

## The Impact of Bank-Specific Characteristics on the Profitability of Commercial Banks in Egypt

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### Abstract

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The purpose of this study is to investigate the relationship between bank-specific factors and the profitability of banks in Egypt. Thus, finding the main internal characteristics for achieving higher profitability. In this research, OLS regression analysis is used to examine the relationship between bank-specific characteristics and bank's profitability for a sample of 19 Egyptian banks during the period 2007-2016. The findings reveal that bank size and loan loss provision ratio are the main determinants of bank's profitability, by showing a significant relationship with all measures of profitability. Capital ratio shows a significant relationship with ROA and NIM, but insignificant with ROE. However, Loan ratio and deposit ratio have an insignificant effect of bank's profitability.

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**Keywords:** Determinants, Bank's profitability, Capital Adequacy, Credit Quality, Egyptian Banking Sector.

### 1. Introduction

Financial intermediary acts as a middleman between lender-savers and the borrower-spenders helping to transfer funds from one to the other. Banks represent one of the most vital groups of financial intermediaries. The banking sector fulfils a crucial economic function in providing financial intermediation and economic acceleration by converting deposits into productive investments. In this respect, banks are important providers of funds, and their stability is relevant and critical for the financial system (Menicucci and Paolucci, 2016).

The banking industry is a crucial pillar for the stability and development of an economy's financial system, through the efficient allocation of the national savings to prompt various investments and growth rates (Jreisat, Hassan and Shankar, 2018). In addition, the stability of the financial system is fundamental for both the overall economic development and the effectiveness of the central bank monetary policy. In other words, the financial development benefits the economy by increasing efficiency of saving mobility and resource allocation to productive sectors (Tongurai and Vithessonthi, 2018; Greenwood, Sanchez, and Wang, 2010; King and Levine, 1993b). Moreover, increasing the efficiency of the financial sector enhances the economic growth through reducing agency cost (Aghion and Mayer-Foulkes, 2005) and promoting risk-sharing in the economy (Bencivenga and Smith, 1991). On the other hand, financial development may affect economic growth adversely if the volatility of real output increases (Huang, Fang, and Miller 2014), systemic risk rises (Allen and Carletti, 2006; Gennaioli, Shleifer, and Vishny 2012; Wagner, 2007).

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Banks play a major role in the operation of the economy. The importance of banks' profitability in the economy is not only assessed at the micro-level, but also at the macro-level. At the micro-level, profit is the significant requirement of a competitive banking institution, as it is essential for successful business in a period of growing competition on financial markets. Thus, the main purpose of a bank's management is to realize profits, as the critical condition for conducting any business. Profit is the main element in the existence, growth, and survival of any organization (Menicucci et al., 2016). At the macro-level, a profitable banking sector has a better ability to endure negative shocks and contribute to the stability of the financial system. Given the relation between the efficiency of the banking sector and the growth of the economy (Rajan and Zingales, 1995), the study of banking sector performance is of great prominence in developed economies. Therefore, understanding the determinants of bank's profitability is essential to the stability of the economy. Since the well-being of the banking sector is critical to the welfare of the economy at large (Menicucci et al., 2016).

Throughout recent years, studies regarding the evaluation of bank performances, particularly commercial banks, have recorded an increase of attention to them. This amplifies the importance of this paper which focuses on the Egyptian banking sector and studying the impact of bank-specific elements on its profitability. Therefore, the objective of this paper is to investigate the determinants of Egyptian banks' profitability, by collecting data over the period 2007-2016. The sample includes a sample of the working banks in Egypt. The article is organized in the following way: Section 2 is dedicated to the literature review of the bank-specific determinants of bank's profitability. Section 3 reviews the methodology of the study. Section 4 presents the data analysis and the findings of the empirical study. Section 5 includes the conclusion of the study.

## **2. Literature Review**

### **2.1. Introduction**

Several studies have attempted to examine the effect of bank characteristics on its profitability in many countries of the world. Following the early work edited by Short (1979) and Bourke (1989), an extensive number of recent studies have examined the major factors of banks' performance and profitability in many countries of the world.

Researches undertaken have conducted two approaches of profitability analysis; single country and panel of countries. While some studies focus on single country to understand the bank performance, Ben Naceur and Goaeid (2001), Athanoglou et al., (2008), Garcia-Herrero et al., (2009), El-Ansary and Megahed (2016), and Abobakr (2018). Others focus on investigating a panel of countries, Abreu and Mendes (2002), Staikouras and Wood (2004), Goddard et al., (2004), Beck et al., (2005), Athanoglou et al., (2006), Micco et al., (2007), Pasiouras and Kosmidou (2007), and Flamini et al., (2009).

In addition, previous studies classified the major factors into two main categories; internal and external factors. The internal factors are that influenced by the bank's management decisions and policy objectives. While the external factors are determinants that are beyond the control of bank's management but reflect the macroeconomic, political and legal factors that affect the operation and performance of banks. Thus, it is more appropriate to classify the literature based on internal and external determinants of bank profitability.

As this study focuses solely on investigating the effect of internal determinants of bank's profitability in Egypt. Thus, the literature review includes an overview on bank's internal determinants used in this study, and review their effect on different measures of profitability as found in previous studies.

