DETERMINANTS OF THE PRODUCTIVITY CHANGE FOR THE BANKING SECTOR IN EGYPT

Ammar Jreisat, Hassan Hassan and Sriram Shankar

ABSTRACT

This study aims to undertake the evaluation and examination of the productivity change of the Egyptian banking sector. Using a novel data set covering 14 banks operating in the Egyptian market from 1997 to 2013. We use a nonparametric approach (based on data envelopment analysis (DEA)) to investigate the productivity change in the Egyptian banking sector. Input-oriented Malmquist indices of productivity change are estimated with DEA to measure total factor productivity (TFP) change. The TFP changes are decomposed into the product of technological change and technical efficiency change (catch-up). In the second stage, we study potential determinants of productivity change using a regression model. We find that the Egyptian banking sector as a whole shows a productivity regress of 0.9% per year, mainly due to the technological improvements. The estimated regression model identifies some variables that significantly influence the productivity of banks in Egypt. The banks with higher loan to deposit ratio and higher returns on equity have higher productivity growth reflecting on their strong strategic and managerial skills. The size of a bank
seems to be associated with an increase in productivity. The maturity of a bank (measured by age) is associated with higher productivity. The NIM and NIETA variables do not seem to be affecting the productivity of banks. Surprisingly, our results reveal that the financial crisis was negatively and statistically insignificant, hence it had no effect on the Egyptian banks.

**Keywords:** Data envelopment analysis; Egyptian banks; Malmquist productivity indices; total factor productivity; second-stage regression

**JEL Classification:** D22; D24; G21

---

**INTRODUCTION**

The growing globalisation of financial markets and banking industry has affected the actions of many nations especially emerging countries. The banking industry is crucial for the stability of financial systems through the efficient allocation of national savings for investments. Also, financial system stability is important for both the overall economic development and the effectiveness of the central bank monetary policy. Over the last two decades, the Egyptian government has undergone consistent and remarkable transformation from a socialist to a capitalist economy. These changes were introduced mainly to improve the economic efficiency of Egyptian banking system.

The banking industry plays a significant role in mobilising savings to fuel different investments and growth rates. This role is particularly important for Egypt where banks dominate the financial markets and public banks dominate the banking industry (Mohieldin, 1999). The Central Bank of Egypt (CBE) seeks to achieve rapid macroeconomics growth through expansionary fiscal and monetary policies to reinforce integration, competition and economic performance. Banks are considered the main pillar for achieving growth in Egypt and represent a key element of the financial system. The CBE has accrued unprecedented outstanding loans during the last two decades. Conversely, the ultimate consequences of the high, yet debt-backed growth were uncontrollable inflation and outstanding debts (CBE, 2005). Consequently, since 1997, the economic outlook of the Egyptian banks has been deteriorating substantially and worsened in the last few years especially after the 2011 revolution (CBE, 2013).

The productivity of banks can be measured simply as a scalar ratio of outputs to inputs that the bank uses. Banks’ productivity may vary based on differences in the quality of inputs used. However, efficiency can be measured
by associating the observed and optimal values of the bank’s outputs and inputs. 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 and productivity growth in the developed economies, but studies on banking efficiency and productivity growth relating to Middle Eastern economies are few. To the best of our knowledge, there are no single research articles related directly to the productivity growth 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 system in these countries 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. Moreover, this has created interest among policy makers, managers and economists to study the efficiency performance and productivity of banks in Middle Eastern countries over time.

The purpose of this chapter is to investigate whether the Egyptian banks have experienced any improvement in their productivity during the financial liberalisation period 1997–2013. The aim is to investigate whether there has been an increase and convergence of efficiency levels following the process of liberalisation. The chapter uses data envelopment analysis (DEA) to calculate input-oriented Malmquist productivity indices (MPI) to measure total factor productivity (TFP) change in 14 banks during the period 1997–2013. The TFP changes are decomposed into the product of technological change and technical efficiency change (catch-up). We then also evaluate the main determinates of Egyptian banks’ efficiency in order to analyse the influence of various factors on bank efficiency.

The aim of this chapter is to fill the gap in the existing literature on efficiency and productivity growth in the banking industry of Egypt. The era of our sample is very rich with many aspects that influenced the Egyptian banking system, starting with 1991 when the Egyptian government issued many new prudential measures for bank’s capital adequacy, asset classification and provisions after considering liquidity requirements for foreign and domestic banks. Also, the government introduced the international concentration limits for domestic and foreign banks in 1993. Then, the government started its privatisation program which included the banking sector. As a result, majority foreign ownership of banks were allowed in 1996. In addition, in 2003, the Egyptian government decided to fully liberalise the currency exchange rate allowing it to be determined by the market forces. In 2004, the CBE started
a new program to restructure the banking sector and deal with non-performing loans (NPL) 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 brought about significant changes in practices of Egyptian banks from 2009 to 2013. The study undertaken in this chapter will provide a new perspective about the banking sector of Egypt.

The primary objective of this chapter is to undertake an in-depth evaluation and examination of the productivity growth in the Egyptian banking sector. Input-oriented Malmquist indices of productivity change are estimated with DEA to measure TFP change using a balanced panel data containing 14 banks operating in Egypt (three large, five medium, three small and three foreign) for the period 1997–2013. The study compares the productivity change between the foreign banks and domestic banks, between large banks, medium and small banks during the sample period. The empirical results are obtained by running an input-oriented DEA model using the software package DEAP Version 2.1 (Coelli, 1996).

The rest of the chapter is organised as follows. To put the study in perspective, we provide a brief overview on financial liberalisation and the banking sector in Egypt in Section 2. Section 3 presents a brief overview of the existing literature on productivity changes in the banking industry. The drivers of productivity change are analysed in Section 4. The estimates of productivity change are regressed against a vector of explanatory variables in Section 5. Sections 6 summarises and brings together the main findings.

