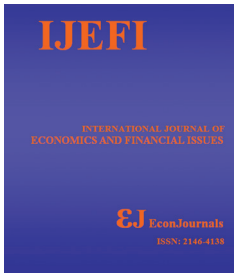

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Does Bank Efficiency Matter? A Case of Egypt

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ABSTRACT

This paper offers to measure the efficiency of the Egyptian banks and its determining factors. Using data envelopment analysis in the first stage to find the efficiency level for banks, by comparing the efficiency of large, medium and small banks and the efficiency of foreign and domestic banks through a balanced panel which cover 14 banks operating in Egypt from 1997 to 2013. A detailed analysis per banking group reveals that medium banks are the most efficient ones, followed by foreign banks. In the second stage, potential determinants of technical efficiency are studied using a regression model using method developed by Papke and Wooldridge (1996). The variables logarithm of total assets, loans to deposits, and Net interest margin are all statistically significant with positive affected on the efficiency level for the Egyptian banks, however, number of branches and non-interest expense over total assets all statistically significant with negatively affected on the efficiency level for the Egyptian banks.

Keywords: Egyptian Banks, Technical Efficiency, Pure Technical Efficiency, Scale Efficiency, Data Envelopment Analysis
JEL Classifications: D22, D24, D61, G21

1. INTRODUCTION

In a global context, both of developed and underdeveloped countries seek to achieve rapid macroeconomics growth through expansionary fiscal and monetary policies. Egypt is considered to be one of the main developing countries in Africa and the Middle East countries. Banking industry is considered one of the main pillars of achieving growth in countries with high population like Egypt. The Egyptian government accrue unprecedented outstanding loans during the last few decades. However, the ultimate ramifications of the high, yet debt-backed growth were uncontrollable inflation and enormous outstanding debts. Banking efficiency is essential for the survival of banks especially in Egypt.

The question of whether banks outperform or underperform other banks has received considerable attention in the literature. There is a large body of literature dealing with the measurement of banking efficiency in the developed economies, but studies on banking efficiency relating to Middle Eastern economies are few. Up to our humble knowledge, there is a few research related directly to the efficiency of banks in Egypt. One of the reasons for the lack of this research is that most Middle Eastern countries including Egypt did not introduce financial and banking sector reforms until the 1990s. Until then, financial systems tended to be heavily regulated and dominated by the public sector (United Nations, 2005). However, over the past two decades, the majority of Middle East countries have gradually moved towards more liberalised financial systems. This has created interest among policy makers, managers and economists in assessing the efficiency performance of banks in Middle Eastern countries over time.

The primary objective of this research is to undertake in-depth evaluation and examination of the efficiency of the of the Egyptian Banking sector for a balanced panel which covers 14 banks operating in Egypt (3 large, 5 medium, 3 small and 3 foreign) for the period 1997-2013, by estimating a non-parametric approach data envelopment analysis (DEA). The study compares the efficiency levels between the foreign banks and domestic banks, between large banks, medium and small banks during the sample period. For a comprehensive analysis technical efficiency (TE) is decomposed into pure TE and scale efficiency (SE). The empirical results are obtained by running an input-oriented DEA model using the software package, DEAP Version 2.1 (Coelli, 1996). Finally, we examine the effects of

other factors on TE levels in order to provide some explanations for variations in efficiency scores and to offer insights for the improvement of bank management and regulatory policies. The results are obtained by using method developed by Papke and Wooldridge (1996).

The rest of the paper is organized as follows. Section 2 describes the financial reforms and banking sector in Egypt. Section 3 discusses the relevant literature. Section 4 describes the estimates of TE and provides the results of the efficiency level for the banks. Section 5 disccus the estimated regression model identifies some variables which significantly influence the efficiency of banks in Egypt. Section 6 concludes.