### **2.2. Bank-Specific Characteristics**

This section identifies the main independent variables used in the research to investigate their effect on the bank's profitability. Among several internal and external determinants of profitability as previously mentioned, the most commonly used bank-specific characteristics are considered in the study as potential determinants of Egyptian banks' profitability. Precisely, total assets of a bank representing bank's size, capital ratio representing capital strength, loans to total assets ratio, total deposits to total assets ratio, and asset quality expressed by the ratio of loan loss provisions to total loans.

### 2.2.1. Bank Size

Bank Size is considered to be a crucial variable in the determination of bank's profitability. Thus, one of the most significant questions in literature is whether bank size maximizes bank profitability (Menicucci et al., 2016). Several studies have investigated the association between bank size and profitability resulting in different findings, however many evidences confirmed the role of size as a determinant of bank profitability. According to the market power hypothesis, banks with large market shares and well-diversified products are able to exercise market power in pricing those products to earn above average profits. In addition, in a highly-concentrated banking sector, large banks benefit from economies of scale and other size-related advantages (Goddard et al., 2004). On the other hand, product and risk diversification may lead to a negative relationship between size and profitability as the high diversification could determine higher risks. However, the evidence of such economies is not certain since the findings do not reveal that an increase in size will always amplify the profitability level (Menicucci et al., 2016).

Various studies revealed that size positively affects the profitability of the banks inspected, such as Abobakr (2018), Kawshala and Panditharathna (2017), Menicucci et al., (2016), Yakubu (2016), Pradhan and Shrestha (2016), and Ally (2014). Mostly, prior studies on the effect of bank size on its profitability line with the argument that larger banks benefit from economies of scale and cost reduction (Ben Naceur and Goaid, 2008; Bourke, 1989; Molyneux and Thornton, 1992; Bikker and Hu, 2002; Goddard et al., 2004a, 2004b), therefore they are expected to have higher levels of performance than smaller banks. Based on the relative efficiency hypothesis (Clarke et al., 1984), only at a specific level, if the relative size of an organization enlarges, its market power, reduced risk and economies of scale lead to the increase of its operational efficiency. Accordingly, larger banks are more efficient on average (Berger and Humphrey, 1997), consequently they are more profitable than smaller banks.

However, the empirical findings from previous studies are mixed, some studies have found economies of scale for large banks (Berger et al., 1997; and Altunbas et al., 2001). While opposing researches found economies of scale for smaller banks (Vander Vennet, 2002).

In addition, other researchers agreed with the negative relation between profitability and bank size, implying that larger banks achieve lower profitability levels compared to smaller ones. These results are suggested by Sufian and Chong (2008) in Asia, Jiang et al., (2003) in Hong Kong, Bashir (2003) for Middle Eastern Islamic banks, and Miller and Noulas (1997) in the USA. Ben Naceur (2003) especially claimed that the size has a negative and significant influence mostly on net interest margins. This inverse relationship was also found by Aladwan (2015), Saeed (2014), Sufian and Habibullah (2009), and Kosmidou et al., (2008) for conventional banks. Finally, Dietrich and Wanzenried (2011), in their banking performance study, concluded that a negative relationship observed in large banks depends on huge losses caused by several irrecoverable loans.

Therefore; as in the literature, bank size is included in this study as an independent variable and it is measured by total assets. Based on main literature review, a bank's profitability has been stated to be positively associated with size and it is hypothesized that: H1. There is a significant positive relationship between size and bank profitability.

### 2.2.2. Capital Ratio

Capital ratio examines the relationship between profitability and bank capitalization. The capital adequacy is widely assessed using the capital ratio, since it captures the general soundness of banks by representing how well the bank is capitalized (Menicucci et al., 2016). Thus, the equity to total assets ratio (i.e. capital ratio) is considered as one of the basic measures of capital strength (Golin, 2001), and bank's capital is also widely used to analyze the status of a bank's financial power.

Menicucci et al., (2016) stated that a solid capital structure is essential for financial institutions, as it adds power to face financial crises and to consolidate security for depositors during unstable macroeconomic conditions. Similarly, Bourke (1989) had suggested that well-capitalized banks enjoy access to cheaper and less risky sources of funds or that the prudence implied by high capital ratios is maintained in the loan portfolio consequently improving the profit rates. As a result, banks with weak capital structure could not bear dangerous situations. Hence, it is crucial for financial institutions to preserve a higher strength of capital structure to withstand losses and to diminish the insolvency risk during difficult times.

Supporting the positive relationship between capital adequacy and bank's profitability, studies by Kohlscheen et al., (2018), Kawshala et al., (2017), Menicucci et al., (2016), Yakubu (2016), Ally (2014), and Saeed (2014) theorized that banks with higher equity are protected from insolvency risk. As well-capitalized banks challenge lower costs of financial distress, and therefore achieve high level of profitability (Abreu and Mendes, 2002; and Ben Naceur, 2003). Particularly, Abreu and Mendes (2002) found that in some European countries, well-capitalized banks face low predicted bankruptcy, funding costs, and higher interest margins on profitable assets, thus revealing a positive relationship between capital and bank profitability. Nonetheless, higher levels of equity reduce the cost of capital and decrease the need for external funding. Consequently, they achieve higher profitability since lower risk increases banks' creditworthiness. On the contrary, lower capital ratio in banking implies greater leverage and risk, and then higher borrowing costs. Additionally, Clementina and Isu (2015) reported that improved capital position enhances the bank performance.

