_{r=1}^{s} q_r y^*_r$ is the virtual efficiency profit that could be achieved if the DMU were situated on the efficient frontier. The value of the profit efficiency scores will always fall in the range $(0,1)$.

3.3 Estimation of Profit Efficiency

Summing the cost and revenue efficiencies generates the profit efficiency (PE) concept, which seeks to minimize costs and maximize revenue simultaneously. Unlike cost and revenue efficiencies, PE is obtained by allowing inputs and outputs to vary. The profit maximization problem can be described as follows:
\[ \text{max } \sum_{r=1}^{s} q_r y_r^* - \sum_{i=1}^{m} p_i x_i^* \]

\[ \text{s.t.} \]
\[ \sum_{j=1}^{n} \lambda_j x_{ij} \leq x_i^* \quad i = 1,2, \ldots, m; \]
\[ \sum_{j=1}^{n} \lambda_j y_{ij} \geq y_r^* \quad r = 1,2, \ldots, s; \]
\[ x_i^* \leq x_i, \quad y_r^* \geq y_r, \]
\[ \lambda_j \geq 0 \]
\[ \sum_{j=1}^{n} \lambda_j = 1 \]

Assuming (VRS).

where the first constraint indicates that the use of the inputs in a linear combination of efficient DMUs must be less than or equal to the use of inputs of the j-th DMU. The second constraint shows that the observed outputs of the j-th DMU must be less than or equal to the linear combination of the DMUs forming the efficient frontier. However, the two constraints in this problem are solved simultaneously. The third constraint is imposed to assure that the revenue maximization and cost minimization are both achieved. This constraint requires that the inputs of the j-th DMU must be greater than or equal to the output of the DMUs on the efficient frontier, and it indicates that the output of the j-th DMU must be less than or equal to the outputs of the DMUs on the efficient frontier. This constraint is important because it is possible to maximize profit efficiency by minimizing costs only. In this case, profit maximization will be equivalent to cost minimization. The same argument is valid for the revenue efficiency. Finally, the profit efficiency can be obtained using the following equation:

\[ \frac{\sum_{r=1}^{s} q_r y_r - \sum_{i=1}^{m} p_i x_i}{\sum_{r=1}^{s} q_r y_r^* - \sum_{i=1}^{m} p_i x_i^*} \]

where \( \sum_{r=1}^{s} q_r y_r - \sum_{i=1}^{m} p_i x_i \) represents the observed profitability of DMU. This value could be negative for DMUs with losses. \( \sum_{r=1}^{s} q_r y_r^* - \sum_{i=1}^{m} p_i x_i^* \), on the other hand, represents the virtual profitability that could be achieved if the DMU is located on the efficient frontier. Accordingly, the profit efficiency values must lie in the range \((-\alpha, 1)\).

4. Data, Sample Characteristics and Variable Definitions

DEA needs a set of inputs and outputs in order to measure efficiency, and therefore, relative productivity. Accordingly, we model commercial banks as multi-product firms, producing two outputs and employing two inputs. All variables are measured in millions of U.S. dollars except prices, which are measured as ratios. The outputs include (1) net loans; and (2) other earning assets, which consist of loans to special sectors, interbank
loans, and investment securities (treasuries and other securities). All output prices are estimated as proxies. These are calculated as follows: 1) the price of loans is defined as total interest income to net loans; and 2) the price of other operating income is defined as other operating income to other earning assets weighted by the proportion of other earning assets over the total of other earning assets plus off-balance-sheet items.

Inputs include (1) personnel expenses; and (2) loanable funds, which are defined as the sum of demand and time deposits and non-deposit funds as of the end of the respective year. Also, input prices are estimated as proxies. The price of labor is calculated as personnel expenses over total assets. The price of capital is calculated as non-interest expense over total assets. Finally, the price of funds is calculated as total interest expense over loanable funds.

To examine the X-efficiency scores of Kuwaiti banks, we manually gathered data for the years 1996-2010; all accounting data were obtained from the annual reports of each bank as posted on each single bank’s website. Furthermore, we compared these data to the data posted by the Kuwaiti Central Bank, where we found a full match between the two sources. In our analysis all banks in the country are included.