2. FINANCIAL REFORMS AND BANKING SECTOR IN EGYPT

The era of our sample is very rich with many aspects that influenced the Egyptian banking system, starting from 1992 to 1998, the Egyptian government has altered its attitude towards a fully market-oriented economy. The government embarked upon a major program of economic reform that stimulated banking industry. This new program aimed generally at expanding the private sector's ownership base, integrating into the global economy, and accelerating the pace of privatization of the public sector (Central Bank of Egypt [CBE], 1996). Consequently, the government issued Public Enterprise Companies Law No. 203/1991 to facilitate the implementation of the privatization program. Additionally, in 1992, the government developed the legislations and legal regulations of the Egyptian Stock Exchanges through the passage of Capital Market Law No. 95/1992. In specific, this program designed with help of International Monetary Fund and the World Bank to decrease the government's role in the financial sector, to encourage private sector investments, to introduce market-oriented banking mechanisms, to promote foreign direct investment in Egypt and to enhance competition in the banking sector (Euromoney, 1999).

In 2003 when the Egyptian government decided to fully liberalize the currency exchange rate where the rate is set according to the market forces. Floating the Egyptian pound against the US dollar to move according the market supply and demand made the economy more competitive. In 2004, the CBE started a new program to restructure the banking sector and deal with non-performing loans by encouraging a wave of mergers and acquisitions which enabled large and strong banks to acquire many small banks. The number of banks decreased from 65 banks in 1997 to only 39 banks in 2013. However, the global financial crises and the Egyptian Revolution in 2011 brought about great changes in practices of Egyptian banks from 2009 to 2013. This research will provide a new perspective to the field of banking efficiency in Egypt.

3. LITERATURE REVIEW

There are a various studies in the field of measuring the efficiency of banks worldwide, however, the case of Middle Eastern countries are diverse. In particular, the Egyptian studies on measuring the efficiency of banks are limited. Al-Faraj et al. (1993) evaluated the relative efficiency of 15 branches in Saudi Arabia bank which is one of the largest commercial banks, using a number of inputs and outputs in DEA model. The inputs include the number of employees working in the branch, the percentage of employees with college degree, the average number of years of experience which the employees have at a branch, an index for location, an index for the rank of the highest authority, an index for expenditure on decoration, an index for the average monthly salaries, an index for other operational expenses and an index for acquired equipment. The outputs include: The monthly average net profit, the monthly average balance of current accounts, the monthly average balance of savings accounts, the monthly average balance of other accounts, the monthly average of mortgages. The DEA results reveal that 12 out of 15 branches are efficient. Based on an input oriented DEA approach. Darrat et al. (2003) examined the performance of eight banks in Kuwait during the period 1994-1997. The data used for three inputs, namely labour, capital and deposits and two outputs, namely, loans and investment were drawn from the balance sheets and income statements of banks. The labor is measured by the number of all employees in the banks, capital by the book value of fixed assets and premises, and deposits by the sum of demand and saving deposits. The results showed that Kuwaiti banks failed to optimally utilize a significant proportion of their resources. The bank inefficiency appeared to be both allocative and technical in nature. Their results also indicated that smaller banks in Kuwait were more efficient than larger ones, although all banks had improved their efficiency levels and experienced some gains in productivity.

In a more recent study, Al-Khathlan and Malik (2010) investigated both technical and scale efficiencies of Saudi commercial banks for the period, 2003-2008. Their sample covered ten out of 12 commercial banks. They employed the DEA intermediation approach. The result indicated that the majority of Saudi banks operated at higher levels of efficiency and managed their financial resources adequately.