On the other hand, in line with the conventional risk-return hypothesis, banks with lower capital ratio are considered riskier and thus achieve higher profits compared to well-capitalized financial institutions (Saona, 2011; Ali et al., 2011; Staikouras and Wood, 2004). Subsequently, this risk-return assumption implies a negative relationship between capital adequacy and bank profitability. The negative relationship between capital ratio and bank's profitability is found in prior researches such as Garcia et al., (2016), Pradhan et al., (2016), and Chouikh and Blagui (2017).

With respect to the majority of prior literature, capital ratio is expected to have a positive relation with profitability because well-capitalized banks are estimated to be more profitable. The results of some of the previous studies show the following hypothesis: H2. There is a positive significant relationship between capital ratio and bank profitability.

### **2.2.3. Loan Ratio**

The volume of loans detained is used to measure the efficiency of asset portfolio management. In accordance with the prior literature, total loans-to-total assets ratio is considered as a crucial indicator of liquidity. Not to mention that, liquidity is essential in explaining bank profitability, and loans are the main source of income and are estimated to have a positive impact on bank performance (Menicucci et al., 2016). However, banks having high proportion of liquid assets are unlikely to gain higher profits, but are less exposed to liquidity risk (Bourke, 1989). Thus, various literatures found a positive relationship between liquidity and profitability (Bashir, 2003; Sufian and Habibullah, 2009).

In additions, various prior studies support the positive relationship between loan ratio and bank's profitability. Since loans are the main source of income for the banks, therefore the more the banks will lend, the higher will be the profitability as they earn large amount of interest from its financing in various sectors of the economy. Results of studies by Abel and Le Roux (2016) in Zimbabwe, and Tariq & Usman, Aman, and Ali (2014) in Pakistan are consistent with the previous argument.

However, the empirical results of studies regarding the relationship between the level of liquidity and profitability in banks are diversified. As evidences from various studies revealed a negative correlation between bank loans and profits (Menicucci et al., 2016). An extremely high loan ratio could imply that banks have rapidly grown their loans portfolio, paying a higher cost for their funding requirements, thus affecting the profitability negatively. In addition, a large credit portfolio might lead to a drop in the credit quality and thus reducing bank profits as it consists mainly of high-risk loans which could cause lower returns and financial losses. In this regard, Duca and McLaughlin (1990), among others, concludes that variations in bank profitability depend mainly on changes in credit risk. Previous studies carried out in Egypt such as Abobakr (2018), and El-Ansary et al., (2016) showed that a higher loan ratio influences profitability negatively. Others carried out by Menicucci et al., (2016), Saeed (2014), Growe et al., (2014), Alper and Anbar,(2011), Hassan and Bashir, (2005), and Staikouras and Wood, (2004) have also confirmed the negative effect of loan ratio on the bank's profitability. Hence, it is possible to conclude that the size of a bank's credit portfolio affects its profitability either positively or negatively, depending on the level of credit quality. However, with respect to the majority of the prior studies, the following hypothesis is suggested:H3. There is a positive significant relationship between loan ratio and bank profitability.

#### 2.2.4. Deposit Ratio

Banks rely significantly on customer deposits to allocate credits to other customers. Thus, enabling banks to provide more loan opportunities. In general, with deposits being the main source of funding for banks, it is commonly assumed that customer deposits affect banking performance positively, if there is a satisfactory demand for loans in the market. It is expected that higher growing deposits would be able to expand the business of the bank and consequently generate more profits (Menicucci et al., 2016). In addition, the ratio of total deposits to total assets is another liquidity indicator, yet it is considered as a liability. Nevertheless, several factors affect the impact on profitability that are caused from increase in banks' deposits (Menicucci et al., 2016). First, the impact is affected by the bank's ability to transform deposit liabilities into income-earning assets. In addition, empirical evidence from Ben Naceur and Goaid (2001) showed that the best-performing banks are those that have preserved high levels of deposit accounts related to their assets.

Correspondingly, Abobakr (2018), Kawshala et al., (2017), Islam et al., (2017), and Menicucci et al. (2016) highlighted that the amount of deposits to total assets has a positive and significant impact on profitability. Since more deposits improve the lending capacity and thus result in higher profits. Surprisingly, various studies have shown negative relationship between deposits to total assets ratio and bank's profitability. Even though deposits are considered as the cheapest source of funding for banks, it can affect the profitability negatively when not efficiently transformed into investment opportunities (Abobakr, 2018). Consistently, previous researches by El-Ansary et al., (2016), Saeed (2014), and Alper and Anbar (2011) concluded a negative correlation between deposit ratio and profitability that might be due to low investment opportunities available. Finally, the relationship between the bank's deposit ratio and its profitability is not yet settled. The effect of fund source on profitability is captured by deposits over total assets ratio and is based on various prior studies. It can be hypothesized that: H4. There is a positive significant relationship between deposit ratio and bank profitability.

#### 2.2.5. Loan Loss Provision Ratio

Analyzing the ratio of loan loss provisions to total gross loans measures the effect of a bank's asset quality on its profitability. Asset quality refers to the quality of the bank's earning assets, including its loan portfolio. A high ratio indicates the poor quality of loans and therefore a higher risk of the loan portfolio. Additionally, it shows the bank's exposure to credit risk which is the possibility of losing outstanding loan partially or totally due to credit events.

