Measuring Bank Efficiency in the Arabic Countries

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INTRODUCTION

Individuals, families, firms and economic systems can achieve a status of relevant wealth and then they can preserve it by increasing their productivity continually. High levels of productivity guarantee the competitiveness of an economy that operates in a global economic environment and promise the prosperity of a society's members. Therefore, policies about productivity of individuals, industrial sectors and economy systems have to be at the centre of public's and policy makers' interest.

Productivity can be defined as the ratio of products and services to the factors of production such as land, labour, and physical capital that are utilised for the production of these goods. Hence, there can be distinguished different types of productivity, namely land productivity, labour productivity, physical capital productivity and total productivity, when all factors of production are considered as a unity. Productivity can be augmented by increasing the number of final products and by keeping the factors of productivity stable, or by reducing the productivity factor and keeping the number of final products stable, or by a combination of two, having a maximum output result with the lowest input resources possible.

It is interesting to examine which are the factors that determine the level of productivity of a country or a region. Since, it would be difficult and even utopia to investigate the productivity for an economic system as a whole it is preferable to concentrate on a particular sector of the economy. Therefore, the present study is concentrated on financial institutions. The financial institutions because of their importance and magnitude can be considered as the corner stone of any economic system. Hence, a first step in investigating the level of productivity of a country's economy is to investigate the performance of its financial institutions.

As long as the level of productivity manages to increase for a given country, there exists an optimistic omen for its future. Otherwise, the financial institutions and as a result the whole financial and economic system of a particular country, are under the threat of a potential economic recession. In this case, it is necessary that the policy makers undertake precautionary actions in order to prevent an economic disaster from occurring.

The global competition and the deregulations of each country's financial institutions have lead to changes in the nature of bank activities, which have attracted the attention of researchers. There is a plethora of studies that apply both econometric and non-parametric techniques to examine the efficiency and the productivity change of the banks, for the US, the European and other countries, both developed and developing economies. [Fare, Grosskopf, Norris and Zhang (1994), Elyasiani and Mehdian (1995), Miller and Noulas (1996), Arcelus and Arozena (1999), Glass and McKillop (1991), Farero and Papi (1995), Fukuyama (1995), Dietsch (1997), Noulas (1997), Jackson, Fethi and Inal (1998), Mörttinen (2002), Reddy (2004), Berger, Hasan and Zhou (2005)].

However, recently the researchers' interest has focused on the effect of productivity change due to off-balance-sheet (OBS) bank activities, such as line of credit, loan commitments, securitization, derivatives and other fee-based items or products. [Rogers (1998), Stiroh (2000), Clark and Siems (2002), Casu and Girardone (2004)]. These studies have supported that the exclusion of OBS activities in the estimation of bank cost and profit efficiency may result in a bank output misspecification.

The present study is focused on banking in the Arabic countries. The objective is to investigate the performance of the banks in the Arabic countries in terms of efficiency, during the period 1997-2002 and to examine the significance of OBS items in the banking performance. Some of the Arabic countries follow the Islamic banking system, some of them follow the western world one. Although it is commonly supported that Islamic banking in its present form is a recent phenomenon, Islamic finance was practiced in the Muslim world throughout the Middle Ages, fostering trade and business activities, according to the Institute of Islamic Banking and Insurance. Based on the same source, in Spain, in the Mediterranean and the Baltic states, Islamic merchants became indispensable middlemen for trading activities.

The characteristic principle of Islamic banking that differs from the rest banking systems is the prohibition of the so-called 'Riba'. Riba is a term that encompasses not only the concept of usury, but also that one of interest. This idea has not been recognized as applicable in banking practices beyond the Islamic world. In the late 70's, financial resources of Muslims, particularly those of the oil producing countries, received a boost due to the rationalization of the oil prices, which had been under the control of foreign oil companies till then. These events allowed Muslims to form their lives according to the ethics and philosophy of their religion.

The new competitive framework worldwide along with various technological improvements forced Islamic banks to adopt new products and services beyond the traditional banking ones. These new products were about new forms of intermediation and other fee-based activities such as loan commitments, securitization and derivates; the known OBS activities. This paper is unique in examining how OBS activities influence the level of productivity in Arabic banks.

The structure of this paper is as follows: Section 2 reviews the relative literature. Section 3 describes the methodology and the data. Section 4 presents and analyzes the empirical results and finally section 5 contains the summary and concluding remarks.