Jreisat and Paul (2010), provided a review of banking efficiency in the Middle East economies with a special emphasis on measuring the efficiency of banking sector in Jordan, they find that majority of studies have used DEA approach; only few have used SFA methodology to compute efficiency estimates. These studies have revealed that banks have achieved some levels of efficiency. Also, they presented a detailed analysis of banking efficiency in Jordan using data for the period 1996-2007. The input oriented DEA methodology is applied to obtain estimates of TE decomposed into pure technical efficiency (PTE) and SE. An attempt is also made to check whether banks are operating at most efficient scale size. Their analysis reveals that the Arab bank which is one of the large banks has performed at the highest level of TE during the sample period. The small banks are found to be more efficient than the medium sized banks. The foreign banks have shown the lowest TE indicating a large scope for cost reduction. More recently, Jreisat (2012), has investigates the efficiency and productivity growth of the Jordanian banking sector, during the period of

financial deregulation, 1996-2007. It begins with analysis of TE based on DEA, followed by measuring cost efficiency, finally, the Malmquist productivity indices are computed to examine the total factor productivity change, his book should help policy makers and bankers in understanding the ways regulatory changes influence banks' efficiency and productivity in Middle East.

Reda and Isik (2006) examine the efficiency and productivity of commercial banks in Egypt from 1995 to 2003 using the DEA and Malmiquist productivity index. They find commercial banks are technically inefficient and productivity deteriorating annually over the period of study. Badreldin and Kalhoefer (2009) examine the effect of mergers and acquisitions on Egyptian banks' performance by employing the return on equity scheme during the period 2002-2007. They find that there is insignificant positive relationship between mergers and acquisitions and profitability of banks. They conclude that banking industry reforms had not have any effect on profitability. More recently, Reda (2013) investigates the relationship between mergers and acquisitions and banking efficacy in Egypt over two periods 2000-2003 and 2007-2010. The study employ DEA and the traditional financial measures to quantity managerial efficiency, changes in profitability and financial performance respectively. The study show that mergers and acquisitions had a positive effect on managerial efficiency while banks' capitalization and risk management practices, the banks' intermediation role and banks' profitability remain unchanged.

The aim of this research is to fill the gap to the existing literature on banking efficiency in the banking industry in Egypt. In our knowledge none of the past studies focus to evaluate and measure the efficiency of the Egyptian banks and its determining factors.

4. THE ESTIMATES OF TE

In this section, we examine the TE of banks in Egypt based on DEA approach. TE is decomposed into the product of "PTE" and "SE." This requires the estimation of two DEA models one with constant returns to scale and the other with variable returns to scale. DEA provides TE scores (decomposed into PTE and SE score) which lie between 0 and 1, where 1 indicates full efficiency and 0 means fully inefficient. Thus, DEA can reveal how efficient a decision making unit is relative to the others. The efficiency score translates into how well a bank converts its inputs into outputs. A survey of these alternative approaches is given in Coelli et al. (2005). The empirical results are obtained by running an input-oriented DEA model using the software package, DEAP Version 2.1 (Coelli, 1996). The study uses data for banks operating in Egypt during the period, 1997-2013. The intermediation approach is quite popular in empirical research particularly based on cross-section data (Colwell and Davis, 1992; Favero and Papi, 1995). The choice of variables may also depend on the availability of required data. We use the intermediation approach in which banks are viewed as financial intermediaries employing inputs such as total deposit and labour to produce outputs such as total loans and other investments. The variables are listed in Table 1.

Table 1: List of inputs and outputs

Inputs	Labor ($X1$)
	Total deposits ($X2$)
Outputs	Total loans ($Y1$)
	Other investments ($Y2$)

The definitions of the variables used in DEA model are as a follows. Labor is defined as a number of full time worker, while total deposits are defined as customers' deposits. Total loans are the total credit facilities as appear in the balance sheets of the banks. Other investments are the investments in bonds and securities. The data used in this study covers 1997-2013 period and are taken from, auditing annual report of individual banks CBE. The data were collected from 14 banks operating in Egypt, 11 domestic banks, and 3 foreign banks (Table 2).

4.1. Results of TE

We use the intermediation approach in which banks are viewed as financial intermediaries employing input such as total deposit and labour to produce outputs such as total loans and other investment. The empirical results are obtained by running an input-oriented DEA model using the software package, DEAP Version 2.1 (Coelli, 1996).