Furthermore, the level of loan loss provisions indicates the bank's asset quality and points out changes in the future performance. A high ratio indicates low credit quality and lower profitability. Therefore, the correlation between loan loss provisions and bank's profitability is expected to be negative. Previously, Miller and Noulas (1997) believed that the primary cause for the rise of the profit margin, is the reduction of loan loss provisions. The study suggested that as the exposure of the financial institutions to high-risk loans upsurge, the growth of unpaid loans increases and profitability declines. Theory suggests that increased exposure to credit risk is generally associated with lower firm profitability. Similarly, Mehta and Bhavani (2017), Garcia and Guerreiro (2016), Menicucci et al. (2016), Ozgur and Gorus (2016), and Ally (2014) disclosed that the provisions to total gross loans ratio has a negative impact on banks' profitability. In this regard, suggesting that banks should focus more on credit risk management and increase profitability by screening and monitoring more efficiently credit risk, thus improve the forecasting of future risk levels. On the other hand, based on the risk-return hypothesis, with a significant loan quality, a high ratio suggests a positive relationship between risk and profitability. Accordingly, previous studies carried out by Ben Ameer and Mhiri (2013), Vong and Chan (2009), Athanasoglou et al., (2008), and Kosmidou et al., (2008) showed a positive relationship between the ratio of loan loss provisions over total loans (asset quality) and profitability. Hence, it is challenging to anticipate the relationship between asset quality ratio and profitability, but the results of the majority of previous studies lead to the following hypothesis: H5. There is a negative significant relationship between asset quality and bank profitability.

### 3. Research Methodology

The statistical techniques used for the analysis are Pearson's Coefficient of Correlation, regression analysis, in addition to descriptive statistics such as mean and standard deviation. The regression analysis includes alternatively three different measures of profitability as dependent variables; ROE, ROA and NIM, and five determinants of profitability as independent variables; Bank size, Capital ratio, Loan ratio, Deposit ratio, and Loan loss provisions ratio.

### **3.1. Data Collection and Sample Selection**

The population data of this research includes all banks in the Egyptian banking industry, including both conventional and Islamic banks. As per 2017 CBE report, the total number of banks currently operating in the Egyptian market reached 38 in 2017. The collected data in this research are collected from secondary sources, and the main source of the research data is the banks' website where the banks disclose the audited annual reports for their stakeholders. Unfortunately, not all banks publish their annual reports regularly on the website, thus making it harder to obtain these annual reports. Therefore, those banks were eliminated from the sample. Using a convenience sampling technique, a selected sample of 19 working banks registered with CBE during the period of 2007 to 2016 only has been included and data were obtained from the audited annual reports published on each banks' website. The sample selected includes both conventional and Islamic banks, 16 and 3 respectively.

### **3.2. Dependent and Independent Variables**

#### **3.2.1. Dependent Variables**

Although there are various measures for profitability among previous banking studies, in line with prior literatures inspecting the determinants of banks' profitability, three of the most commonly used measures of bank profitability will be relied on as the dependent variable. This study considers return on equity (ROE), return on assets (ROA), and net interest margin (NIM) as alternative measures of profitability.

##### **3.2.1.1. Return on Equity**

Return on Equity (ROE) measures the return to shareholders on their equity invested. It is a profitability indicator calculated by dividing the bank's net income by the total equity. A high ROE expresses an efficient use of the bank's equity and indicates a better managerial performance (Grove et al., 2014; Alper and Anbar, 2011; Oslan and Zoubi, 2011; Mirzaei and Mirzaei, 2011; Kanwal & Nadeem, 2013; Chinoda, 2014; Abel & Le Roux, 2016).

##### **3.2.1.2. Return on Assets**

Return on Assets (ROA) measures how effectively the bank's resources are managed to generate profits (Golin, 2001; Hassan and Bashir, 2005). ROA is the ratio of net income to total assets (Islam et al., 2017; El-Ansary et al., 2016; Rahman et al., 2015; Chinoda, 2014; Grove et al., 2014; Alper and Anbar, 2011; Oslan and Zoubi, 2011; Mirzaei and Mirzaei, 2011; Liu and Wilson, 2010; Sufian and Chong, 2008).

##### **3.2.1.3. Net Interest Margin**

Finally, the third measure of bank profitability is the net interest margin (NIM). It is expressed by the difference between the interest income generated by banks and the amount of interest the bank must pay to its depositors and creditors from whom it has borrowed funds, divided by the average amount of their interest-earning assets. The NIM is used in various studies of bank performance since it quantifies the profitability of the bank's interest-earning business such as Menicucci et al., 2016, Garcia et al., 2016, and Ben Naceur and Goaid, 2001.

#### **3.2.2. Independent Variables**

Based on the literature review on the previous studies on banks' profitability, there are several bank-specific variables that help in determining the profitability and performance of banks.

##### **3.2.2.1. Bank Size**

The majority of the previous studies used the total assets as the main indicator of the bank's size, such as Kohlscheen et al., (2018); Kawshala and Panditharathna (2017); Menicucci et al., (2016); Yakubu (2016); Pradhan and Shrestha (2016); Flamini et al., (2015); Aladwan (2015); Saeed (2014); and Ally (2014) among numerous studies.

In addition, the use of natural logarithm avoids problems caused by heteroscedasticity and minimize the influence of outliers.

##### **3.2.2.2. Capital Ratio**

The capital ratio assesses the bank's capital adequacy which reflects how well the bank is capitalized and measures the status of the bank's financial power (Menicucci et al., 2016). The equity to total assets ratio is considered as one of the basic measures of capital strength (Golin, 2001). This measure is commonly used in prior studies such as those of Kohlscheen et al., (2018); Chouikh et al., (2017); Kawshala et al., (2017); Menicucci et al., (2016); Yakubu (2016); Saddique et al., (2016); and El-Ansary et al., (2016).