2. FINANCIAL REFORMS AND BANKING SECTOR IN EGYPT

Egyptian banking sector, as in many other developing countries, experienced periods of restructuring and deregulation as state-owned banks were gradually privatised. Undoubtedly, these changes affected both the efficiency and productivity of Egyptian banks. In 1991, the Egyptian government initiated a reform process in order to transition from a centralised economy towards a market-oriented economy. Consequently, the government embarked upon a major program to restructure the banking industry. This new program aimed generally at (i) expanding the private sector’s ownership base, (ii) integrating Egypt into the global economy, and (iii) accelerating the pace of privatisation of the public sector (CBE, 1996). Consequently, the government issued Public Enterprise Companies Law (PECL) No. 203/1991 to facilitate the
implementation of the privatisation program. Additionally, in 1992, the government developed the legislations and legal regulations of the Egyptian Stock Exchanges through the passage of Capital Market Law (CML) No. 95/1992. Specifically, this program was designed with the help of the International Monetary Fund (IMF) 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). Consequently, since 1990s, the CBE has introduced a series of reforms regarding banking regulation and legal environment in order to improve the performance and development of the Egyptian banking sector. The banking law which was enacted in 1975 (Law 120/1975) defined the nature and mode of operations for all banks into three main categories: (i) Commercial banks which accept deposits and provide loans for many transactions, (ii) business and investment banks which deal with medium and long-term projects and (iii) specialised banks which deal with specific economic activity such as agriculture, industrial development or real estate sectors. The structure of the Egyptian banking sector in the 1990s can be seen in the Appendix, which depicts the oligopolistic nature of the Egyptian banking sector, as four state-owned banks control 50% of the sectors’ assets and 53% of commercial banks’ assets (CBE, 2000). However, with the exception of the big four, the industry is highly fragmented as no single bank controls more than 5% of the sectors’ assets and only 14 banks control 1% or more of all assets.

The first round of privatisation took place from 1994 to 1998 as part of a restructuring program with the objective to increase the efficiency of public sector. The Egyptian government privatised about 189 state-owned companies, but none of the public banks were included in this round. In 1996, the government issued new laws that permitted 100% foreign ownership of banks and allowed banks to do business in both foreign and local currencies (CBE, 2001). These new laws enabled both private and foreign banks to operate in a competitive environment. Also, in 1996, the government of Egypt ordered the four public banks to reduce their majority stakes in joint venture banks to a maximum of 20% ownership. However, the second round of privatisation (1999–2004) started by the passage of Law 155 (Law 155/1998) allowing the privatisation of state-owned banks. Moreover, the Egyptian parliament passed (Law 5/1998) a law to close a double tax loophole (this loophole allowed banks to avoid tax liability by investing in T-bills). The CBE also introduced restrictions on credit facilities for certain imports in 1999 that reduced the volume of letters-of-credit (LCs) which amounted to about 22% of banks off balance-sheet positions (CBE, 2002). Immediately prior to the
second round of privatisation, the Egyptian economy faced a serious currency liquidity crisis in 1999. This crisis affected the performance of Egyptian banking sector due to the recessionary economic environment. In addition, at the end of 2002, the CBE raised the minimum capital adequacy ratio from 8% to 10% which created difficulties for undercapitalised banks, and they were forced to either raise their capital or merge with other capitalised bank(s). In early 2003, many Egyptian banks, particularly those that had significant proportion of investment portfolio in foreign currency, faced foreign exchange losses immediately after the Egyptian government decided to float the Egyptian pound against the US$. As a result, the CBE reacted quickly by increasing interest rates on T-bills in order to limit the overshoot in the exchange rate (CBE, 2004). The average interest rate on T-bills rose up from around 8.10% in early 2003 to around 11.30% at the end of the same year. During this year, the Egyptian banks, especially state-owned banks, suffered from high NPL ratios. Consequently, in 2003, the CBE started its comprehensive reform plan to rescue the banking sector.

The government sought to enhance banking competition, reduce NPLs, raise capital adequacy and enforce prudential regulations through specific banking restructuring programs (Reda, 2013). As a result, a NPL monitoring unit was established by the CBE in 2004 to restructure the state-owned banks, consolidate banking systems through mergers and acquisitions of small and weak banks, privatise some state-owned banks, divest public sector shares in joint venture banks, resolve NPL and strengthen the supervisory authority of the CBE (CBE, 2010). The CBE required the big four public banks which own more than 50% of the banking sector’s assets to sell their stakes in joint-venture banks and to raise paid-up capital requirements to a minimum of USD 50 million for branches of foreign banks (CBE, 2005). It also refrained from issuing new banking licenses which effectively direct foreign banks to form a partnership with a local bank. One of the major features of this new program was the minimum capital requirement of Egyptian pound 500 million for local banks. Also, the new program focused on lending rules to avoid future negative shocks in the asset quality for all banks. In 2005, the Egyptian Ministry of Finance undertook an initiative to revamp Egypt’s tax structure, both at the personal and corporate levels, with the latter constituting a reduction of the taxation rate from 42% down to 20%. The banking sector benefitted from this tax reform, particularly those banks that were listed in the Egyptian Stock exchange, as they got a further tax exemption of about 10%.

The CBE program helped the Egyptian banks to comply with the guidelines of Basel Accord II (CBE, 2010). Moreover, the government started
to privatise state-owned banks to increase competition in the banking sector, to prevent further market fragmentation and to improve know-how through the participation of foreign banks (Mohieldin & Naser, 2007). As a result, the banking sector consolidated to some extent, and the number of banks operating in Egypt significantly dropped from 65 in 2003 to 40 in 2014 (CBE, 2014).

During the implementation of this ambitious program to revive the Egyptian banking sector and overcome the slow-down in the preceding years, the global financial crisis started and like in many other countries, had a negative impact on the Egyptian economy in general and its banking sector in particular. Before the global financial crisis, the Egyptian banks were more liquid, well-capitalised, regulated and closely scrutinised (CBE, 2009). However, the banks’ profitability was affected by the global financial crisis and the collapse of the local stock market. While the portfolios of Egyptian banks did not include risky instruments like derivatives and securitised bonds, the Egyptian banks suffered losses on their portfolio investments as a result of the slowdown of the economy (CBE, 2009). The CBE prepared a new phase of the financial reform in order to limit the impact of global financial crisis, which included a deposit insurance plan to protect small investors and establishing the non-banking financial sector regulatory body to regulate insurance companies, capital market activities and mortgage finance companies (CBE, 2010).