Table 3 presents estimates of TE and its decomposition for each group of banks. Several points emerge from Table 3, first, the group of medium sized banks has the highest TE (77.5% on average) during the study period. Their efficiency level increased increase in pure TE per year. SE of these banks showed a mild decline. Large banks (public banks) have the lowest TE (50.9%) amongst the group of domestic banks. Their efficiency has declined during the sample period. The efficiency performance of small banks was somewhat similar to medium sized banks for the entire period. The average TE for all banks is 59.9%. This suggests that inputs could be reduced by 39.1% on average, relative to the best-practice banks during the period 1997-2013. The foreign banks are more efficient than domestic banks, as may be noted that TE were 67.3%, 58.6% respectively, over the period (1997-2013). Overall, all banking groups did not reached very high score of TE. Large banks appear to be less efficient than small banks also domestic banks appear to be less efficient than foreign banks, regardless of the measurement approach used.

Nevertheless the efficiency score, has risen between 1997 and 2000 but from 2001 to 2004 the efficient score has drop, the reason may be due to the currency turmoil which followed the governmental decision to float the Egyptian pound against US dollar according to the market supply and demand which seriously affected the Egyptian economy. In 2004, the CBE started a new program to restructure the banking sector and deal with non-performing loans by encouraging a wave of mergers and acquisitions which enabled large and strong banks to acquire the small banks. The number of banks decreased from 65 banks to only 39 banks in 2013. The efficiency score increases as a consequence from 2006 to 2008. However, the global financial crises and the Egyptian Revolution affected the efficiency score of Egyptian banks negatively from 2009 to 2013.

Table 2: Assets of Domestic and Foreign Banks, 1997

Bank category	Bank name	Short name	Total assets (JD millions)
Domestic			
Large	National Bank of Egypt	NBE	15,905,295
	Banque Misr	BM	14,758,047.9
	Bank du Caire	BDC	8,446,256.8
Medium	Commercial International Bank	CIB	4,011,017.1
	Suez Canal Bank	SCB	2,180,494
	Faisal Islamic Bank	FIB	1,838,888
	Housing and Development Bank	HDB	1,590,305
	Misr Iran Development Bank	MIDB	1,160,970
Small	Export Development Bank of Egypt	EDB	691,101.18
	AlBaraka Bank Egypt	ABE	461,254.73
	Societe Arabe Internationale de Banque	SAIB	401,020
Foreign	National Societe Generale Bank	NSGB	1,164,457
	Arab African International Bank	AAIB	997,995
	HSBC Egypt	HSBC	636,343.2

