DETERMINANTS OF EGYPTIAN BANKS PROFITABILITY BEFORE AND AFTER FINANCIAL CRISIS

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Abstract

One of the most important instruments of the financial system that reveals the future of the economy in any country is the profitability of the banking sector. Starting from 2008, Egypt was banged by consecutive shocks, both globally and locally, started with global financial crisis in Sep., 2008. The essential objective of the current study is to investigate factors that affect Egyptian banks' profitability before and after financial crisis using Generalized Method of Moments (GMM) through Eviews. The sample period covers from 2004 to 2013, return on assets and return on equity were used as proxy for banks' profitability. The explanatory variables which affect profitability are deposits to total assets ratio, operating income to asset ratio, credit quality, capital adequacy, loans rate, equity growth minus loan growth rate, asset share ratio and Egyptian banks' total assets to Egyptian gross domestic product (GDP).The empirical findings suggested that Egyptian banks with higher capital strength, asset share, and efficient management exhibit higher profitability level, whilst Egyptian banks with higher credit risk and loans intensity exhibit lower profitability level.

Keywords: Bank's Profitability, Capital Adequacy, Credit Quality, Generalized Method of Moments

1. INTRODUCTION

A study prepared by Ramadan et al. (2009) stated that by mid-2008, the raise in global prices had synchronized with the first round of the global financial crisis, featuring a binary challenge of a price raise fueling domestic inflation and a slump in global demand weakening growth and aggravating unemployment in Egypt. The financial sector became the anchor of economic growth and poverty lessening in Egypt; it is one of the outdated and most-established in the Middle East and one of the best-developed in the region. In 2005, regulatory reforms addressed issues including capital adequacy requirements, the privatization of public-sector banks and the unification of small private institutions into more robust entities. Stringent minimal capital requirements streamlined a comparatively crowded banking sector and brought the number of licensed banks operating in Egypt down from 57 in 2004 to 40 banks recorded 3634 branches in fiscal year 2012/2013, leaving the growing sector on exceptionally solid ground.

2. LITERATURE REVIEW

2.1. Developed countries studies

A research presented by Athanasoglou et al. (2005) investigated the effect of bank-specific, industry-specific and macroeconomic determinants of bank profitability of Greece, using an empirical framework that incorporates the traditional Structure-Conduct-Performance (SCP) hypothesis. In order to interpret profit persistence, they applied a Generalized Method of Moments (GMM) technique to panel data of Greek banks over the period started from 1985 to 2001. The results showed that capital is important in explaining bank profitability and that increased exposure to credit risk lowers profits. Furthermore, labor productivity growth has a positive and significant impact on profitability, whilst operating expenses are inversely and strongly linked to it, showing that cost decisions of bank management are instrumental in influencing bank performance. The forecasted effect of size does not provide evidence of economies of scale in banking. The ownership status of the banks is insignificant in explaining profitability, denoting that private banks do not in general make relatively higher profits, at least during the period under consideration. Macroeconomic control variables, such as inflation and cyclical output, clearly affect the performance of the banking sector.

Another research by Pasiouras and Kosmidou (2007) investigated factors influencing the profitability of domestic and foreign commercial banks employing a balanced panel data of 584 commercial banks operating in the 15 European Union (EU) countries over the period 1995–2001 consisting of 4088 observations. They used return on average total assets as a proxy of banks' profitability. Equity to total assets, cost to income ratio, Liquidity and bank's asset size were used as an internal explanatory variables, whereas inflation, real gross domestic product growth rate, concentration ratio, stock market capitalization to total assets of the deposit money banks, total assets of the deposit money banks over GDP and stock

market capitalization to GDP as an external explanatory variables. Their results showed that all the variables are significant except concentration in the case of domestic banks' return on average asset (ROAA), although their effect and relation with ROAA is different for domestic and foreign banks. The power of the explanatory model is much higher for domestic banks and capital strength and efficiency in expenses management are the most essential determinant of ROAA in all cases as the relatively strong significant coefficients of the equity to assets and cost to income ratios. Equity to assets is positive related to ROAA.