3. A REVIEW OF LITERATURE ON THE EGYPTIAN BANKING EFFICIENCY AND PRODUCTIVITY CHANGE

The literature on efficiency and productivity change of banks and how productivity is influenced by changes in regulations, innovation and technological processes and differences of productivity across countries is vast. Various studies conducted in the United States, Europe, Asia and a few in Africa have measured efficiency and productivity change in the banking sector.

The literature on assessing the efficiency of U.S. banks are numerous (Elyasiani & Mehdian, 1995; Ferrier & Lovell, 1990; Grabowski et al., 1994; Mukherjee et al., 2001; Richard et al., 2002; Seiford & Zhu, 1999; Whelock & Wilson, 1999), and all have studied the efficiency and productivity of U.S. banks in recent years. Elyasiani and Mehdian (1995) investigated productivity, concentrating on trends in technical efficiency and technological change
for small and large U.S. commercial banks for the period of 1979–1986. They used DEA to measure the efficiency of U.S. banks pre- and post-deregulation periods and found that the technical efficiency of large banks declined by 3% over an eight-year period. They assert the absence of any significant difference in the technical efficiency of U.S. banks following bank deregulation. Mukherjee et al. (2001) studied productivity growth in 201 large U.S. commercial banks, covering the initial post-deregulation period of 1984–1990 and found that productivity grew by 4.5% per year on an average, with a significant decline in the initial years. Banks with a large asset size experienced higher productivity growth overall. This study shows that larger banks and a higher specialisation of products, in general, have higher productivity.

Ferrier and Lovell (1990) and Grabowski et al. (1994) used the DEA approach to assess the productive performance of U.S. banks relative to the best practice frontier and found that overall the efficiency of the U.S. banking industry ranges from 65% to 90%. Following this, Richard et al. (2002) used the DEA model to evaluate the productive efficiency of U.S. commercial banks from 1984 to 1998. Strong and consistent relationships between efficiency and independent measures of performance were found. Seiford and Zhu (1999) examined the performance of the top 55 U.S. commercial banks using DEA. They used a two-stage (Badreldin & Kalhoefer, 2009) production process to measure profitability and marketability, with inputs and outputs in each stage consisting of eight factors. Their results indicated that relatively large banks exhibited better performance on profitability, whereas smaller banks tended to perform better with respect to marketability. Whelock and Wilson (1999) studied the productivity changes of U.S. banks from 1984 to 1993 and found that the banking industry experienced overall decline in technical efficiency. They elucidated this decline to a minority of banks advancing the productivity frontier forward while the other banks remained behind during the 10 years investigated and these variations due to bank size.

Among the many researches that focus on the European banks (e.g., Berg et al., 1992, 1993; Casu & Molyneux, 2000; Casu et al., 2004; Chaffai et al., 2001; Grifell-Tatje & Lovell, 1997, 1999; Noulas, 2001), Berg et al. (1992) analysed the performance of 346 Norwegian banks from 1980 to 1989 using the Malmquist index and found that productivity regresses before deregulation and progresses after deregulation. They conclude that productivity change was mainly due to relative efficiency gains instead of frontier shifts. Berg et al. (1993) confirm the same results in the Finnish and Swedish banking sectors using data for a single year. Grifell-Tatje and Lovell (1997) found that Spanish commercial banks have lower productivity changes than Spanish
saving banks in the period between 1986 and 1993. Chaffai et al. (2001) investigated productivity gaps in banking industries across four European countries using a Malmquist decomposition and separated productivity differences into purely technological differences and differences attributed to external factors.

Grifell-Tatje and Lovell (1999) found a large increase in bank productivity in Spain over the period 1987 to 1994 which was offset by a large negative price effect attributed to high competition among banks and an increase in productivity that was entirely due to technological progress. Casu and Molyneux (2000) investigated the productivity of European banks after conversion toward a common European frontier from 1993 to 1997. They found that there is a small improvement in bank efficiency levels. They assert that efficiency differences across European banks appear to be mainly explained by country-specific factors. Noulas (2001) investigated the efficiency of private and public banks in Greece after the banking deregulation using the DEA approach. Private banks were found to be more efficient than public banks, although the differences were insignificant. Casu et al. (2004) compares parametric and non-parametric approaches of measuring productivity of European banks from 1994 to 2000. They found that the two competing approaches identify different results for the sources of productivity for single years while showing similar results in terms of the components of productivity growth in European banks during the 1990s.

Other streams of research have focussed on the Asian and Australia regions, and many authors have carried out studies (e.g., Batchelor & Gerrard, 2004; Fukuyama, 1995; Gilbert & Wilson, 1998; Jan & Liu, 2006; Kourouche, 2008; Kuma et al., 2010; Lim and Chu-Chun-Lin, 1998; Lin, 2010; Neal, 2004; Ram Mohan & Ray, 2004; Rezvanian & Mehdian, 2002; Rezvanian et al., 2008; Sathye, 2002; Yeh, 1996).

Gilbert and Wilson (1998) employed DEA to measure the effects of deregulation on the productivity change of South Korean banks for the period 1980–1994. Their findings indicate that deregulation had led to an improvement in the productivity levels of large banks, which recorded strong productivity growth, whereas the regional banks recorded productivity regress or no change.

Rezvaniana et al. (2008) examined the effects of ownership on efficiency change, technological progress and productivity growth of the Indian banking industry over the period 1998–2003. A non-parametric frontier approach was used. The study revealed that foreign banks were significantly more efficient than domestic banks. Batchelor and Gerrard (2004) used MPI to identify the extent to which technical efficiency and technological advances explained any
productivity changes in the three commercial banks of Singapore over the period 1997–2001. The results showed that the banks improved their performance by 11.7% in terms of TFP, while the technical efficiency of the banks remained relatively unchanged.