LITERATURE REVIEW

One of the most frequent used techniques to calculate productivity shift is the Malmquist total factor productivity (TFP) index. This index was invented by Malmquist (1953) and measures changes in total output relative to inputs. Berg, Forsund and Jansen (1992) introduced the Malmquist index as a measurement of the productivity change in the banking industry for the first time. They focused on the Norwegian banking system during the deregulation period 1980-1989. Their results showed that deregulation led into a more competitive environment. The rise of productivity was faster for larger banks, due to the increased antagonism they faced.

Regarding the US market, Jagtiani, Nathan and Sick (1995) investigated whether failure in incorporating off-balance-sheet (OBS) bank products might lead to a misspecification problem. They focused on US commercial banks over the period 1988-1990. They found that OBS products seemed to have little or no significant effect on the scale economies measures. Furthermore, they supported that for most combinations of outputs, there was no evidence of cost complementarity. Finally, the authors suggested that the volume of OBS activities had little or no impact on bank costs.

Jagtiani and Khanthavit (1996) studied large US banks for the period 1984-1991. They took into consideration both on- and off- balance sheet items and allowed product mixes to differ across banks and to vary over time. Their paper examined the impact of the risk based capital requirements, which were approved in July 1988, on bank cost efficiencies. The empirical results suggested that theses requirements reduced the optimal bank size that achieved maximum scale and scope economies. So, some of the large banks that previously were efficient became too large and inefficient.

Rogers and Sinkey (1999) examined common features of US commercial banks that were heavily engaged in non-traditional areas for the year 1993. The empirical results suggested that these banks tented to be larger, had smaller net interest margins, had relatively fewer cost deposits, and exhibited less risk. Also, while larger banks had fewer core deposits and faced more competitive

interest rate conditions, resulting in narrow spreads from traditional intermediation, they had more diverse sources of revenue and greater access to financial markets, which reduced risk.

Stiroh (2000) examined the improved performance of US banks from 1991 to 1997. The analysis of cost and profit functions suggested that the gains were primarily due to productivity growth and changes in scale economies. The estimates of both productivity growth and economies of scale were robust across traditional and non-traditional output specifications. These efficiency estimates were particular sensitive to the output specification functions. Failure to account for non-traditional activities like OBS items led profit efficiency, but not cost efficiency, to be understated for the largest banks.

Clark and Siems (2002) investigated the importance of including aggregate measures of off-balance-sheet activities for US banks. The results indicated that economic cost and production cost X-efficiency estimates increased with the inclusion of the OBS items. Profit X-efficiency estimates were largely unaffected. Furthermore, the composition of banks' OBS activities appeared to help explain interbank differences in cost and profit X-efficiency estimates, whereas bank size and the mix between on- and off-balance-sheet banking activities were largely uncorrelated with the X-efficiency estimates.

Regarding the European market, Rime and Stiroh (2003) examined the performance of Swiss banks from 1996 to 1999. Using a broad definition of bank output they found evidence of large relative cost and profit inefficiencies in Swiss banks. A more narrow definition that focused only on traditional activities (excluding OBS activities) led to efficiency estimates that were even lower. They also found evidence of economies of scale for small and mid-size banks, but little evidence about the fact that significant scale economies remained for the very large banks. Finally, evidence on scope economies was weak for the largest banks that were involved in a wide variety of financial activities. They concluded that excluding OBS items from the measurement of productivity lead to its understatement.

Tortosa-Ausina (2003) analyzed the importance of non-traditional activities when measuring bank cost efficiency. She chose the data envelopment analysis technique to measure efficiency. Two bank output definitions were considered; one accounting for traditional output only and one treating non-traditional activities as an additional output. The application was performed over a sample of Spanish commercial and saving banks for the period 1986-1997. The empirical results revealed that average cost efficiency was enhanced for the alternative model which included the non-traditional activities. However, this result varied over time, between different size and types of financial institutions.

Casu and Girardone (2004) used the Malmquist methodology to analyze the importance of the inclusion of OBS activities in the definition of banks' output when total factor productivity indices were estimated. Their data included annual information for a balanced panel of over 2000 European banks from France, Germany, Italy, Spain and UK between 1994 and 2000. They employed the nominal value of banks' OBS items as an output measure. The authors tested for differences between mean TFP indices first when the OBS activities were excluded from the analysis and then included there. The results suggested that by including the OBS items the estimated productivity levels increased for all the sample countries. They concluded that omitting the non-traditional activities in the definition of bank output led to understatement of productivity levels.