An empirical research applied by Liu & Wilson (2010) investigated the profitability of Japanese banks following the major financial crisis that affected the country's economic situation in the mid-1990s. Also, they examined the determinants of bank's profitability with various ownership structures. The dependent variables of their studies were return on equity, return on assets and net interest margins whilst the independent variables were divided into bank-specific factors and country specific factors. The bank-specific variables were noninterest income divided by total operating income, net loans divided by total assets, equity divided by total assets, total operating cost divided by total income, the ratio of impaired loan to gross loans granted and the share of bank its assets as a percentage of the total assets of whole Japanese banking system, whilst macroeconomic variables were the Herfindahl–Hirschman index (HHI) of industry concentration (the sum of the squares of each bank's market shares), real GDP and the percentage of market capitalization of listed companies over GDP. They found that efficient banks, well capitalized, with lower credit risks tend to outperform less capitalized, less efficient counterparts with higher credit risks. Moreover, they found that industry concentration, Gross domestic product (GDP) growth and the extent of stock market development play an essential role in determining the profitability of Japanese banks

Another successive study employed by Dietrich and Wanzenried (2011) tested the portability of 372 commercial banks located in Switzerland over the period started from 1999 to 2009. In order to evaluate the impact the global financial crisis, they separately consider the pre-crisis years, from 1999 to 2006, and the crisis period, from 2007 to 2009. Their profitability factors include bank-specific characteristics, industry- specific and macroeconomic variables. They found that banks which intensively dependent on interest income are having lower profitable than banks whose income is higher diversified. Efficacious banks are highly profitable than banks that are less efficacious. Also, they found that ownership is an essential determinant of profitability. The authors concluded that the financial crisis did indeed have a significant effect on the Swiss banking industry and on banks' profitability as well.

An important research by Zhang and Daly (2013) examined the impact of bank specific and macroeconomic factors on China's bank performance from 2004 to 2010. Their results suggested that banks with lower credit risk tend to be highly profitable while banks with greater expense preference registered a negative effect on

bank performance. Referring to macroeconomic variables, the results showed that China's financial services tend to enlarge along with economic growth. The study results showed that higher economic integration through increased trade and capital flows synchronized with an increase in bank profitability.

A recent research presented by Growe et al., (2014) examined the profitability and performance measurement of U.S. regional banks during the period 1994-2011; they segmented explanatory variables into three groups; the first one is bank-specific variables, the second group of explanatory variables is industry-specific and the last group of explanatory variables is macroeconomic factors. They employed GMM. Their results showed that profitability has a negative relationship with noninterest expenses, provisions for credit losses and measures of asset quality, whereas noninterest income did not relate significantly to profitability. The rate of noninterest spending to total assets was positively related to profitability. Thus, they concluded that spending on noninterest items can enrich profitability as long as it does not become too high related to income.

On the other hand, a new research by Saeed (2014) highlighted bank-related, industry-related and macroeconomic Factors Affecting United Kingdom banks' profitability before, during, and after global financial crisis using 73 commercial banks in his sample from 2006 to 2012. Fixed effect model was used in his model for econometric-based regression analysis and after performing Hausman test on the model. They concluded that bank size, loan, deposits, liquidity, capital ratio, and interest rate have positive effect on ROA and ROE while GDP and inflation rate showed a negative effect on the same.

A distinctive research by Messai et al., (2015) investigated the determinants of profitability for the 15 countries of Western Europe over the distress period 2007 to 2011 for 322 banks using a panel dynamic model GMM. Their results concluded that the capital ratio and the credit risk are the most relevant drivers of bank's profitability. Their results also showed that profitability and liquidity associated positively as a high scale of loans is associated with higher interest margins and consequently to higher profitability level. Regarding to inflation, it has negatively affected interest margins and unforeseen growing in price indices gave rise to liquidity problems for borrowers. And also their results concluded that gross domestic product growth rate has a positive relationship with bank profitability.

2.2. Emerging Markets Studies

A successive research employed by Sufian and Chong (2008) studied determinants of Philippinesbank profitability during the period 1990–2005 using fixed effects model. Their empirical results emphasized that size, credit risk, and expense preference behavior have a negatively significant relationship on banks' profitability, whilst non-interest income and capitalization have a positive relationship with ROA. Regarding external factors affecting banks profitability, inflation showed a negative effect on bank profitability, whilst the impact of economic growth, money supply, and

stock market capitalization showed insignificant relationship with the profitability of the Philippines banks.