### 3.2.2.3. Loan Ratio

The loan ratio is used to examine the efficiency of the bank's asset portfolio management. With reference to various previous literatures, loan ratio is commonly measured by dividing the bank's total net loans by the bank's total assets (Menicucci et al., 2016; El-Ansary et al., 2016; Saeed, 2014; Tariq et al., 2014; Ben Naceur, 2013).

### 3.2.2.4. Deposit Ratio

Generally, deposits are considered to be a crucial source of funding for banks. The bank's deposit ratio is the ratio of the total deposits to the bank's total assets. This mean of measurement is widely used in prior studies such as Kawshala et al., (2017); Menicucci et al., (2016); El-Ansary et al., (2016); Saeed (2014).

### 3.2.2.5. Loan Loss Provision Ratio

The most widely used measure is the ratio of loan loss provisions to the bank's total gross loans, analyzes the quality of the bank's assets and its credit quality. Studies carried out by Menicucci et al., (2016), Garcia et al., (2016), Saddique et al., (2016), El-Ansary et al., (2016), among numerous prior studies used the ratio of loan loss provisions to total gross loans in their study to examine the effect of the loan loss provisions ratio on bank's profitability.

## 3.3. Research Model

A linear regression model is used to test the relationship between banks' profitability and bank-specific characteristics. Accordingly, most of the previous studies on banks' profitability, such as Short (1979), Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (1999), Athanasoglou et al., (2006), Garcia-Herrero et al., (2009), and Goddard et al., (2004a) used linear models to assess the impact of different factors that may be significant in explaining profitability. To examine the profits' determinants of Egyptian banks, a linear regression model is formulated as follows:

$$\gamma_{jt} = \delta_0 + \alpha_1 BSIZE_{jt} + \alpha_2 CR_{jt} + \alpha_3 LR_{jt} + \alpha_4 DR_{jt} + \alpha_5 LLP_{jt} + \varepsilon_{jt}$$

Where  $\gamma_{jt}$  is the profitability of bank  $j$  at time  $t$ . Three indicators, namely, ROE, ROA and NIM, represent three alternative profitability measures for the bank  $j$  during the period  $t$ . Hence, three models are alternatively tested in the analysis, and each one includes a different measure of profitability (dependent variable). For the independent variables; BSIZE is the bank size, CR is the capital ratio, LR is for loan ratio, DR is for the deposit ratio, and LLP is the loan loss provisions ratio. These models are tested for periods from 2007 to 2016, from 2007 to 2010, and from 2011 to 2016 to examine the effect of 2011 revolution on the banking industry.

## 4. Findings and Analysis

This section emphasizes the empirical study and findings of testing the research hypotheses. In addition, it deals with presenting the results of summary statistics of each variable in the research, showing the effect of bank-specific variables on banks' profitability. Data analysis had been performed where descriptive statistics is presented as a preliminary step of the research findings. Afterwards, the hypotheses are tested using regression analysis.

### 4.1. Descriptive Analysis

Table 4.1. shows the summary statistics of the dependent and independent variables used in the empirical model.

Firstly, the profitability data, the value of ROE has a wide dispersion in the scores, as revealed by the minimum, maximum and standard deviation values. On average, the Egyptian banks included in this sample exhibit a ROE of 0.1316 over the entire period 2007 to 2016. The ROE ranges from -1.40 to 0.56, and the standard deviation for ROE is 23.726. This difference between mean and standard deviation points out great differences among the profitability of banks. As for the ROA, the data ranges from -0.08 to 0.06 with a mean of 0.0125 and a standard deviation of 0.01482.

The data displayed for ROA in this sample indicates that the observations in the data set are close to the mean and that no significant discrepancies are shown between banks. In addition, NIM ranges from 0.00 to 0.06, with an average of 0.0278 and standard deviation of 0.01007, showing that there are only few variations. This explains that the interest rates on all types of finances are relatively consistent among almost all Egyptian banks.

Research Variables	N	Minimum	Maximum	Mean	Std. Deviation
ROE	190	-1.40	0.56	0.1316	0.23726
ROA	190	-0.08	0.06	0.0125	0.01482
NIM	190	0.00	0.06	0.0278	0.01007
Bank size (BSIZE)	190	21.12	27.28	23.9060	1.25323
Capital ratio (CR)	190	0.03	0.19	0.0910	0.03515
Loan ratio (LR)	190	0.08	0.87	0.3846	0.11580
Deposit ratio (DR)	190	0.43	0.94	0.8046	0.08393
Loan Loss Provision ratio (LLP)	190	0.02	0.45	0.1085	0.09816

The descriptive analysis revealed for dependent variables; ROE, ROA and NIM are similar to that of Pradhan et al., 2016; Menicucci et al., 2016; Nuhiu et al., 2017; and Abobakr, 2018. In the concept that the data reveals wide variations in ROE, but minimal variations in ROA and NIM. Supporting the idea that almost all banks in a particular region or country apply relatively similar interest rates for almost all kinds of finances.