Sathye (2002) analysed the change in productivity of 17 Australian banks for the period 1995–1999. The results showed that the technical efficiency of banks declined by 3.10% and the TFP index declined by 3.5% during the sample period. Neal (2004) investigated X-efficiency and productivity changes in the Australian banking sector over the same period, revealing that regional banks were less efficient than others. It also showed that TFP in the banking sector had increased by 7.60% per annum over the sample period. Sturm and Williams (2002) examined the efficiency and productivity performance of Australian banks based on technical efficiency and MPI for the period 1988–2001. The study utilised two models: Model A employed three inputs: labour, total deposits and capital; and two outputs: loans and, advances and receivables off-balance sheet (OBS) activity. Model B employed two inputs: interest expenses and non-interest expenses; and two outputs: net interest income and non-interest income. The results indicated that technical efficiency improved over time under both models. The annual mean technical efficiency scores under Model A ranged from 73% in 1991 to 94% in 1986. Under Model B, the scores ranged from 67% in 1993 to 96% in 1997. The results from the MPI analysis were mixed. Under Model A, it was found that there was an overall mean TFP growth of 10%, with technological progress dominating technical efficiency change, while under Model B, it was found that overall mean TFP declined by 3%.

Kourouche (2008) investigated the efficiency and productivity of 10 Australian banks during the period 1995–2005. Technical efficiency levels of the banks were examined using DEA; and TFP change was estimated using MPI. The results revealed that the efficiency and productivity change varied across the banks and over the years. The results suggested that the banks needed to control their costs and invest in new technology and capital equipment to improve efficiency and productivity levels. Reddy (2005) found that TFP in Indian banks was stationary over the period from 1995 to 2006, and technology change regressed while efficiency change was improving. Kuma et al. (2010) investigated TFP change and its components in Indian banks using DEA from 1995 to 2006 and found that technology and innovation had a greater impact than efficiency change. Ram Mohan and Ray (2004) measured TFP growth for all Indian banks using the DEA methodology and found that differences among productivity levels of different bank groups were insignificant. Lin (2010) investigated the efficiency of banks after the
Asian Financial Crisis in nine Eastern-Asian countries using the DEA methodology over the period 1993–2002. Malmquist decomposition was applied to distinguish technical changes from efficiency changes. The results showed that technical efficiency decreased in Indonesia, Thailand and Malaysia after the Asian Financial Crisis. Jan and Liu (2006) investigated the technical efficiency and productivity of banks in Taiwan over the period from 1987 to 2000 after the Asian Financial Crisis. The results showed that productivity average of overall banks exhibited a growth trend by 1992 after permitting new banks to be established in Taiwan. However, the technical efficiency of old banks in Taiwan decreased and became lower than new banks.


The Egyptian studies on measuring efficiency and productivity change of banks are limited. However, there are a few studies on measuring productivity and efficiency in the Middle East area. In one of the studies recently done on Jordanian banks, Paul and Jreisat (2012) used input-oriented DEA model to compute Malmquist indices of productivity change using data for 17 banks for the sample period 1996–2007. Their results reveal that over the sample period, which covers the entire deregulation era, the Jordanian banking sector as a whole shows a productivity growth of 3.5 per year which is largely due to the technological improvement. The productivity change among the domestic banks is much higher than the foreign banks.

Hassan et al. (2004) investigated the efficiency of the banking sector in Bahrain based on data for a panel of 31 banks in 1998 and 2000. Their study estimated allocative and technical efficiencies, scale efficiency and overall cost efficiency. The model used three inputs, namely, labour, capital and loanable funds and two outputs, namely, short term loan and long term loans. The input prices were price of labour, price of capital and interest rate on loanable funds. Their result indicated that the average allocative efficiency was about 73%, whereas the average technical efficiency was about 56%. This indicated that the dominant source of inefficiency in Bahrain banks was due to technical inefficiency rather than allocative inefficiency, which was mainly attributed to diseconomies in scale. Overall, average scale efficiency was about 79%, and average pure technical efficiency was about 71%, suggesting that the major source of the total technical inefficiency for Bahrain banks was pure technical inefficiency (input related) and not scale inefficiency. They also investigated the conventional accounting measures of performance with
four measures of cost efficiency to investigate whether higher financial performance has effect on bank cost efficiency. Their results showed that return on equity (ROE) and return on asset (ROA), which measured overall profitability of the banking sector in Bahrain, give the profitability with average ROE and ROA being 10.36% and 1.622% in 1998 while 13.49% and 2.097% in 2000, respectively. They also measured productivity growth using MPI. Their results also revealed that all banks had improved their efficiency levels and experienced some gains in productivity. Finally, regression analysis was used to investigate determinants of the overall efficiency scores. They found that larger and profitable banks were more likely to operate at a higher level of efficiency. The study also revealed that market power had played an important role in cost and technical efficiencies. 

Jreisat and Paul (2010) provided a review of banking efficiency in the Middle East economies with a special emphasis on measuring the efficiency of the banking sector in Jordan, and 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 technical efficiency decomposed into pure technical and scale efficiency. 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 technical efficiency 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 technical efficiency indicating a large scope for cost reduction.

More recently, Jreisat (2012) has investigated the efficiency and productivity growth of the Jordanian banking sector, during the period of financial deregulation, i.e., 1996–2007. It begins with analysis of technical efficiency based on DEA, followed by measuring cost efficiency, and finally, the MPIs are computed to examine the TFP change.

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 that commercial banks are technically inefficient, and productivity is deteriorating annually over the period of study. Badreldin and Kaloefer (2009) examine the effect of mergers and acquisitions on Egyptian banks’ performance by employing the ROE scheme during the period 2002–2007. They find that there is an insignificant positive relationship between mergers and acquisitions and profitability of banks. They conclude that banking industry reforms have not had any effect on profitability.
Determinants of the Productivity Change

None of these studies have covered the entire financial deregulation and revolution period. The present study overcomes this limitation by encompassing the entire financial liberalisation period and investigating the drivers of productivity change in Egyptian banks.