5. Revenue, Cost, and Profit Efficiencies Results

5.1 Revenue Efficiency Results

Table 1 represents the average revenue scores and their descriptions: conventional, Islamic, and the whole sample. Table 1 show that revenue efficiency was in a state of consistent increase for the period 1996-2004, with a clear advantage for conventional banks, whose efficiency scores were 5% to 10% higher than those of Islamic banks. Starting from 2005, efficiency scores converted backwards with all Kuwaiti banks’ inefficiencies increasing significantly with a marginal superiority given to Islamic banks. Comparing the efficiency scores of 2002 with those of 2009, we can indicate -9%, -20%, and 11% efficiency changes for all, conventional, and Islamic banks respectively. Year 2010 looks totally different, and we can indicate 11%, 45%, and -32% efficiency changes from 2009 for all, conventional, and Islamic banks respectively. Such a significant efficiency change can be explained by three possible reasons: Firstly, Islamic banks usually invest in longer-term investments than conventional banks, especially in real estate. Accordingly, it is expected that Islamic banks’ losses may take a longer time to be actualized/re-evaluated. The second reason is the number of Islamic banks which have only recently converted to Islamic banking and, therefore, have limited experience in Islamic banks’ investment opportunity sets and, consequently, a limited ability to operate successful Islamic funds. Thirdly, the Kuwaiti government supported the banking system after the economic crisis by issuing government bonds and treasury bills, a choice Islamic bank could not accept.

5.2 Cost Efficiency Results

Table 2 represents the cost-efficiency scores of Kuwaiti banks. We can see that there was a general trend of efficiency loss over time for all Kuwaiti banks, with two distinctive stages to be noted: 1997-2003 and 2004-2010. In the first stage, conventional banks
achieved a higher efficiency score than Islamic banks. In the second stage, however, we can see that, with the exception of 2007, Islamic banks outperformed conventional banks. This superiority of Islamic banks was mainly due to the loss of efficiency in conventional banks and not to any gained efficiency in Islamic banks.

5.3 Profit Efficiency Results

Table 3 represents the profit efficiency scores of our sample banks. Profit efficiency sums up both revenue and cost efficiencies. We can still see the previously indicated trends in the last two sections. The period of 1996-2003 shows conventional banks having a clear superiority over Islamic banks; they scored about 85%, while Islamic banks achieved 60%. For 2004-2010, the whole scene looks different; Islamic banks achieved higher average efficiency scores of 73%, with conventional banks scoring 57%. Overall, the profit efficiency trend of Islamic banks looks less volatile than that of conventional banks.
Table 1: The Nonparametric Revenue Efficiency of Kuwaiti Banks (1996-2010).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (Whole Sample)</td>
<td>0.70</td>
<td>0.76</td>
<td>0.79</td>
<td>0.82</td>
<td>0.84</td>
<td>0.87</td>
<td>0.92</td>
<td>0.71</td>
<td>0.62</td>
<td>0.66</td>
<td>0.72</td>
<td>0.63</td>
<td>0.61</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>Max</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.84</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Min</td>
<td>0.53</td>
<td>0.63</td>
<td>0.67</td>
<td>0.70</td>
<td>0.72</td>
<td>0.72</td>
<td>0.68</td>
<td>0.76</td>
<td>0.41</td>
<td>0.49</td>
<td>0.46</td>
<td>0.27</td>
<td>0.26</td>
<td>0.33</td>
<td>0.34</td>
</tr>
<tr>
<td>Stdev</td>
<td>0.20</td>
<td>0.13</td>
<td>0.14</td>
<td>0.13</td>
<td>0.11</td>
<td>0.10</td>
<td>0.14</td>
<td>0.12</td>
<td>0.23</td>
<td>0.13</td>
<td>0.24</td>
<td>0.25</td>
<td>0.26</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>1.04</td>
<td>1.34</td>
<td>1.05</td>
<td>0.85</td>
<td>0.99</td>
<td>0.34</td>
<td>-0.60</td>
<td>-0.98</td>
<td>-0.16</td>
<td>0.72</td>
<td>0.23</td>
<td>-0.42</td>
<td>0.03</td>
<td>0.26</td>
<td>-1.30</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-0.14</td>
<td>1.93</td>
<td>-1.00</td>
<td>-1.40</td>
<td>-0.32</td>
<td>-1.31</td>
<td>-1.68</td>
<td>-1.81</td>
<td>-2.06</td>
<td>-1.00</td>
<td>-1.12</td>
<td>-0.48</td>
<td>-1.12</td>
<td>-1.68</td>
<td>0.66</td>
</tr>
</tbody>
</table>