Secondly, the independent variables which shows a wide range of variations. Specifically, bank size and loan ratio show the highest dispersion, similar to results of Abobakr (2018); and Menicucci et al., (2016). Bank size ranges from 21.12 to 27.28, with a mean of 23.9060 and a standard deviation of 1.25323. As for loan ratio, the minimum and maximum values are 0.08 and 0.87, respectively, the mean is 0.3846, and the standard deviation is 0.11580. The wide dispersion for both variables is revealed since the sample includes banks of different sizes and some banks are well-established for a long period, while others are smaller in size.

While other independent variables show lower variations, they indicate more consistency of the data set. As capital ratio data ranges from 0.03 to 0.19, with a mean of 0.0910 and standard deviation of 0.03515. The results are in line with a recent study carried out on Egyptian banks by Abobakr, (2018). The mean value of capital ratio indicates that almost all banks in the sample follow the capital requirements set by Basel II and the CBE, therefore the capital ratio has the least variation. As the CBE requires a minimum level of capital adequacy of 10% (CIB, 2016), and the minimum capital adequacy ratio set by Basel II is 8%. Noting that the capital adequacy ratio is calculated as the ratio between total value of capital elements and the risk-weighted assets and contingent liabilities of the bank. As for the deposit ratio, its value ranges from 0.43 to 0.94, with mean of 0.8046 and standard deviation of 0.08393.

Finally, the loan loss provision ratio has minimum and maximum values of 0.02 and 0.45 respectively, with a mean of 0.1085 and a standard deviation of 0.09816. Finally, the descriptive statistics results for the independent variables are relatively similar to a recent study carried out on Egyptian banks over the period of 2006 to 2015, by Abobakr (2018). In addition, Menicucci et al., (2016) have also revealed that both bank size and loan ratio have the greatest deviations.

## 4.2. Regression Analysis

The linear regression is used in this study by the OLS method. To justify using OLS, there are four main assumptions; linearity, normality and autocorrelation, homoscedasticity, and multicollinearity. Firstly, the linearity assumption was checked by plotting the dependent versus the independent variables for the three models, and the results show the existence of linear relationships. Moreover, visual indicators of normality (P-P plot and histogram) showed that data was normally distributed in either the histogram or P-P Plot for the three models tested. Additionally, the homoscedasticity assumption was tested using the Breusch-Pagan test. The results ROE, ROA, and NIM, are 0.0243, 0.1805, and 0.3814 respectively. Thus, showing that both ROA and NIM are accepted for homoscedasticity since the P-values are greater than 0.05.

While as the P-value for ROE is less than 0.05, therefore the presence of heteroscedasticity is interpreted. Furthermore, high autocorrelation for the three models was examined using the Wooldridge test as the results for ROE, ROA, and NIM are 0.0002, 0.0072, and 0.0000 respectively. Therefore, robustness checks were conducted and the problem of homoscedasticity and autocorrelation were fixed by conducting Robust Regression on Stata program. Finally, the independence of variables is checked to be secured from the absence of multicollinearity problems that may prejudice our results using variance inflation factors (VIF) beside Pearson's correlation. Firstly, the results for the three models show that there is no problem of multicollinearity as VIF figures are less than 10. In addition, the results of the Pearson's correlation analysis conducted presented in table 4.2. confirm the absence of multicollinearity between the independent variables.

According to Bryman and Cramer (1997), Pearson's correlation between independent variables is considered as a problem if it is higher than 0.80 (Kennedy, 2008). As shown in table 4.2 the highest correlation, exists between independent variables, is -0.575 which is still below 0.80. Thus, according to Pearson's correlation, there is no multicollinearity between independent variables used in the research model.

	BSIZE	CR	LR	DR	LLP	ROE	ROA	NIM
BSIZE	1							
CR	-.0575**	1						
LP	-0.169*	0.163*	1					
DR	0.304**	-0.319**	-0.266**	1				
LLP	-0.034	0.035	-0.364**	-0.069	1			
ROE	0.326**	-0.256**	0.085	0.135*	0.453**	1		
ROA	0.118	0.134*	0.201**	0.008	-0.436**	0.871**	1	
NIM	0.041	0.316**	0.035	0.008	-0.370**	0.505**	0.637**	1

\*\* . Correlation is significant at the 0.01 level (1-tailed).

\* . Correlation is significant at the 0.05 level (1-tailed).

#### 4.2.1. Testing the effect of bank-specific variables on bank's profitability

The following table 4.3 presents the results of ordinary least squares (OLS) regression used in testing the relationship between bank-specific variables and bank's profitability for the whole period from 2007 to 2016 for the three models.

Variables		Model 1 ROE	Model 2 ROA	Model 3 NIM
BSIZE	Coefficient	0.022869	0.0021824	0.0021757
	Sig	0.000	0.000	0.000
CR	Coefficient	-0.3012475	0.0854738	0.1409439
	Sig	0.287	0.001	0.000
LR	Coefficient	-0.0215383	0.0038872	-0.0120347
	Sig	0.751	0.531	0.028
DR	Coefficient	-0.0126726	0.000288	0.0016323
	Sig	0.888	0.966	0.887
LLP	Coefficient	-0.5527063	-0.438732	-0.429683
	Sig	0.000	0.000	0.000
R-Square		30.80%	26.81%	33.72%
F		14.46	13.38	12.89
Prob > F		0.0000	0.0000	0.000

##### 4.2.1.1. Regression Analysis using ROE as Independent Variable

The results show that the bank size has a positive significant relationship with ROE as supported by previous studies such as Menicucci et al., (2016), and Pradhan et al., (2016).