4. THE MALMQUIST TOTAL FACTOR PRODUCTIVITY INDEX: DECOMPOSITION AND MEASUREMENT

The Malmquist TFP index was first introduced in two very influential papers by Caves, Christensen and Diewert (1982a, 1982b). These authors define TFP index using Malmquist distance functions; hence the resulting index is known as Malmquist TFP index. One of the important features of these distance functions is that they allow description of a multi-input, multi-output production technology without the need to specify a behavioural objective such as cost minimisation or profit maximisation. Distance functions are of two types: the input distance functions and the output distance functions. Input distance functions look for a minimal proportional contraction of an input vector, given an output vector; and output distance functions consider the maximum proportional expansion of output with a given set of inputs. Since the banks have better control over the inputs, we adopt an input-orientated approach for computing TFP.

Let $y_t \in R^M_+$ denotes an $(M \times 1)$ output vector, $x_t \in R^N_+$ an $(N \times 1)$ input vector and $L(y)$ denote the input requirement set representing the set of all input vectors, $x$, which can produce the output vector, $y$. Then the input distance function, which involves the scaling of input vector, is defined on input set, $L(y)$, as:

$$d^i_t \left( y_t, x_t \right) = \max \{ \rho_t : (x_t / \rho_t) \in L(y) \}$$

(1)

where the subscript `$i$' indicates ‘input-oriented’ measure. The notation $d^i_t \left( y_t, x_t \right)$ stands for the distance from the period $t$ observation to the period $t$ technological frontier. In other words, this distance function represents the largest factor, $\rho_t$ by which an input vector $(x_t)$ is deflated to produce the output vector under period $t$ technology. Similarly, $d^s_t \left( y_t, x_t \right)$ would indicate distance from period $t$ observation to period $s$ technology. An input distance function can be illustrated using an example where two inputs, $x_1$ and $x_2$, are used to produce a given output vector, $y$. For a given output vector, the
production technology is represented by the isoquant, $L(y)$ in Fig. 1. The value of the distance function for the point, $A$, which defines the production point where the firm uses $x_1$ of input 1 and $x_2$ of input 2, to produce the output vector $y$, is equal to the ratio $\rho = OA/OB$.

Based on input distance functions, the Malmquist TFP index can be constructed to measure productivity change between periods $s$ and $t$, based on period $t$ technology,

$$m^t_s(y_s, x_s, y_t, x_t) = \frac{d^t_s(y_t, x_t)}{d^t_s(y_s, x_s)}.$$  \hspace{1cm} (2)

A similar input-oriented Malmquist index can be obtained based on period $s$ technology as follows:

$$m^s_t(y_s, x_s, y_t, x_t) = \frac{d^s_t(y_t, x_t)}{d^s_t(y_s, x_s)}.$$  \hspace{1cm} (3)

Clearly, Eqs. (2) and (3) imply that estimation of TFP change between the two periods could depend on the choice of technology. In order to avoid the effect of any arbitrarily chosen technology, Färe et al. (1994) suggest to estimate the input-oriented TFP as the geometric mean of the indices based on periods $t$ and $s$ technologies as given by Eqs. (2) and (3), respectively. Hence we have

$$m_t(y_s, x_s, y_t, x_t) = \left[ \frac{d^s_t(y_t, x_t)}{d^s_t(y_s, x_s)} \right]^{\frac{1}{2}} \left[ \frac{d^t_s(y_t, x_t)}{d^t_s(y_s, x_s)} \right]^{\frac{1}{2}}.$$  \hspace{1cm} (4)
When the value of $m_i$ exceeds unity, this indicates a positive TFP growth from period $s$ to period $t$ and, a value of the index less than one indicates a decline in TFP growth. Eq. (4) can be re-written as

$$m_i(y_s, x_s, y_t, x_t) = \frac{d_t^i(y_t, x_t)}{d_s^i(y_s, x_s)} \left[ \frac{d_t^s(y_t, x_t)}{d_s^s(y_s, x_s)} \right]^{1/2}.$$  \hspace{1cm} (5)

The ratio outside the square brackets measures the change in the input-oriented measure of technical efficiency between periods, $s$ and $t$. This efficiency change is equivalent to the ratio of the Farrell technical efficiency in period $t$ to the technical efficiency in period $s$. The remaining part of the index indicates the shift in technology between the two periods. Thus, the Malmquist TFP index shows that productivity change is the product of technical efficiency change (called ‘catch-up’) and technological change (‘shift in frontier’). Fig. 2 illustrates the decomposition.

The technologies for period $t$ and period $s$ ($t > s$) are represented by $S_t$ and $S_s$ showing technological progress from period $s$ to $t$. Both observations $(y_t, x_t)$ and $(y_s, x_s)$ are inefficient with respect to their own frontier and $(y_t, x_t)$ does not belong to $S_s$ frontier (though $S_s$ frontier includes $(y_s, x_s)$). Our formula (5) of the Malmquist index can be expressed in terms of distances along the x-axis. Thus we have

$$m_i(y_s, x_s, y_t, x_t) = \frac{oe}{oa} / \frac{of}{ob} \left[ \frac{of}{od} \right] \left[ \frac{oc}{ob} \right]^{1/2}.$$  \hspace{1cm} (6)

---

*Fig. 2. Decomposition of Malmquist Productivity Index.*

(Source: Färe et al. (1990)).
To measure Malmquist TFP change between any two periods as defined in Eq. (5), four distance functions have to be calculated.

The technical efficiency change can be further decomposed into changes in scale efficiency and pure technical efficiency components. This requires the calculation of the distance functions with variable returns to scale (VRS) technology. The values obtained with constant returns to scale (CRS) and VRS technology can be used to calculate the scale efficiency change residually. The mathematics underlying the estimation procedure is outlined in Färe et al. (1990) and Coelli et al. (2005).

The Data and Estimates of Malmquist TFP Change

The Farrell (1957) approach to frontier estimation was not given much attention until a paper by Charnes, Cooper and Rhodes (1978) in which the DEA approach was introduced for the first time. Many other researches have applied and extended this methodology (see Lovell (1993) and Seiford (1996) for extensive reviews of the related literature). DEA is a mathematical method that uses a linear programming procedure to determine the efficiencies of decision-making units (DMUs) with multiple inputs and multiple outputs. Many other researches have applied the DEA approach in different industries, such as banking, airlines, hospitals, hotels, sports, etc. The DEA approach is a unique method that needs neither a specified functional form nor the weights of inputs and outputs but can measure the efficiency of different units relative to other units used as comparators (Lovell & Schmidt, 1993).