| Average (Non Islamic Banks) | 0.70 | 0.77 | 0.80 | 0.83 | 0.83 | 0.87 | 0.90 | 0.96 | 0.69 | 0.65 | 0.67 | 0.70 | 0.66 | 0.50 | 0.95 |
| Max   | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.84 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Min   | 0.53 | 0.63 | 0.67 | 0.70 | 0.72 | 0.72 | 0.68 | 0.78 | 0.41 | 0.50 | 0.52 | 0.27 | 0.26 | 0.33 | 0.77 |
| Stdev | 0.20 | 0.13 | 0.16 | 0.14 | 0.11 | 0.09 | 0.13 | 0.10 | 0.25 | 0.14 | 0.26 | 0.28 | 0.25 | 0.22 | 0.09 |
| Skewness | 1.04 | 1.11 | 0.90 | 0.57 | 0.74 | 0.23 | -1.30 | -2.24 | 0.15 | 0.29 | 0.22 | -0.40 | -0.43 | 1.05 | -2.30 |
| Kurtosis | -0.14 | 1.55 | -1.89 | -2.12 | -0.85 | -1.45 | 0.91 | 5.00 | -2.47 | -1.95 | -1.22 | -0.21 | 1.26 | -0.61 | 5.35 |
| Average (Islamic Banks) | 0.67 | 0.76 | 0.71 | 0.73 | 0.72 | 0.71 | 0.76 | 0.82 | 0.53 | 0.64 | 0.77 | 0.57 | 0.88 | 0.56 |
| Max   | 0.58 | 0.82 | 1.00 | 0.95 | 1.00 | 0.81 |
| Min   | 0.46 | 0.46 | 0.51 | 0.32 | 0.76 | 0.34 |
| Stdev | 0.13 | 0.25 | 0.24 | 0.34 | 0.17 | 0.23 |

The revenue efficiency scores presented in this table are obtained by the following equation: \( RE = \frac{\sum_{r=1}^{k} q_r y_r}{\sum_{r=1}^{k} q_r y^*} \) where \( q_r \) is the price outputs and \( y_r \) is the quantity of output \( r \). \( \sum_{r=1}^{k} q_r y_r \) is the observed/actual revenue of the DMU and \( \sum_{r=1}^{k} q_r y^* \) is the virtual efficiency profit that could be achieved if the DMU lies on the efficient frontier. The profit efficiency scores take values in the range (0, 1).
The cost efficiency scores presented in this table are obtained by the following equation:

\[
CE = \frac{\sum_{i=1}^{m} p_i x_i^*}{\sum_{i=1}^{m} p_i x_i} = \frac{\text{Minimum virtual cost}}{\text{Observed cost}} \leq 1
\]