Source: Annual Report for Each Bank 1997

Table 3: DEA estimates of efficiency by category of banks, 1997-2013

Banks	Efficiency	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Large	TE	0.48	0.51	0.60	0.64	0.60	0.57	0.51	0.49	0.46	0.52	0.57	0.55	0.44	0.43	0.43	0.46	0.41
	PTE	0.69	0.75	0.89	0.92	0.86	0.82	0.78	0.72	0.67	0.83	0.94	0.95	0.77	0.8	0.81	0.82	0.79
	SE	0.69	0.68	0.66	0.69	0.69	0.69	0.66	0.68	0.68	0.63	0.61	0.58	0.60	0.58	0.56	0.59	0.56
Medium	TE	0.83	0.88	0.93	0.92	0.87	0.82	0.72	0.69	0.7	0.72	0.73	0.72	0.75	0.77	0.71	0.62	0.80
	PTE	0.84	0.90	0.95	0.93	0.89	0.84	0.75	0.72	0.75	0.76	0.77	0.76	0.78	0.86	0.86	0.77	0.89
	SE	0.98	0.98	0.99	0.99	0.98	0.98	0.97	0.97	0.94	0.95	0.96	0.95	0.95	0.90	0.84	0.85	0.88
Small	TE	0.66	0.72	0.73	0.86	0.77	0.73	0.66	0.58	0.64	0.64	0.59	0.73	0.77	0.77	0.70	0.74	0.73
	PTE	0.89	0.89	0.83	0.94	0.86	0.85	0.76	0.70	0.74	0.73	0.66	0.76	0.79	0.79	0.72	0.77	0.78
	SE	0.75	0.81	0.87	0.91	0.88	0.86	0.85	0.82	0.86	0.87	0.90	0.96	0.98	0.98	0.96	0.96	0.94
ALL	TE	0.57	0.61	0.68	0.71	0.66	0.63	0.56	0.56	0.55	0.58	0.63	0.64	0.59	0.59	0.57	0.57	0.51
	PTE	0.74	0.79	0.90	0.92	0.86	0.82	0.76	0.74	0.71	0.80	0.88	0.89	0.78	0.80	0.81	0.81	0.82
	SE	0.76	0.75	0.75	0.76	0.76	0.77	0.74	0.80	0.80	0.76	0.75	0.74	0.77	0.74	0.72	0.73	0.74
Domestic	TE	0.56	0.6	0.67	0.71	0.66	0.63	0.57	0.54	0.52	0.57	0.6	0.6	0.54	0.55	0.52	0.53	0.6
	PTE	0.73	0.79	0.9	0.92	0.87	0.83	0.77	0.71	0.69	0.81	0.89	0.9	0.78	0.81	0.82	0.8	0.83
	SE	0.76	0.75	0.74	0.76	0.76	0.76	0.74	0.75	0.75	0.71	0.7	0.69	0.72	0.7	0.67	0.69	0.72
Foreign	TE	0.78	0.79	0.73	0.72	0.62	0.59	0.49	0.47	0.59	0.56	0.7	0.8	0.73	0.74	0.73	0.75	0.67
	PTE	0.91	0.9	0.83	0.81	0.69	0.67	0.62	0.56	0.61	0.57	0.71	0.83	0.77	0.79	0.79	0.84	0.76
	SE	0.85	0.88	0.87	0.87	0.9	0.88	0.81	0.84	0.97	0.97	0.98	0.96	0.95	0.94	0.93	0.89	0.88

Source: Author's calculations. The efficiency estimates for each bank category are the weighted geometric means of bank specific efficiencies, where the weights are their shares in the aggregate output of the bank category they belong to. The weights vary from year to year. TE: Technical efficiency, PTE: Pure technical efficiency, SE: Scale efficiency, DEA: Data envelopment analysis

5. DETERMINANTS OF BANKS EFFICIENCY

In the previous sections, we present and analyse the TE of the Egyptian banking sector obtained from the DEA. This section relates to the efficiency estimates derived to investigate the determinations of banking efficiency. We adopt two-stage approach, in which TE are estimated in the first stage using DEA, and estimated TE are regressed against a vector of explanatory variables (x) in the second stage, and these variables may potentially affect the efficiency scores.

Ordinary least square (OLS) estimator simply ignores the bounded nature of dependent variable and assumes a linear conditional mean model for TE:

$$E(TE/x) = x\beta \quad (1)$$

However, given that the dependant variable TE is strictly bounded from above and below, it is not reasonable to assume that the effect of any explanatory variable is constant throughout its entire range. Further, the linear specification does not automatically guarantee that the predicted values of TE lie between 0 and 1 without severe constraints on the range of x or arbitrary modifications to fitted values outside the unit interval.

In order to tackle this problem empirical economist chose logistic relationship

$$E(TE/x) = \frac{e^{x\beta}}{1+e^{x\beta}} \quad (2)$$

Since it ensures that $0< E(TE/x) <1$. However, Equation (2) is not directly estimated but it is transformed into log-odds model:

$$E\left(ln\frac{TE}{1-TE}\middle|x\right) = x\beta \quad (3)$$

And then the estimation is done using OLS. There are two major shortcomings of the above model; (i) Recovering $E(TE/x)$ from

(3) is not straight foreword (Papke and Wooldridge, 1996. p. 620) and (ii) Equation (3) is not well defined for boundary values 0 and 1 of *TE*. Since the DEA based frontier estimator always classifies at least one firm to be fully efficient (with *TE* = 1), Equation (3) cannot be used in this case.