For our paper, we follow the same methodology done by Paul and Jreisat (2012) for the Jordanian banks. We used the input-oriented DEA model to compute Malmquist indices of productivity change. For finding the TFP variables we employ two inputs, labour (x1) and total deposit (x2) to produce two outputs, total loans (y1) and other investments (y2). Labour is measured in terms of full time workers; total deposits are customers’ deposits. Total loans are the total credit facilities that appear in the balance sheets of the banks. Other investments consist of investments in bonds and securities, shares, treasury bills, governmental bonds and investment in affiliate and subsidiary companies. For a comprehensive analysis, the domestic commercial banks are classified (based on their assets size in 1997) into three categories: (1) large banks, (2) medium banks, (3) small banks, see Table 1. It should be noted that the banks’ assets have changed over the years but none of the banks crossed their categories. This facilitated their comparison over the sample period.
Determinants of the Productivity Change

The data used in this study cover the 1997–2013 period and are taken from the annual auditing report of individual banks CBE. The data were collected from 14 banks operating in Egypt, 11 domestic banks and 3 foreign banks.

### 4.2 Results of Malmquist TFP Change

We have used the non-parametric data envelope approach to compute the input-oriented Malmquist indices of productivity change based on the panel data which cover 14 banks operating in the Egypt from 1997 to 2013. The computer software DEAP (Coelli, 1996) is used to calculate these indices. The value of the MPI greater than one indicates positive productivity growth or productivity progress, while a value less than one indicates productivity decline or productivity regress. Percentage change in productivity is given by \((\text{productivity change} - 1) \times 100\). Where mean aggregate indices are reported for the different groups of banks, these are weighted geometric means using the shares of individual banks in the group output as weights. Similarly, the indices aggregated over the period are also weighted geometric means, where shares of yearly outputs in the total output for the period are used as weights. The sample period mean of TFP change and its components of technical efficiency change, pure technical efficiency change, scale efficiency change and technological change
indices for each bank are presented in Table 2. The results reveal that the two medium-sized, one small-sized banks and one foreign bank have shown productivity improvements and for the remaining banks (10) productivity has declined over the years. The highest mean TFP growth per annum has been shown by Societe Arabe Internationale de Banque (SAIB) 4.6% and lowest by the Arab African International Bank (AAIB). The observed improvement in mean TFP is largely attributable to technological progress. About nearly half of the banks have shown a decline in their technical efficiency.

Table 3 records mean MPI estimates for the broad groups of banks and the banking sector as a whole. The Egyptian banking sector as a whole shows a productivity decline of 0.9% per year which is largely due to the technological decline. The productivity change among the domestic banks is less than the foreign banks. The time series estimates of the productivity growth of the whole sample banks are presented in Table 4. The productivity growth has dropped during the sample era, and the reason may be due to the weak economic growth as a consequence of several economic and political shocks during the period 1997–2013 (Dobrongov & Iqbal, 2005).
To check how productivity has changed over the sub-periods of financial reforms, we present in Table 5 the estimates of TFP for all banks for three sub-periods, 1997–2003, 2003–2008 and 2009–2013, which represent, respectively, the early, middle and later phases of financial liberalisation in Egypt. The estimates of TFP for all banks for the whole period are provided.

The results reveal that TFP growth in the banking sector experienced a decline in TFP growth at the rate of 2.55% in the early phase 1997–2003, and the reason may be due to several factors affecting the banking performance. First, the Egyptian economy faced a serious currency liquidity crisis in 1999 prior to bank privatisation. This crisis affected the performance of Egyptian banking sector due to the recessionary economic environment. Second, at the end of 2002, the CBE raised the minimum capital adequacy ratio from 8% to 10% which created a problem for undercapitalised banks that have to raise their capital or merge with another capitalised bank. Third, in the early 2003, the Egyptian government decided to float the Egyptian pound against the US$ which increased the banks’ foreign exchange losses, particularly, those that have significant proportion of their investment portfolio in foreign currency. As a result, the CBE reacted quickly by increasing interest rates on T-bills so as to limit overshoot in the exchange rate (CBE, 2004). The average interest rate on T-bills rose up from around 8.10% in early 2003 to around 11.30% at the end of the same year. During this year, the Egyptian banks, especially state-owned banks, suffered from high NPL ratios.

In the middle phase, 2004–2008, TFP growth increased at the rate of 4.04% per annum, implying that the banking sector has responded positively to the financial liberalisation policies initiated by the Egyptian government. In 2004, the CBE started a new program to restructure the banking sector and deal with NPL by encouraging a wave of mergers and acquisitions which enabled large and strong banks to acquire the small banks. As a result, the banking sector consolidated to some extent and the number of banks operating in Egypt