Papers about productivity of Arabic banks are rare. Darrat, Topuz and Yousef (2002) investigated the efficiency of banks in Kuwait. The authors supported those banks in Kuwait since 1995 played an important role in the country's financial and capital development. The banks were permitted to own up to 50% of privatized companies. Furthermore, the banks in Kuwait provided a wide array of services such as guarantees, overdrafts and loans, letters of credit, and foreign currency hedging. Darrat, Topuz and Yousef (2002) focused on the productivity growth of Kuwaiti banks over the period 1994-1997 using the non-parametric approach of DEA. They obtained their data from the balance sheets and income statements of the eight banks in Kuwait. They employed three inputs (labor, capital, and deposits), and two outputs (loans and investments). Their results revealed that

there had been a substantial increase (about 28%) in the efficiency of Kuwaiti banks due to the reduction of the cost of funds and to technological improvements. Also, smaller banks appeared more efficient than larger banks. Profitability was positively related to efficiency. Moreover, market power played an important role in efficiency. Finally, capitalization of Kuwaiti banks had a positive impact on their cost efficiency.

METHODOLOGY AND DATA

Malmquist Total Factor Productivity (TFP) Index

In the present study we employ the data envelopment analysis (DEA) technique to estimate the Malmquist indices of Total Factor Productivity (TFP) change. The term DEA was invented by Charnes, Cooper and Rhodes (1978). DEA is a technique based on linear programming that places a non-parametric surface frontier over data points in order to determine the efficiency of each firm in relation to the frontier. The aim of DEA is to estimate relative efficiency among similar firms or units that have the same technology (processing procedure) to pursue similar objectives (outputs) by using similar resources (inputs). The highest efficiency is denoted by one, while the lowest is denoted by zero. Charnesetal (1978) suggested a model, which had an input orientation and assumed constant returns to scale. We follow the above approach. Since then, a large number of studies used and expanded the DEA methodology. Tavares (2002) stated that until January of 2002 the DEA bibliography database consisted of 3,203 publications written by 2,152 distinct authors.

Malmquist TFP index measures the changes in total output relative to changes in inputs. This approach was first suggested by Malmquist (1953). The Malmquist TFP index is one of the most common used methods to evaluate the productivity change. Regarding the banking productivity measurement, the TFP index was initially introduced by the pioneer study of Berg, Forsund and Jansen (1992) in order to capture the productivity changes in the Norwegian banking sector. Since then a great number of studies employed the Malmquist TFP index to evaluate efficiency of financial institutions.

The Malmquist TFP index calculates the change in productivity between two points by estimating the ratio of the distances of each point relative to a common technology. The Malmquist input oriented TFP change index between the base period t and the following period t+1 is defined according to the equation:

$$M\,(y_t, x_t, y_{t+1}, x_{t+1}) = \left[\frac{d_{t+1}(Y_{t+1}, X_{t+1})}{d_t(Y_t, X_t)} \; X \; \frac{d_t(Y_{t+1}, X_{t+1})}{d_{t+1}(Y_{t+1}, X_{t+1})} \right]^{1/2} \qquad (1)$$

As long as M is greater than unity a positive TFP growth from period t to period t+1 has taken place. Otherwise, a value of M less than one indicates TFP decline. Equation (1) is the geometric mean of two TFP indices. The first index is calculated with respect to period t technology, while the second index is evaluated with respect to period t+1 technology.

The productivity change (M) can be decomposed into technical efficiency change (TEC) and technological change (TC). Using symbols for this decomposition, Equation (1) can be written as follows:

$$M\,(y_t, x_t, y_{t+1}, x_{t+1}) = \frac{d_{t+1}(Y_{t+1}, X_{t+1})}{d_t(Y_t, X_t)} \left[\frac{d_t(Y_{t+1}, X_{t+1})}{d_{t+1}(Y_{t+1}, X_{t+1})} \; X \; \frac{d_t(Y_t, X_t)}{d_{t+1}(Y_t, X_t)} \right]^{1/2} \qquad (2)$$