Thus, supporting the argument that large banks benefit from economies of scale and achieve higher profitability. Therefore, accepting H1, when ROE is used as a measure of profitability. As for capital ratio, loan ratio, and deposit ratio, results show a negative insignificant effect on ROE. Consequently, rejecting H2, H3, and H4 respectively. For capital ratio, the results are consistent with previous studies by Abobakr (2018) and Chouikh et al., (2017), indicating that the negative relationship with ROE is in line with the conventional risk-return hypothesis, banks with lower capital ratio are considered to be riskier and thus achieve higher profits. Moreover, the negative relationship between loan ratio, deposit ratio and ROE are similar to recent studies by Abobakr (2018) and El-Ansary et al., (2016) in Egypt, due to the low investment opportunities available in the majority of Egyptian banks.

Finally, loan loss provision ratio shows a negative significant effect on bank's ROE. Therefore, supporting the argument that the bank's profitability increases by improving the quality of assets and the bank's credit quality. Similar to the results reflected in previous studies such as Saddique et al., (2017); Pradhan et al., (2016); and Menicucci et al., (2016). Accordingly, it reflects that loan quality is more important than its quantity in achieving higher profitability. Consequently, accept H5.

#### **4.2.1.2. Regression Analysis using ROA as Independent Variable**

Similar to the results of model 1, bank size shows a positive significant effect on bank's profitability when using ROA as a measure of profitability. The results are consistent with the findings of various prior studies such as Abobakr (2018), Kawshala et al., (2017), Menicucci et al., (2016), and Yakubu (2016). Hence, accepting H1; the larger the bank size, the greater its profitability. As larger banks benefit from economies of scale and lower agency costs. Unlike model 1, capital ratio shows a positive significant relationship with ROA and supports H2. The results are consistent with previous studies such as Kohlscheen (2018), Abobakr (2018), Kawshala et al., (2017), Menicucci et al., (2016), and Saeed (2014). Accordingly, supporting the argument that well capitalized banks tend to be more profitable as they tend to face lower funding costs and lower potential bankruptcy costs. Regarding loan ratio and deposit ratio, the results show that both ratios have positive but insignificant effect on ROA, therefore partially rejecting H3 and H4. The positive relationship between loan ratio and ROA implies that more loans aid in achieving higher profitability as they are considered the main source of income, but the effect is not conclusive as the relationship is insignificant. However, the results contradict that of Abobakr (2018), Menicucci et al., (2016), and El-Ansary et al., (2016). As for deposit ratio, the positive relationship between deposit ratio and ROA supports the argument that deposits are the cheapest source of funding for banks, thus by increasing deposits, the profitability should increase accordingly. Yet, the relationship is insignificant.

The results contradict the finding of recent studies held in Egypt such as Abobakr (2018), and El-Ansary (2016), concludes that increasing the bank deposits might affect profitability negatively, if not efficiently transformed into investment opportunities. In line with results of prior studies such as Saddique et al., (2017); Garcia et al., (2016); Menicucci et al., (2016); and Ally (2014). Finally, loan loss provision ratio shows a negative significant effect on ROA. Similar to the results of model 1, supporting that maintaining an acceptable credit quality is crucial in achieving higher profits. Therefore, accept H5.

#### **4.2.1.3. Regression Analysis using NIM as Independent Variable**

Similar to the first and second models, the regression results show that bank size has a positive significant effect on NIM as well. Hence, strongly supporting the argument that as bank's size increases, by increasing the total assets, the bank's profitability increases, as large banks benefit from economies of scale and cost reduction. Accordingly, H1 is accepted. The results are in line with numerous prior studies such as Menicucci et al., (2016) and Pradhan et al., (2016).

Furthermore, capital ratio appears to have a significant and positive relationship with bank's profitability, when measured by NIM. Thus, H2 is accepted. Since capital acts as a buffer, increasing capital ratio reduces the need for external funding. Consequently, reducing external funding costs and lowering the prospect bankruptcy costs, as previously supported in studies such as Menicucci et al., (2016), Garcia et al., (2016), and Tariq et al., (2014).

Regarding the loan ratio, the relationship between loan ratio and bank's profitability was expected to be positive and significant. Surprisingly, the regression analysis results for loan ratio against NIM is shown to be negative and significant. Indicating that as the total loans to total assets ratio increases, the bank's profitability decreases. The negative relationship might be due to the low investment tools available in the Egyptian banking sector. Previous studies such as Tariq et al., (2014) have also revealed a negative relationship between loan ratio and bank's profitability. On the contrary, other studies have shown a positive relationship between the loan ratio and NIM, such as Menicucci et al., (2016). In this regard, H4 is rejected. In addition, the relationship between deposit ratio and NIM appears to be insignificantly positive. Since deposits are considered to be the cheapest source of funds for banks, thus increasing the deposits to total assets ratio results in higher profits. Though, the relationship is inconclusive. The results are consistent with Menicucci et al., (2016), and Tariq et al., (2014).

In line with the results of models 1 and 2, the results for model 3 show that loan loss provision ratio has a negative significant effect on the banks' profitability when measured using NIM. The results strongly support the argument that banks consider the quality of the loans more than their quantity. As low loan loss provision ratio indicates better credit and loan quality, thus reduces the costs of bad debts. Consequently, achieving higher profitability levels, as supported by previous studies such as Saddique et al., (2017), Menicucci et al., (2016), and Pradhan et al., (2016).