Moreover, Bannaceur and Goaied (2008) examined the Determinants of Tunisian commercial banks interest margin and profitability on a sample of 10 Tunisian Commercial banks through panel data over the period 1980-2000 using two measurements of performance; the net interest margin and the return of assets whereas overhead to total assets, the ratio of equity capital to total assets, the ratio of banks' loans to total assets, the ratio of non- interest bearing assets to total assets, log of bank assets and market concentration ratio, and just one macroeconomic variable was used which is real GDP per capita growth. They applied a Fixed Effects Model (FEM) and Random Effects Model (REM) in order to examine cross-section variation and a Hausman test were used in order to find which of mostappropriate model. Results showed a positive and significant effect of the overhead to assets ratio variable on the net interest margin.

Another research by Sufian (2009) studied determinants of Bank Profitability in Malaysia during the period from 2000 to 2004 in annually basis. The results showed that Malaysian banks should focus more on credit risk management. Non-interest income divided by total assets, Non-interest expense divided by total assets and book value of stock-holders' equity as a fraction of total assets exhibited positive sign and is statistically significant with ROA and regarding to macroeconomic factors, natural log of GDP showed negative significant relationship with bank profitability, but there was a positive significant relationship with inflation rate and bank profitability.

Davydenko (2010) investigated the determinants of bank profitability in Ukraine. He used a panel data started from 2005 to 2009 in a quarterly basis. He conducted fixed and random effects models. The research results showed that Ukrainian banks encountered low quality of loans and did not manage to extract reasonable profits from the emerging volume of deposits. Ukrainian banks managed benefit from exchange rate depreciation despite of low profits from the core banking activities. His finding showed an evidence for the difference in profitability figure of banks with foreign capital against exclusively domestically owned banks. His results also indicated that there is a chance for consolidation of Ukrainian banks in order to utilize economies of scale.

A research done by Agustini and Viverita (2011) examined factors influencing the profitability of listed Indonesian commercial banks before global financial crisis and during global financial crisis as well over the period of 2002-2009 using GMM. Bank-specific factors were used as indicators affecting ROAA as a proxy of banks profitability. Banks' profitability is mainly explained by bank size and bank capital regarding to their positive and significant impact on profitability in all specified model and different time period. Inflation showed negatively relation with bank profitability in the pre-crisis periods and shifted to positive sign during the crisis periods. Diversification showed negative and statistically significant impact on banks' profitability in the pre-crisis period. Commercial banks also showed minimizing cost behavior because of the

competition in industry is getting tighter. There was a positive effect of bank-based financial development on bank profitability and positive effect of bank concentration on its profitability.

Ana et al. (2011) investigated determinants of bank profitability in Croatia carried out on a data sample of 28 Croatian commercial banks in a span period from 2003 to 2008 using a dynamic panel model with two-step Arellano and Bond GMM estimator. The analysis showed that the concentration measured was statistically significantly affects bank profitability, credit risk management of Croatian banks showed a positive influence on bank profitability. Other econometric models indicate a statistically significant negative influence of provisions on profitability.

Meanwhile, Mirzaei and Mirzaei (2011) investigated bank-specific and macroeconomic determinants of profitability in Middle Eastern banking using both OLS and GMM techniques. The analysisshowed that the coefficient of bank size is negative and highly insignificant for both models, the cost to income ratio is negative and statistically highly significant, liquid assets to size is statistically significant, off-balance sheet activities to total assets is positive, but it is statistically insignificant, loss provisions to loans is negative and statistically highly significant, the Middle Eastern banks with higher credit risks tend to show lower profitability, net loans to deposits and short term funds affects negatively profitability, overheads ratio is positive and highly insignificant, growth of total assets is positive and highly significant, market share has weak effect on profitability, negative and statistically significant relationship between inflation and profitability, inverse statistically significant relationship between domestic credit to private sector and profitability, GDP per capita is negative and insignificant and there is no any evidence of impact of population growth factor on profitability.

Moreover, Sufian (2011) investigated the profitability of Korean banks of bank specific and macroeconomic determinants over the period 1992-2003. The researcher found that Korean banks with lower liquidity levels tend to show greater profitability and greater diversification assigned to banks' income sources towards derivative instruments and other fee-based activities shows a positive impact. Business cycle effects, especially inflation, display a substantial pro-cyclical impact on bank profitability. The industry concentration of the national banking system positively and significantly affects bank performance. The effect of the Asian financial crisis is negative, while Korean banks have been relatively more profitable during the pre-crisis compared to the post-crisis period.