The ratio outside the square brackets calculates the TEC between period t and t+1. The remaining part of the TFP index in Equation (2) measures the TC. This is the geometric mean of the improvement in technology between the period t and t+1. The technological change captures the improvement or the worsening in the performance of best practice decision-making units (DMUs), as financial firms tend to be named in the DEA literature. DMU is a more suitable term than 'firm'

when, for example, a bank is studying the performance of its branches. In parallel, technical efficiency change reflects the convergence towards, or divergence from the best practice by the remaining DMUs. The benefits extracted by this decomposition are that it presents information about the sources of the total productivity change. This study uses the DEA program developed by Tim Coelli and the Centre for Efficiency and Productivity Analysis of the University of New England in Australia to measure the distance functions that compose the TFP index and its components.

Data and Definition of Inputs and Outputs

The data is obtained from Thompson's BankScope database from bank balance sheets for the period 1997-2002. Specifically, eleven Arabian banking markets constitute the sample. In alphabetical order the countries are: Bahrain, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, United Arab Emirates (UAE) and Yemen. In order not to calculate twice a DMU, three consolidation codes of Bankscope were selected. First, the consolidated statements with an unconsolidated companion, second the consolidated statements with no unconsolidated companion and third the unconsolidated statements with no consolidated companion. Analytically, the number of DMUs included in this study by country and by year is presented in Table 1.

Table 1 Number of Observations by Country and Year

	1997-98	1998-99	1999-00	2000-01	2001-02
BAHRAIN	6	7	8	7	11
JORDAN	12	12	13	13	12
KUWAIT	6	7	8	8	8
LEBANON	51	53	57	58	57
OMAN	6	7	10	11	12
QATAR	1	3	5	4	5
SAUDI ARABIA	13	13	13	14	6
UAE	5	13	14	14	16
YEMEN	-	-	-	2	1
SUM	**100**	**115**	**128**	**131**	**128**

The classification of a bank's variable as an input or as an output is a question related directly to its function explanation. As a result, a variety of definitions about variables exists in the relatively literature. These different approaches can be roughly divided into three categories based on the preferred approach: *the value added approach, the intermediation approach and the user cost approach*. The value added approach considers deposits as outputs. The idea is that funds are collected from depositors and there is competition among DMUs to attract customers. Berger and Humphrey (1992) modified this approach and considered deposits as both outputs and inputs. Moreover, according to the intermediation approach, only banks' assets are thought as outputs, while deposits are regarded as inputs. The concept of this approach is that DMUs buy and sell funds acting as intermediaries between borrowers and receivers of funds. Finally, the user cost approach classifies a variable as output or input oriented according to its contribution to bank income. That means that if the financial return on the assets exceeds the opportunity cost of funds, DMU's assets are considered as outputs.

The value added method has been preferred for the present paper. Therefore, three variables are defined as outputs. These variables are: 1) Total other earning assets, 2) total customer loans and 3) total deposits. On the other hand, as input variables are characterized the following: 1) Personnel expenses, 2) other operating expenses and 3) total fixed assets. As each Arabic country uses its own currency it would practical to express all values in a common currency. This currency is not an Arabian currency but the common one of the European Union, the Euro.

The off-balance-sheet (OBS) items are employed as an output variable in the present study. DEA program is used twice for each approach. Similarly to Casu and Girardone (2004) first the OBS items

are omitted for the calculation of TFP indices and then the OBS items are included for the calculation of the total productivity change. Next, the two sets of total productivity change indices are compared to each other in order to determine whether the inclusion of the OBS items has improved or worsened the results of the DEA analysis.

Neural Network Approach

As it is referred in Section 2, there is a variety of studies such as Jagtiani, Nathan and Sick (1995), Jagtiani and Khanthavit (1996), Tortosa-Ausina (2003) and Casu and Girardone (2004) in the international literature that mention the magnitude of the inclusion or not of OBS items for the evaluation of DMUs productivity change. Some of the above studies concluded that OBS items tend to overestimate DMUs' efficiency [e.g. Casu and Girardone (2004)] and some others claimed that some firms' efficiency is enhanced, whereas in other cases it is worsened [Tortosa-Ausina (2003)]. In any case, it would be interesting to measure which approach provides more trustworthy results in the sense of how close are the estimated figures of productivity to the real ones.