Some authors use two-limit tobit model to limit the predicted efficiency scores to be between 0 and 1. However, this model can only be applied observations are available for both limits, which is often not the case in most efficiency studies. Furthermore, the tobit model imposes restrictive assumptions on the dependent variable; This requires normality and homoskedasticity of the dependent variable, prior to censoring.

We examine the effects of other factors on TE levels in order to provide some explanations for variations in efficiency scores and to offer insights for the improvement of bank management and regulatory policies. The results are obtained by using method developed by Papke and Wooldridge (1996).

For fractional dependent variables Papke and Wooldridge (1996) have developed a simple estimation methodology. Their methodology does not require manipulating the dependent variable, when it takes the extreme value of zero or one. Furthermore, the conditional expectation of dependent variable given the independent variables can be estimated in a straightforward manner. Finally, the predicted values of the dependent variable always lie between zero and one.

Papke and Wooldridge (1996) use the following Bernoulli log-likelihood function:

$$l_{it}(\beta) = TE_{it}\log[G(x_{it}\beta)] + (1 - TE_{it})\log[1-G(x_{it}\beta)] \quad (4)$$

Where, $0< G(.) <1$ is a logit function. In our application y_i corresponds to TE and the vector $x = (ROE, Brancehes, LTA, LTD, NIM, NIETA, Age, Agesquare)$. The estimates[1] for the parameter β are obtained by maximizing the log-likelihood for the entire sample of 14 Egyptian banks to cover the entire period of 1997-2013. In other word the maximization problem can be written as:

$$\max_{\beta} \sum_{t=1}^{12}\sum_{i=1}^{17} l_{it}(\beta) \quad (5)$$

The estimated variance-covariance matrix is given by $\hat{V} = \hat{A}^{-1}\hat{B}\hat{A}^{-1}$ where, A and B are given by $\hat{A} = (N\times T)^{-1}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{g}_{it}^{2}x_{it}^{'}x_{it}[\hat{G}_{it}(1-\hat{G}_{it})]^{-1}$ and $\hat{B} = (N\times T)^{-1}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{u}_{it}^{2}\hat{g}_{it}^{2}x_{it}^{'}x_{it}[\hat{G}_{it}(1-\hat{G}_{it})]^{-2}$, respectively, where $\hat{G}_{it} = G(x_{it}\hat{\beta})$, $\hat{g}_{it} = g(x_{it}\hat{\beta})$, $g(x\beta) = \partial G(x\beta)/\partial x\beta$ and $= TE_{it} - \hat{G}_{it}$

1 The Stata command for this estimator can be downloaded from the following link: https://www.msu.edu/~ec/faculty/papke/flogitinstructions.pdf.

We briefly discuss potential effects of various variables on the cost efficiency of the banks below:

- *LTA*: Logarithm of total assets. This variable is included in this analysis as a control for the size of the banks and its impact on efficiency. It is thought of to be positively related to efficiency. If the bank becomes too large to manage efficiently, the bank will be less efficient
- *Branches*: Number of branches for each bank. Number of branches for each bank. The expected sign for this variable is mixed as it is a practical matter of having either too many or too few branches. On the positive side more branches could increase the revenues for the bank. And on the negative side too many branches also could lead too many bureaucracies and an increase in costs associated with maintaining these branches. It is expected that this variable will be positively or negatively related to efficiency, depending on how the banks attract the customer for giving them a good services
- *NIM*: Net interest margin. This variable defined as the differences between interest income and interest expenses divided by total assets. This variable is included in this analysis to find out the profit and relationship with efficiency. It is expected that this variable will be positively related to the efficiency, as that the higher the NIM, the more efficient banks are
- *LTD* is the ratio of loans to deposits. It assesses a bank's ability to transform deposits into loans. The higher this ratio, the more efficient the process of financial intermediation provided by the bank
- *NIETA*: The ratio of non-interest expense over total assets, measures the magnitude of administrative expenses. Banks that have good management systems should be able to achieve lower administrative costs. Thus, it is expected that the higher the NIETA, the higher the bank management risks, and the less efficient the bank is
- *ROE* is return on equity, with an anticipation that the higher the *ROE*, the more efficient the banks are
- *AGE*: The age of the bank is used to reflect the maturity of bank. We expect that ceteris paribus, more mature banks would be more efficient than the younger or newly opened banks.