Furthermore, Olson & Zoubi (2011) investigated efficiency and bank profitability in MENA countries. They collected data for 83 different banks in 10 countries from year 2000 to 2008. Their observations were 527 observations. Their study pointed out that accounting factors help interpret cost and profit efficiency, but cost efficiency has tiny effect on profitability and profit efficiency as well, but they focused more on profit efficiency than cost efficiency. They used a generalized least squares panel estimator using the distribution free approach (DFA) for segregating inefficiency from random error. Authors found that the average bank

operates at cost efficiency lower than in North American banks, but match with studies of the banking industry in developing economies and many European countries as well. MENA banks are higher profitable than other countries, whereas Islamic banks in the region are more profitable, but lower cost efficient than conventional banks in MENA.

Masood and Ashraf (2012) examined determinants of Islamic banks profitability of four regions. Panel data method employed to data for this aim for profitability measures the return on assets and returns on equity were used in this study. Based on empirical analysis results, they found that assets size has positive and significant influence on the profitability of Islamic banks. Their results reported that banks with larger assets obtain the higher profitability. The loans to assets, capital adequacy and assets management results led to positive and significant relationship with return on assets and return on equity which plays a vital role in the profitability of banks. The Islamic banks loan losses provision is less than conventional banks. The non-performing loans impact negatively banks profitability because assets quality and credit volume affect banks financial matters. The gearing ratio shows positive impact on return on assets and inverse relationship with profitability measure of return on equity. This showed that the gearing ratio led to higher return on assets and negatively affects the return on equity, whereas the financial risks positive and significant relationship with the return on assets led to more profitability of banks and for equity side, financial risk impact inversely. The Islamic banks are proposed to take higher risk than of conventional banks. Due to achievement of more profitability, Islamic banks use deposits as leverage sort and shared risk with depositors. The RGDP contribute negatively on banks' profitability from assets side, but impact positively on return on equity. For banks profitally, inflations contribution is not significant, but deposits, liquidity and operating efficiency showed not essential or lower effect on profitability of banks.

Another study by Almumani (2013) studied the impact of managerial factors on commercial bank profitability in Jordon from 2005 to 2011. The another measured profitability measured by ROA as a dependent variable, whilst by cost efficiency, credit risk, credit composition, liquidity, capital adequacy and the bank size as independent variables. His major outcomes showed the cost income ratio is the major endogenous variables under the control of management that determines the profitability of Jordanians banks, while liquidity, credit composition, credit risk, capital adequacy and the bank size did not show any statistical effect on profitability.

A successive study conducted by Amba and Almukharreq (2013) investigated the impact of the financial crisis on both Islamic and conventional banks' performance and test whether Islamic bank's performance is the best before and during the financial crisis. Three ratios were used to represent bank's profitability gauges which are return on assets, return on equity and net interest margin, while they used the following explanatory variables; equity and tangible equity as measures for capital structure, liquid assets and loans as measures for liquidity, and deposits in addition to overheads for

liability. Their outcomes showed that the financial crisis had an inverse effect on profitability of both Islamic and conventional banks but the Islamic banks were higher profitable than conventional bank during the period of the financial crisis but not statistically significant effect. The profitability determinants operated differently for Islamic and conventional banks during the crisis. They found that the Islamic banks had preferable capital structure than the conventional banks during the financial crisis whilst the conventional banks had preferable liquidity and liability ratios than the Islamic banks.

Dietrich and Wanzenried (2013) studied the determinants of commercial banking profitability in low, middle, and high-income countries of 10,165 commercial banks across 118 countries over the period from 1998 to 2012 using a wide bank-level data and the GMM estimator technique. The study results concluded that banking profitability all over the world varies widely as commercial banks have to cope with different macroeconomic circumstances, different institutional realities and different tax policies. They found that underdeveloped countries with low-income tend to be less competitive as suggested by their relatively high profitability. The higher country's income goes together with tougher competition and a higher efficiency in the capital allocation measured by the loan loss provisions to total assets ratio, however with a less profitability.