To answer the above question the present paper employs the non-parametric approach of neural network systems (NNS). Neural network systems use a set of processing nodes. These processing nodes are interconnected in a network that can then identify patterns in data as it is exposed to the data. Using back propagation a neural network learns through an iterative procedure. The network is repeatedly shown examples of the data to learn and makes adjustments to the weights in order to fit the model better. This process is repeated thousands of times. Three data sets are needed to perform a neural network analysis. The three data sets are i) the training set, ii) the test set and iii) the validation set. The NNS in order to learn the problem use the training set. The test set is used during training to monitor the learning performance. The validation set is used after training as a final check to determine how well the model performs. According to Specht (1991), about 65 percent of the observations are employed for the first set, 15 percent for the second set and the remaining 20 percent are employed for the latter set.

Next, the predicted values extracted by the validation set will be compared to the actual values of productivity that have been obtained by the DEA program. Then, the mean absolute percent error (MAPE) of the predicted values will be computed using the following formula:

$$\text{MAPE}=\frac{\sum_{i=1}^{n}\left|\frac{R_i - P_i}{R_i}\right|}{N} *100, \qquad \text{N, } R_i \neq 0 \tag{3}$$

where R_i is the real value of productivity of the i DMU, P is the predicted value of productivity of the i DMU and N is the number of observations. MAPE will be computed for each approach by country and by year. First the OBS business items will be excluded and next theses activities will be included. Then, the values of MAPE which will be obtained by each approach will be compared to each other. The lower (higher) value of MAPE indicates the higher (lower) fit of the underlying approach. So, the approach that will present the lower value for MAPE will be considered the most appropriate.

PRESENTATION AND ANALYSIS OF RESULTS

Malmquist total factor productivity (TFP) change indices have been calculated and then decomposed into technological change (TC) and technical efficiency change (TEC). In symbols: (TFP) = (TC) X (TEC). A value of TFP greater than unity implies positive TFP growth while a value less than one indicates TFP decline over the examined period. An improvement in TC is regarded as a shift in the best practice frontier, while an improvement in TEC is the "catch up" term. TFP indices and their components are illustrated in Table 2.

Table 2 TFP Indices and their Components by Period

INCLUDING OBS				EXCLUDING OBS		
PERIOD	**TEC**	**TC**	**TFP**	**TEC**	**TC**	**TFP**
1997-1998	1.278	0.4	0.511	1.997	0.356	0.711
1998-1999	1.078	0.726	0.783	1.104	0.771	0.852
1999-2000	1.288	0.407	0.525	1.214	0.503	0.611
2000-2001	1.898	0.52	0.987	2.337	0.371	0.868
2001-2002	0.626	1.742	1.091	0.567	2.095	1.187

Based on the results in Table 2, the total productivity index when the OBS items are included in the analysis is greater than the productivity index when the OBS are excluded only for the period 2000-2001. So, OBS activities do not seem to increase the level of productivity of the Arabic banks. Moreover, the TFP indices are greater than unity (M>1) only for the year 2002, based on both approaches. This means that the Arabic banks managed to improve their overall productivity performance only for the last period examined.

As far as the components of the TFP indices are concerned, the technological change indices are lower than the technical efficiency changes indices for all years and for both approaches with the exception of the last period. So, productivity is mainly driven by the remaining DMUs. The only year that the best practice DMUs performed superior to their antagonists, the overall productivity change met an increase. Furthermore, the TC indices when the OBS activities were included were greater than the corresponding TC indices when the OBS activities were excluded for the years 1998 and 2001. The reverse happened for the rest of the years. This image is totally the opposite for the TEC indices. As a result, no specific conclusion can be extracted whether the consideration of non-traditional activities enhances or not the performance of the best practice and the remaining DMUs, when theses two categories are examined separately.

The value ranges between TFP indices with and without OBS items are from the minimum 0.069 for the period 1998-1999 to the maximum 0.2 for the period 1997-1998 in cardinal numbers. We employed the t-test to examine the statistical significance of differences between the TFP indices that include OBS items and those that exclude such activities for every sub-period. The null hypothesis that is under examination states that the estimated productivity change indices which the two approaches produce, are statistical equal to each other. The alternative hypothesis states that the differences of the TFP indices that are computed by the two different approaches are statistically different from zero. Table 3 presents the empirical results of the t-test for every case. In parallel, the corresponding P-values are computed.