where \( p_i \) is the price of input \( i \), \( x^* \) is the optimal input quantity and \( x_i \) is the actual inputs quantity. The cost efficiency score will be one for DMUs on the efficient frontier. The cost efficiency scores take values in the range \((0,1)\).
Table 3: The nonparametric Profit efficiency of Kuwaiti Banks (1996-2010).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average(Whole Sample)</td>
<td>0.65</td>
<td>0.64</td>
<td>0.71</td>
<td>0.80</td>
<td>0.71</td>
<td>0.78</td>
<td>0.79</td>
<td>0.94</td>
<td>0.60</td>
<td>0.49</td>
<td>0.60</td>
<td>0.67</td>
<td>0.54</td>
<td>0.53</td>
<td>0.83</td>
</tr>
<tr>
<td>Max</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.77</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Min</td>
<td>0.20</td>
<td>0.33</td>
<td>0.36</td>
<td>0.51</td>
<td>0.49</td>
<td>0.55</td>
<td>0.46</td>
<td>0.66</td>
<td>0.22</td>
<td>0.32</td>
<td>0.42</td>
<td>0.15</td>
<td>0.09</td>
<td>0.11</td>
<td>0.32</td>
</tr>
<tr>
<td>Stdev</td>
<td>0.35</td>
<td>0.27</td>
<td>0.29</td>
<td>0.22</td>
<td>0.19</td>
<td>0.20</td>
<td>0.22</td>
<td>0.14</td>
<td>0.29</td>
<td>0.14</td>
<td>0.27</td>
<td>0.30</td>
<td>0.33</td>
<td>0.40</td>
<td>0.26</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.20</td>
<td>0.56</td>
<td>-0.03</td>
<td>-0.38</td>
<td>0.59</td>
<td>-0.09</td>
<td>-0.35</td>
<td>-2.45</td>
<td>-0.13</td>
<td>1.08</td>
<td>0.48</td>
<td>-0.34</td>
<td>0.14</td>
<td>0.12</td>
<td>-1.27</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-1.90</td>
<td>-1.38</td>
<td>-2.28</td>
<td>-2.29</td>
<td>-0.94</td>
<td>-2.30</td>
<td>-1.50</td>
<td>6.00</td>
<td>-1.72</td>
<td>1.56</td>
<td>-0.57</td>
<td>-0.75</td>
<td>-0.99</td>
<td>-2.12</td>
<td>0.18</td>
</tr>
<tr>
<td>Average(Non Islamic Banks)</td>
<td>0.65</td>
<td>0.66</td>
<td>0.72</td>
<td>0.84</td>
<td>0.72</td>
<td>0.81</td>
<td>0.82</td>
<td>1.00</td>
<td>0.58</td>
<td>0.49</td>
<td>0.59</td>
<td>0.62</td>
<td>0.57</td>
<td>0.40</td>
<td>0.94</td>
</tr>
<tr>
<td>Max</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.77</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Min</td>
<td>0.20</td>
<td>0.33</td>
<td>0.36</td>
<td>0.51</td>
<td>0.49</td>
<td>0.55</td>
<td>0.46</td>
<td>1.00</td>
<td>0.22</td>
<td>0.32</td>
<td>0.42</td>
<td>0.15</td>
<td>0.09</td>
<td>0.11</td>
<td>0.68</td>
</tr>
<tr>
<td>Stdev</td>
<td>0.35</td>
<td>0.29</td>
<td>0.32</td>
<td>0.21</td>
<td>0.20</td>
<td>0.19</td>
<td>0.22</td>
<td>0.00</td>
<td>0.31</td>
<td>0.16</td>
<td>0.31</td>
<td>0.33</td>
<td>0.29</td>
<td>0.38</td>
<td>0.13</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.20</td>
<td>0.31</td>
<td>-0.17</td>
<td>-0.98</td>
<td>0.27</td>
<td>-0.58</td>
<td>-0.92</td>
<td>-2.24</td>
<td>0.18</td>
<td>1.23</td>
<td>0.55</td>
<td>0.04</td>
<td>-0.36</td>
<td>1.26</td>
<td>-2.27</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-1.90</td>
<td>-2.05</td>
<td>-2.92</td>
<td>-2.92</td>
<td>-1.04</td>
<td>-1.40</td>
<td>-1.71</td>
<td>-0.12</td>
<td>1.99</td>
<td>-1.57</td>
<td>-0.90</td>
<td>1.98</td>
<td>0.59</td>
<td>5.20</td>
<td>0.61</td>
</tr>
<tr>
<td>Average(Islamic Banks)</td>
<td>0.53</td>
<td>0.65</td>
<td>0.58</td>
<td>0.60</td>
<td>0.58</td>
<td>0.59</td>
<td>0.66</td>
<td>0.74</td>
<td>0.50</td>
<td>0.62</td>
<td>0.79</td>
<td>0.47</td>
<td>0.87</td>
<td>0.61</td>
<td></td>
</tr>
<tr>
<td>Max</td>
<td>0.58</td>
<td>0.66</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.58</td>
<td>0.66</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Min</td>
<td>0.58</td>
<td>0.58</td>
<td>0.54</td>
<td>0.15</td>
<td>0.73</td>
<td>0.32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stdev</td>
<td>0.24</td>
<td>0.06</td>
<td>0.23</td>
<td>0.46</td>
<td>0.19</td>
<td>0.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The profit efficiency scores presented in this table are obtained by the following equation:

$$\sum_{r=1}^{s} q_r y_r - \sum_{i=1}^{m} p_i x_i$$

where $\sum_{r=1}^{s} q_r y_r - \sum_{i=1}^{m} p_i x_i$ is the observed profitability of the bank, and $\sum_{r=1}^{s} q_r y_r^* - \sum_{i=1}^{m} p_i x_i^*$ is the virtual profitability that could be achieved if the DMU is located on the efficient frontier. The profit efficiency score takes values in the range $(-\alpha, 1)$. 

---

Al-Khasawneh, Khiyar & Shariff
6. Conclusions

Given the uniqueness of the Kuwaiti banking system, and the economic history of the state of Kuwait, this paper examines cost, revenue, and profit in the state of Kuwait during the period 1996-2010. Data Envelopment Analysis (DEA) is used to compute absolute efficiencies. The results of all efficiency measures show that there was a general trend of efficiency loss over time for all Kuwaiti banks, with two distinctive stages to be noted: 1997-2003 and 2004-2010. In 1997-2003, conventional banks maintained a higher efficiency score than Islamic banks. The second stage witnessed serious inefficiencies increase of conventional banks and a slight efficiencies increase of Islamic banks, putting Islamic banks on the lead for the latest stage. Overall, Islamic banks’ cost, revenue, and profit efficiency performance look more stable than that of conventional banks. Our results are significant for future research in this area, suggesting that the bank efficiency research should be done according to the groups they belong to. By merging all banks in one group and analyzing the group can result into the problem of averaging across the group and results can be misleading. The results of this paper cannot be extended to other countries with further analysis.

References


Al-Khasawneh, Khiyar & Shariff