A study conducted by Elsiefy (2013) investigated the determinants of profitability of conventional and Islamic banks in Qatar during the period 2006-2011 used least squares regression using three profitability indicators; ROA, ROE, NIM. His empirical results showed that whereas capital strength and cost efficiency have inverse effect on conventional banks' profits, liability management and exposure to real states loans demonstrate positive effect on profitability. On the other hand, liquidity showed negatively effect on Islamic banks' profitability in Qatar. Unlike conventional banks, Islamic banks' outcomes analysis showed that higher liquidity is associated with higher profits. Regarding to external variables, none of the market structure and macroeconomic variables were found to have any effect on the profitability of any bank except for the negative impact of customer loans market share on Islamic banks' profitability. Finally, the study revealed that the determinants of profitability vary widely between conventional and Islamic banks in Qatar.

Moreover, Kanwal and Nadeem (2013) examined the impact of macroeconomic variables public limited commercial banks' profitability in Pakistan for years 2001- 2011. Commercial banks listed on Karachi Stock Exchange (KSE) are used in the given sample dataset because KSE has the greatest number of commercial banks registered with it. They found that the selected macroeconomic factors do not contribute noticeably to the profits of number of banks in their sample, so in order to escalate the risk-adjusted returns banks have to concentrate further on other external factors or devise policies such as exchange rate, Income level imports exports and tax rates in order to improve the internal factors.

A successive study presented by Adeusi et al., (2014) examined determinants of commercial

Nigerian banks' profitability from 2000 to 2013 using OLS through random effect and fixed effect models. Return on Assets was used as dependent variable, while Capital Adequacy Ratio, Asset Quality, Management Efficiency, Liquidity Ratio, Inflation, and Gross Domestic Product were used as independent variables. Their findings showed that asset quality, management efficiency, and Nigeria's economic growth are statistically significant on commercial banks' profitability and represent the major determinants of banks' profitability.

Another research conducted by Bejaoui and Bouzgarrou (2014) studied the determinants of Tunisian banks profitability; they used the dynamic panel data through Generalized Method of Moment system over the period started from1999 till the end of 2010. They used ROA and ROE as a proxy of banks profitability, whilst capital, intermediation margin, operating efficiency, liquidity risk and credit risk as bank specific factors affecting banks profit. They found that there is significant a positive relationship between capital and profitability while the liquidity risk management showed that the overuse of deposits to finance loans is likely to weigh on banks' profitability and they also found that credit risk management is negatively related to banks' profitability.

An important study presented by Chinoda (2014) examined the determinants of commercial banks' profitability in Zimbabwe; he believed that internal factors are the essential determinants of banks' profitability moreover the great effect of macroeconomic factors. He used ROA and ROE as a proxy of banks' profitability, whereas size, liquidity and expense management as internal factors affecting banks profitability in addition to GDP and inflation as external factors affecting banks' profitability. The results of his study indicated that Liquidity, size, GDP growth rate and inflation has a positive relationship with ROA, whereas there was a negative relationship between expense management and ROA. Regarding to ROE, there was a negative relationship between expense management and liquidity with ROE in addition to strong positive relationship between size and inflation with ROE, whilst GDP showed a low positive relationship with ROE.

A distinctive study employed by Genic et al., (2014) investigated factors drives the profitability of Bosnia and Herzegovina banking sector. They found that there is a significant relationship between profitability and liquidity, cost efficiency and capital adequacy ratio. Only cost efficiency and management of credit risk were indicators that significantly affect the ROAE. Some variance in little variables is the result of global economic and financial crisis of 2008 that inversely affected banks' profitability and lending operation and up to the middle of 2010, high ROAE achieved when the banks increase the effectively manage operating costs, employment of capital, increase the share of deposits in financing loans and improve non lending operation.

In addition, Kiganda (2014) examined Effect of Macroeconomic Factors on Commercial Banks Profitability in Kenya from 2008- 2012 using OLS model. Real GDP, inflation and exchange rate were used as independent variables, while ROA was used

as a proxy of banks profitability. His results indicate that economic growth (real GDP), Inflation, exchange rate and bank profitability (ROA) are normally distributed, weak insignificant positive correlation between GDP, inflation and exchange rate and banks' profitability.