Table 3 T-test for Differences between TFP Indices

PERIOD	**T-STATISTIC**	**P-VALUE**
1997-1998	-1.15	0.254
1998-1999	0.19	0.847
1999-2000	-0.73	0.466
2000-2001	-1.27	0.208
2001-2002	-1.69*	0.094

Note: *→ statistically significant at the 10% level of significance

The results in Table 3 indicate that the null hypothesis is rejected only for the period 2001-2002 for the 10 percent level of significance. The null hypothesis cannot be rejected for the rest cases. This

means that the influence of OBS is not statistically significant for the evaluation of the Arabic DMUs' productivity as for the majority of the cases the null hypothesis cannot be rejected. In other words, the TFP indices that are obtained by the two approaches are not statistically different.

The addition of OBS items may enhance or worsen the productivity change of a DMU. However, what is really essential is to examine for which option the obtained TFP is more representative. The acceptance that productivity indices arise or fall when the OBS activities are under consideration too, does not provide by itself any clear evidence for the reliability of such results. For that reason, the present study employs the non-parametric method of neural networks to measure how well the selected variables can explain the TFP index. This is another unique feature of this paper, where neural network methodology is employed for the evaluation of indices produced by DEA for non European banks.

The neural network approach will be applied twice; in the first case, there is inclusion of the OBS items as outputs in the computation of the TFP index and in the second case there is exclusion of this variable in the TFP index calculation. In each case the variable that we will try to predict is the TFP index and the used inputs and outputs variables that have been used to calculate this index will be the so-called 'inputs' variables in the NNS literature. The mean absolute percent error (MAPE) of the predicted values versus the real values of TFP indices are presented in Table 4.

Table 4 MAPE of Predicted TFP Indices

PERIOD	WITHOUT OBS	WITH OBS
1997-1998	513.2	60.67
1998-1999	38	39.04
1999-2000	127.7	184.6
2000-2001	104.1	49.57
2001-2002	71.51	41.75

The results in Table 4 show that the MAPE with the consideration of the OBS items is lower for the periods 2001-2002, 2000-2001 and 1997-1998, while the MAPE without OBS items is lower only for the period 1999-2000. For the period 1998-1999 the MAPE obtained by each of the two approaches are actually equal to each other. This means that when the OBS items are included in the model the predicted TFP indices are closer to the actual TFP indices for the majority of the cases. These results are contrary to the findings of Angelidis and Lyroudi (2005) for the European countries.

The findings of the present study are consistent with the results of Jagtiani and Khanthavit (1996) and Tortosa-Austina (2003) that DMUs efficiencies vary according to both models as the banks in some sub-periods –and of course some individual DMUs– enhance and some other worsen their performance. In contrast, Casu and Girardone (2004) mentioned that the inclusion of OBS items resulted in an increase of the estimated productivity levels for most of the occasions. The authors could have been led into this conclusion as they used the TFP index of each year to calculate the geometric mean that was considered as the mean of all observations. In this way, the mean TFP index was estimated by using only six annual indices. Hence, this geometric mean of six TFP indices may be less representative than a geometric mean of a plethora DMU's TFP indices.

SUMMARY AND CONCLUDING REMARKS

This study tried to measure the efficiency of the banks in several Arabic countries, in terms of the total factor productivity (TFP) index. The results indicated that the TFP index was greater than one

only for the period 2001-2002 for both cases, with and without OBS items included in the output. The technical efficiency change TEC indices were above one for all periods except the last one (2001-2002).

The present study investigated also whether the inclusion of OBS items in the calculation of the TFP index of the sample banking institutions influenced the value of this index. The results showed that the influence of OBS activities was not statistically significant.

To test which approach provided more reliable results, the neural network systems approach was employed, which is a radical issue in the study of performance and efficiency. The mean absolute percent error (MAPE) between the predicted and the corresponding real values of the TFP index was calculated. The results suggested that the evaluation approach without the inclusion of OBS items presented higher MAPE for the majority of the banks. This implies that when the OBS items were included in the model, the predicted TFP indices were closer to the actual TFP indices.

Future research could investigate further the factors that could affect the TFP indices, regarding the size of the banking institutions the country of origin for each bank and the host country's growth and inflation. It will be interesting to determine the in which Arabic country operate the most efficient banks and what are the factors for this success. This is however, beyond the scope of the present study.

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