<table>
<thead>
<tr>
<th>Banks</th>
<th>TC</th>
<th>TEC</th>
<th>PTEC</th>
<th>SEC</th>
<th>TFP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>1.003</td>
<td>0.981</td>
<td>0.988</td>
<td>1.015</td>
<td>0.984</td>
</tr>
<tr>
<td>Medium</td>
<td>0.995</td>
<td>0.996</td>
<td>0.995</td>
<td>1.000</td>
<td>0.991</td>
</tr>
<tr>
<td>Small</td>
<td>1.019</td>
<td>0.974</td>
<td>1.002</td>
<td>1.017</td>
<td>0.992</td>
</tr>
<tr>
<td>Foreign banks</td>
<td>1.001</td>
<td>0.997</td>
<td>1.003</td>
<td>0.998</td>
<td>0.998</td>
</tr>
<tr>
<td>All domestic banks</td>
<td>1.004</td>
<td>0.986</td>
<td>0.995</td>
<td>1.009</td>
<td>0.989</td>
</tr>
<tr>
<td>All banks</td>
<td>1.003</td>
<td>0.988</td>
<td>0.997</td>
<td>1.006</td>
<td>0.991</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC</td>
<td>1.053</td>
<td>1.022</td>
<td>0.983</td>
<td>1.003</td>
<td>0.981</td>
<td>1.044</td>
<td>1.010</td>
<td>0.973</td>
<td>0.995</td>
<td>0.967</td>
<td>0.961</td>
<td>0.941</td>
<td>1.006</td>
<td>1.070</td>
<td>0.956</td>
<td>1.003</td>
<td></td>
</tr>
<tr>
<td>TEC</td>
<td>1.021</td>
<td>1.012</td>
<td>1.060</td>
<td>0.923</td>
<td>1.036</td>
<td>0.822</td>
<td>0.938</td>
<td>1.088</td>
<td>1.014</td>
<td>1.082</td>
<td>1.092</td>
<td>1.025</td>
<td>0.970</td>
<td>0.912</td>
<td>0.975</td>
<td>0.884</td>
<td>0.988</td>
</tr>
<tr>
<td>PEC</td>
<td>1.001</td>
<td>0.992</td>
<td>1.003</td>
<td>1.000</td>
<td>0.968</td>
<td>1.013</td>
<td>1.000</td>
<td>1.002</td>
<td>0.969</td>
<td>0.940</td>
<td>0.978</td>
<td>0.997</td>
<td>1.010</td>
<td>1.051</td>
<td>0.953</td>
<td>1.080</td>
<td>0.997</td>
</tr>
<tr>
<td>SEC</td>
<td>1.052</td>
<td>1.030</td>
<td>0.980</td>
<td>1.002</td>
<td>1.014</td>
<td>1.030</td>
<td>1.010</td>
<td>0.972</td>
<td>1.027</td>
<td>1.028</td>
<td>0.983</td>
<td>0.944</td>
<td>0.997</td>
<td>1.019</td>
<td>1.003</td>
<td>1.019</td>
<td>1.006</td>
</tr>
<tr>
<td>TFPC</td>
<td>1.075</td>
<td>1.034</td>
<td>1.041</td>
<td>0.925</td>
<td>1.016</td>
<td>0.858</td>
<td>0.948</td>
<td>1.059</td>
<td>1.009</td>
<td>1.046</td>
<td>1.050</td>
<td>0.965</td>
<td>0.976</td>
<td>0.976</td>
<td>0.932</td>
<td>0.972</td>
<td>0.991</td>
</tr>
</tbody>
</table>

*Note:* TFP denotes total factor productivity, TEC is the technical efficiency change, PTEC is the pure technical efficiency change, SEC is the scale efficiency change and TC denotes technological change.
plunged from 65 in 2003 to 40 in 2014 (CBE, 2014). Simultaneously, in 2005, the Egyptian minister of finance affirmed a revamp of Egypt’s income tax structure, on the personal and corporate levels, with the latter constituting a unification of the taxation rate at 20% down from a 42% levy on service entities.

In the latter phase, 2009–2013, TFP growth declined at the rate of 1.54% per annum. There are several potential reasons for this decline. First, the impact of the global financial crisis on the Egyptian banking sector. Before the global financial crisis, the Egyptian banks were more liquid, well capitalised, regulated and closely scrutinised (CBE, 2009). However, the banks’ profitability was negatively affected by the global financial crisis and the collapse of the local stock market. While the portfolios of Egyptian banks do not include risky instruments like derivatives and securitised bonds, the Egyptian banks suffered losses on their portfolio investments as a result of the slowdown of economy (CBE, 2009). Second, the CBE prepared a new phase of the financial reform plan after the global financial crisis which included a deposit insurance plan to protect small investors and establishing the non-banking financial sector regulatory body to regulate insurance companies, capital market activities and mortgage finance companies (CBE, 2010). Finally, the operating macroeconomic environment for Egyptian banks became more challenging, characterised by lower per capita GDP, high unemployment and soaring consumer price inflation.

5. DETERMINANTS OF TOTAL FACTOR PRODUCTIVITY CHANGE

The annual estimates of productivity change for each bank presented in Appendix Table A1 show yearly changes in productivity. In this section, we
discuss a number of possible factors that might have affected the changes in productivity. The estimates of productivity change are regressed against a vector of explanatory variables ($x$). The explanatory variables are drawn from previous studies in banking efficiency literature (see Cavallo and Rossi (2002), Hermes and Nhung (2010), Pasiouras et al. (2009), Casu and Girardone (2004) and Vu and Turnell (2011)).

Specifically, the variables that are widely used in the banking efficiency and productivity literature are as follows:

1. *LTA*: It is the logarithm of total assets. It is used as a proxy for the growth of banks. It is thought of to be positively related to productivity. If the bank becomes too large to manage efficiently, the productivity may decline.
2. *LTD*: It is the ratio of loans to deposits. It assesses a bank’s ability to transform deposits into loans. A higher LTD indicates a more productive process of financial intermediation provided by the bank.
3. *ROE*: It is the return on equity. The higher the ROE for a given set of inputs, the more productive the banks are.
4. *NIETA*: It is the ratio of non-interest expense over total assets. NIETA measures the magnitude of administrative expenses. Banks that employ good management practises should be able to achieve lower administrative costs and thus productivity may increase. Thus, it is expected that the higher the NIETA, the higher the bank management risks and the less cost efficient the bank is, thus productivity may increase.
5. *NIM*: Net interest margin. This variable is defined as the difference between interest income and interest expenses divided by total assets. It is expected that this variable will be positively related to the efficiency, such that the higher the NIM, the more efficient banks are thus productivity may increase.
6. *Financial crises* (GFC): We use it as a dummy variable to find out if the financial crisis has effected the Egyptian banking sector negatively.