Finally, Touny (2014) investigated macroeconomic determinants of banking sector expansion with a comparing study between Saudi Arabia and Egypt. The study employed annual data series which were sourced from the World Bank database. The sample period covered was from 1977 to 2012 for Egypt and from 1984 to 2012 for Saudi Arabia. The bank credit ratio to the private sector as a percent of GDP (BCP) is used as a proxy of banking sector development. The study results pointed out that economic growth seems to have a long-run negative impact on credit to the private sector, since financial liberalization and real interest rate scored a significant positive impact on credit to the private sector in both Saudi Arabia and Egypt. Economic globalization has a significant positive effect in Saudi Arabia.

3. STATEMENT OF THE PROBLEM AND THE RESEARCH OBJECTIVES

This section focuses on the problem of the current research in addition to its main objectives.

3.1. Statement of the Problem

Different empirical studies in different regions have studied the bank's profitability and some of them addressed the financial crisis effect on banks profitability. Global financial crisis has affected inversely the majority of the world economy and specially banking sector. After the financial crisis, Egypt and different Arab countries faced more than one revolution which affected banking system and strategy as well.

Consequently, the research problem can be recapped in the following questions;
- To what extent the impact of the main drivers of Egyptian banks' profitability has been changed before and after financial crisis?

3.2. Research Objectives

The main purpose of this study is to;
- Examine the impact of financial and industry factors of banks on Egyptian banks profitability.
- Investigate, separately, the determinants of Egyptian banks profitability before and after financial crisis.
- Investigate, jointly, the determinants of Egyptian banks profitability before and after financial crisis.

4. RESEARCH METHODOLOGY AND DESIGN

The main theme of this section is to explore the conceptual framework of the study, moreover focusing on identifying the statistical explanatory model of banking profitability and developing the research hypotheses based on literature and literature review.

4.1. Population and sample

We used data for all the 11 banks listed in the Egyptian Stock Exchange. The data were collected from Egyptian Stock Market and statistical bulletins published through Central Bank of Egypt website. The sample period spans from Jan., 2004 to Dec., 2013 in a quarterly basis.

4.2. Methodology and Model Variables

Due to the literature review findings and the research problem, we selected the important variables which could explain determinants of banks' profitability and the following are the endogenous and exogenous variables employed for the analysis. GMM estimation was formalized by Hansen (1982), and since has become almost the most widely used methods of estimation for models in economics and finance. It is an estimation method that allows economic models to be specified while avoiding often unwanted or unnecessary assumptions, such as specifying a particular distribution for the errors and does not require complete knowledge of the distribution of the data. Only specified moments derived from an underlying model are needed for GMM estimation. Its estimation provides a straightforward way to test the specification of the proposed model. GMM is a dynamic panel data method uses lagged values of explained variable as instrumental variable to fix the problem of fix heteroscedasticity and autocorrelation and thus, endogeneity. For this aim, researcher applied GMM on the panel data which is comprised of 11 banks' financial statements over the period started from 2004 to 2013 in a quarterly basis.

4.3. Regression Model

$$Y\ it = \beta 0 + \lambda yi(t\text{-}1) + \beta 1 X1\ it\text{-}\beta 2 Xit\text{-}\beta 3 X3\ it + \beta 4 X4\ it\text{-}\beta 5 X5\ it + \beta 6 X6\ it + \beta 7 X7\ it + \beta 8 X8\ it + \text{\Euro} it \quad (1)$$

where:

Y it denotes return on asset and return on equity for bank i at time t,

$\beta 0$ denotes constant,

λ denotes constant of lag variables

$yi(t\text{-}1)$ denotes lagged dependent variable,

X1 denotes capital adequacy for bank i at time t,

X2 denotes ratio of credit quality for bank *i* at time t,

X3 denotes ratio of deposits to asset for bank i at time t,

X4 denotes equity growth minus loan growth rate for bank i at time t,

X5 denotes ratio of loans to asset rate for bank i at time,

X6 denotes ratio of operating income to asset for bank i at time t,

X7 denotes asset share ratio for bank i at time t,

X8 denotes ratio of banks assets to GDP for bank i at time t,

i = 11 listed Banks in Egyptian stock of exchange,

t = Jan., 2003 to Sep., 2008 and Oct., 2008 to Dec., 2014,

$\text{\Euro} it$ = Error term.

4.3.1. The Dependent and Independent Variables

The model and the analysis variables have been developed according to the literature review. Table 1 illustrates the study variables, variables indicators, how they were calculated and the expected relation. We will briefly explain each variable a long with the significant indication of each variable and the expected relationships.