#### 4.2.2. Testing the Effect of Revolution

As Egypt has faced a major revolution in 2011, a regression analysis is performed by adding a dummy variable to differentiate the years of analysis before and after the revolution. In this regard, the dummy variable added is "0" for examined years from 2007 to 2010, and is "1" from 2011 to 2016.

Variables		Model 1 ROE	Model 2 ROA	Model 3 NIM
<b>BSIZE</b>	<b>Coefficient</b>	0.0273739	0.002468	0.0012621
	<b>Sig</b>	0.000	0.000	0.015
<b>CR</b>	<b>Coefficient</b>	-0.152778	0.948857	0.1108335
	<b>Sig</b>	0.577	0.000	0.000
<b>LR</b>	<b>Coefficient</b>	-0.0656408	0.0010914	-0.0030905
	<b>Sig</b>	0.377	0.873	0.549
<b>DR</b>	<b>Coefficient</b>	-0.0026132	0.0009257	-0.0004078
	<b>Sig</b>	0.977	0.893	0.969
<b>LLP</b>	<b>Coefficient</b>	-0.595484	-0.046585	-0.0342928
	<b>Sig</b>	0.000	0.000	0.000
<b>Dummy</b>	<b>Coefficient</b>	-0.0335708	-0.00021281	0.0068083
	<b>Sig</b>	0.056	0.141	0.000

Table 4.4. shows the results for the regression analysis including the dummy variable. It is shown that there is no significant change in the regression results for the five independent variables; bank size, capital ratio, loan ratio, deposit ratio, and loan loss provision ratio, against the dependent variable in the three models tested by adding a dummy variable. Bank size is positively significant with the three measures of profitability; ROE, ROA and NIM. In addition, capital ratio has a positive significant effect on ROA and NIM only. While loan ratio and deposit ratio show insignificant effect in the three models examined. Finally, the relationship between loan loss provision and the three measures of profitability is negative and significant. However, the dummy variable appears to have a significant change in two models only. Where it has a negative significant effect on ROE, and a positive significant effect on NIM. Subsequently, the regression analysis for the dummy variable implies that there is a relatively significant change between the two periods tested – pre-and post-revolution – regarding ROE and NIM as measures of profitability. On the contrary, ROA shows a negative coefficient, yet the effect is insignificant. Concluding that the negative change in ROA post revolution is minor and inconclusive. Likewise, a recent study by El-Ansary et al., (2016) to investigate the determinants of Egyptian banks profitability before and after the financial crisis had shown that there is no significant difference in the bank's profitability between the three periods tested; pre-crisis, post-crisis, and the entire period. It is suggested that these results are due to the high restrictions exerted on the Egyptian banks.

However, there is a remarkable deviation between the impact of the banks' independent variables on the profitability between the two periods which reveals the modification of Egyptian banks policies.

### 4.3. Summary

In conclusion, after conducting the regression analysis to analyze the impact of bank-specific variables; bank size, capital ratio, loan ratio, deposit ratio, and loan loss provision ratio, on the bank's profitability in Egypt, during the period of 2007 to 2016. It was found that the main determinants of profitability are bank size, as presented by the bank's total assets, capital ratio, and loan loss provision ratio. Accordingly, accepting H1, H2, and H5. On the other hand, loan ratio and deposit ratio show an uncertain relationship with the three measures of profitability; ROE, ROA, and NIM. Thus, H3 and H4 are rejected. In addition, when investigating the effect of the Egyptian revolution on the bank's profitability using ROE, ROA, and NIM, it was found that it has a substantial effect on ROE and NIM. Specifically, it affected ROE negatively, while it resulted in a positive effect on NIM. As for ROA, the effect was negative, yet insignificant. In other words, the effect on the net income to total assets ratio is minor.

### 5. Conclusion

The banking system is crucial for stabilizing the financial system and economic development. Therefore, during the recent years, numerous studies regarding the assessment and analysis of banking performance and profitability have recorded an increase of attention, especially for commercial banks (Nuhiu et al., 2017). The main aim of this study is to determine the bank-specific factors that affect the profitability of banks in Egypt for the period 2007 to 2016. Additionally, a review of the banking performance literature reveals five attributes that were selected to show their effect on banks' profitability. The results indicate that bank size, represented by total assets, is the main determinant of the Egyptian bank's profitability, supporting the argument that large banks take advantage of economies of scale. The findings also show that capital strength is a crucial determinant of bank profitability. On the other hand, regression analysis shows that higher loan ratio and deposit ratio may not certainly lead to higher profitability. Based on the empirical results, it is difficult to find a conclusive impact on profitability in all cases. Hence, loan ratio and deposit ratio are not able to clarify the changes of Egyptian bank's profitability.

Finally, empirical results reveal that provisions to total gross loans ratio is another significant bank-specific determinant of bank profitability in Egypt. The impact of LLP on bank performance is always statistically significant, however the relationship is negative. The findings of the study have several important and relevant implications. By providing comprehensive new insights into the determinants of the profitability of commercial banks in Egypt, signifying that much more attention should be dedicated on bank-specifics to increase the profitability. Therefore, the study expands the knowledge on bank profitability in Egypt with respect to several important dimensions. Consequently, future studies could be conducted by analyzing other internal and/or external variables that could affect a bank's profitability. Moreover, others may be done by increasing the number of banks analyzed and could focus on banks from several countries such as the MENA region to improve the reliability of findings presented in the study.

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