We consider the following model which assumes that the TFPC depends on LTA, LTD, ROE, NIM, NIETA and a dummy variable of financial crisis.

$$\text{TFPC} = f(\text{LTA, LTD, ROE, NIM, NIETA, GFC})$$

Given that our data set consists of balanced panel of banks, we use fixed effects estimator for estimating the model in linear form. The results are presented in Table 6. The estimated model seems to give a reasonable fit to
data in terms of $R^2$. Most of the coefficients are statistically significant at the conventional level of significance. The coefficients for LTA is positive and significant suggesting that, other things remaining the same, growth of the bank is accompanied by an increase in its productivity; this means that larger banks are on an average more efficient. Positive and statistically significant coefficients on LTD suggest that banks with a higher ability to transform deposits into loans (i.e. that maintain a high ratio of loans to total deposits) would have more TFP gains than their counterparts. This finding is reasonable because a higher ratio of loans to deposits means that inputs are utilised more productively; ROE is a positively and statistically significant coefficient that is related to TFP change. This finding is reasonable because the higher the ROE for a given set of inputs, the more productive the banks are. The coefficients for NIETA are positive and statistically insignificant indicating that this variable do not have any influence on the productivity growth of the Egyptian banks. Negative and statistically insignificant coefficients on NIM suggest there are no effect of this variable on the productivity of the banks in Egypt. The coefficients of financial crisis are negative but statistically insignificant, implying that these variables do not have any influence on the productivity growth of banks in Egypt.

Table 6. Results of the Second-Stage Regression.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient (Fixed Effect)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>$-75.45^*$</td>
</tr>
<tr>
<td></td>
<td>(39.91)</td>
</tr>
<tr>
<td>$LTA$</td>
<td>$10.01^*$</td>
</tr>
<tr>
<td></td>
<td>(5.982)</td>
</tr>
<tr>
<td>$LTD$</td>
<td>$10.481^{***}$</td>
</tr>
<tr>
<td></td>
<td>(4.405)</td>
</tr>
<tr>
<td>$NIETA$</td>
<td>$-415.92$</td>
</tr>
<tr>
<td></td>
<td>(356.21)</td>
</tr>
<tr>
<td>$ROE$</td>
<td>$-26.860^*$</td>
</tr>
<tr>
<td></td>
<td>(14.715)</td>
</tr>
<tr>
<td>$NIM$</td>
<td>$-302.93$</td>
</tr>
<tr>
<td></td>
<td>(206.96)</td>
</tr>
<tr>
<td>Financial crisis</td>
<td>$-2.855$</td>
</tr>
<tr>
<td></td>
<td>(3.617)</td>
</tr>
<tr>
<td>No of observation</td>
<td>238</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.0108</td>
</tr>
</tbody>
</table>

Source: Author’s calculations.

Notes: 1. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively. 2. Asymptotic standard errors in parentheses.
6. CONCLUDING REMARKS

This chapter has used the DEA model to estimate input-oriented Malmquist indices to examine TFP changes in the Egyptian banking sector during the entire deregulation period and the period of several crises in Egypt, 1997–2013. The TFP changes were decomposed into the product of technological change and technical efficiency change (catch-up). The technical efficiency change is further decomposed into product of pure technical efficiency change and scale efficiency change. To the best of our knowledge, this is the first attempt to examine TFP changes in the domestic and foreign banks in Egypt during the entire deregulation period, not encompassed in the earlier studies.

The results reveal that over the sample period the Egyptian banking sector as a whole shows a productivity regress of 0.9% per year, which is largely due to the technological decline. The productivity change among the domestic banks is less than the foreign banks. However, both had productivity regress.

Over the entire sample period the estimates of TFP for all banks indicates that the TFP growth declined at the rate of 0.18% per annum, and the reason may be due to factors affecting the banking productivity as a whole. First, the Egyptian economy faced a serious currency liquidity crisis in 1999 prior to bank privatisation. This crisis affected the performance of the Egyptian banking sector due to the recessionary economic environment. Second, at the end of 2002, the CBE raised the minimum capital adequacy ratio from 8% to 10% which created a problem for undercapitalised banks that have to raise their capital or merge with another capitalised bank. Third, in the early 2003, the Egyptian government decided to float the Egyptian pound against the US$ which increased the banks’ foreign exchange losses, particularly, those that have significant proportion of their investment portfolio in foreign currency. Fourth, the global financial crises and the Egyptian Revolution affected the productivity growth of Egyptian banks negatively which seriously affected the Egyptian economy.

The estimated regression model identifies some variables which significantly influence the productivity of banks in Egypt. The banks with higher loans to deposit ratio and higher returns on equity have higher productivity growth reflecting on their strong strategic and managerial skills. The size of the bank seems to be associated with an increase in productivity. The maturity of a bank (measured by age) is associated with higher productivity. The NIM and NIETA variables do not seem to be affecting the productivity of banks. Surprisingly, our results reveal that the financial crisis did not have a significantly adverse impact on the productivity of Egyptian banks.
REFERENCES


Central Bank of Egypt (CBE), Annual Report, various issues.


## APPENDIX

### Table A1. Structure of the Egyptian Banking System as at 31/12/1999
(LE Million; US$ = 3.4 at 31/12/1999).

<table>
<thead>
<tr>
<th>Banks</th>
<th>No</th>
<th>Number of Branches</th>
<th>Assets (LE Million)</th>
<th>Total Deposits (LE Million)</th>
<th>Total Loans (LE Million)</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial banks</td>
<td>28</td>
<td>1220</td>
<td>290,983</td>
<td>208,186</td>
<td>166,157</td>
<td>78.6%</td>
</tr>
<tr>
<td>Public sector banks</td>
<td>4</td>
<td>908</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private &amp; Joint Venture banks</td>
<td>24</td>
<td>312</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business and investment banks</td>
<td>31</td>
<td>140</td>
<td>51,710</td>
<td>27,854</td>
<td>23,866</td>
<td>13.9%</td>
</tr>
<tr>
<td>Private and joint venture banks</td>
<td>11</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign banks</td>
<td>20</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialised banks</td>
<td>4</td>
<td>1026</td>
<td>27,339</td>
<td>10,887</td>
<td>22,862</td>
<td>7.5%</td>
</tr>
<tr>
<td>Industrial banks</td>
<td>1</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Estate banks</td>
<td>2</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture banks</td>
<td>1</td>
<td>989</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>63</td>
<td>2386</td>
<td>370,032</td>
<td>246,927</td>
<td>212,885</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Source: Central Bank of Egypt.*