5.1. Results of the Second Stage Regression

Now we turn to present our results from the analysis of the second stage regression using method developed by Papke and Wooldridge (1996) in which the relationship between the efficiency score computed using DEA in the first stage and set of explanatory variables in order to investigate whether these variables significantly affect the efficiency levels of Egyptian banks. We use the explanatory variables following Vu and Turnell (2011). Table 4 contains the estimated results from Equation (6).

Results in Table 4 reveals that the coefficient of LTA is estimated to be positive and significant, indicating that larger banks are more efficient than smaller ones. The positive and statistically significant coefficient of LTD suggests that banks which have a higher ability of transforming loans into deposit are more efficient than others. This result is quite intuitive in that as higher loans to deposit ratio suggest that the inputs are used productively, leading to increase the efficiency for the banks. Further, as expected the

Table 4: Results of the second stage regression (GLM) and (OLS) for the Eygption Banks

Variables	Parameter	Coefficient (GLM)	Coefficient (OLS)
Constant	β_0	−5.108229***	−0.496372**
		(1.060951)	(0.2264976)
ROE	β_1	−0.2817813	−0.738149
		(0.3468346)	(0.0843663)
Branches	β_2	−0.0394***	−0.00926***
		(0.0005343)	(0.0001127)
LTA	β_3	0.8392652***	0.1759407***
		(0.1552667)	(0.033317)
LTD	β_4	1.631905***	0.2440098***
		(0.2368713)	(0.0301554)
NIETA	β_5	−74.88785***	−10.81455***
		(9.057903)	(1.991702)
NIM	β_6	11.91263*	2.686334**
		(4.442741)	(0.9399395)
AGE	β_7	0.0038707	0.0013296
		(0.008959)	(0.0019356)
AGE2	β_8	−0.0000268	−9.3100006
		(0.0000733)	(0.0000159)
Number of observation		238	238
Log pseudo-likelihood		−99.46573837	R^2=0.5237

Source: Author's calculations. ***,** and * indicate 1%, 5% and 10% significance levels, respectively, Asymptotic standard errors in parentheses. OLS: Ordinary least squares, GLM: Generalized linear model, ROE: Return on equity, LTA: Logarithm of total assets, LTD: Loans to deposit, NIETA: Non-interest expense over total assets, NIM: Net interest margin

positive and significant sign of NIM indicates that banks which are more profitable are more efficient.

The negative and significant coefficient of NIETA implies that higher administrative cost leads to a decrease in efficiency. Finally, a negative and significant coefficient on Branches suggests banks with a bigger network of branches are relatively inefficient possibly due to higher structural overloads.

6. CONCLUSION

The empirical findings from this study are significate contribution to the narrow literature on the performance of Egyptian banks. Our results identify the large sized banks as the less performers and the medium banks as the top performers. The foreign banks have shown better performance than the domestic banks operating in Egypt.

The empirical findings from this study are to highlight the major changes in the financial sector in Egypt which has occurred. Thus, our study shed light on the potential direction of future banking reforms in Egypt and also, on the issue of how banks might go about increasing the efficiency of their operations. As Egypt one of the developing countries, the financial sector has not achieve the efficiency, in depth, and dynamism as the financial sector in the developed countries. Thus, Egyptian government and policy maker should undertake a various features that could lead their financial sector to be more efficient as the developed countries have achieved.

The estimated regression model identifies some variables which significantly influence the efficiency of banks in Egypt. The variables LTA, LTD, and NIM are all statistically significant with positive affected on the efficiency level for the Egyptian banks, however, number of branches and NIETA all statistically significant with negatively affected on the efficiency level for the Egyptian banks.

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