Table 1. The Model variables

Variables	Measure
Dependent Variables	
D1 Return on Assets (ROA)	Net Income/Total Assets
D2 Return on Equity (ROE)	Net Income/Total Equity
Internal Explanatory	
V1 Capital Adequacy	Equity/Total Assets
V2 Credit quality	Loan provisions/Total Net loans
V3 Deposits to total assets ratio	Total Deposits/Total Assets
V4 Equity growth minus loan growth rate	[(Shareholder's Equity t - Shareholder's Equity t-1)/ Shareholder's Equity t-1] - [(Total loans t - Total loans t-1)/ Total loans t-1]
V5 Loans to asset rate	Total Net loans/Total assets
V6 Operating income to asset Ratio	Operating Income/Total Assets
V7 Asset share ratio	Bank asset/Total assets of Egyptian Banks
V8 BA to GDP	Total assets of Egyptian banks/ GDP

Dependent Variables:

- *Return on Assets (D1 ROA) = Net Income/Total Assets*

ROA is a good indicator of bank's financial performance and managerial efficiency. The higher ratio of (ROA) expresses an efficient use of assets of the bank and better managerial performance while a lower ratio means inefficient use of assets (Growe et al., 2014; Alper and Anbar, 2011; Ana and Roberto, 2011; Oslan and Zoubi, 2011; Mirzaei and Mirzaei, 2011; Liu and Wilson, 2010; Sufian and Chong, 2008).

- *Return on Equity (D2 ROE) = Net Income/Total Equity*

ROE is the profitability indicator calculated as the net income to total equity. This ratio tells us that how efficient a bank is able to generate profit from the money that had been invested by shareholders. The higher the ratio of (ROE) expresses an efficient use of equity of the firm and better managerial performance (Growe et al., 2014; Alper and Anbar, 2011; Oslan and Zoubi, 2011; Mirzaei and Mirzaei, 2011).

Independent Variables:

- *Capital adequacy (V1)= Equity / Total Assets*

The ratio of equity to total assets (CA) is considered one of the basic ratios for capital strength. A strong capital structure is mandatory for financial institutions, especially in developing economies as it provides further strength to with-stand financial crises and elevated safety for depositors midst unstable macroeconomic conditions. Moreover, lower capital ratios in banking signify higher risk and leverage, and therefore higher borrowing costs. Thus, profitability level should be higher for better capitalized banks. Equity

to total assets ratio is expected to have positive relation with performance that well-capitalized banks face lower costs of going bankrupt which reduces their costs of funding and risks (Growe et al., 2014; Alper and Anbar, 2011; Oslan and Zoubi, 2011).

- *Credit quality(V2)= Loan provisions / Total Net loans*

Changes in credit risk may reflect changes in the health of a bank's loan portfolio (Cooper et al., 2003), which may affect the performance of the institution. Miller and Noulas (1997) stated that the high financial institutions are exposed to more risk loans, the higher the accumulation of unpaid loans and the les the profitability.

- *Deposits to total asset (V3) = Total Deposits / Total Assets*

Due Central Bank of Egypt indicators in measuring liquidity, the higher this percentage the more liquid the bank is. Insufficient liquidity is one of the major reasons of bank failures. However, holding liquid assets has an opportunity cost of higher returns. There is a significant link between bank liquidity and profitability (Alper and Anbar, 2011; Ana et al., 2011).

- *Equity Growth minus loan Growth rate (V4) = [(Shareholder's Equity t -Shareholder's Equity t-1)/ Shareholder's Equity t-1] – [(Total loans t - Total loans t-1)/ Total loans t-1]*

One of capital ratios used as a proxy of capital strength. Its expected that relationship with banks profitability is negative relationship (Growe et al., 2014).

- *Loan to asset rate (V5) =Total Net loans / Total assets*

One of asset quality indicator as it measures the income source of banks and it is supposed to increase bank profitability, otherwise bank takes on undesired level of risk. It is used a proxy of bank specific lending intensity. Moreover, Bank loans are expected to be the leading source of revenue and are predicted to affect banks performance positively. At strong economy periods, only tiny percentage of loans will default. Furthermore, banks may be negatively affected during a low economy because of borrowers are likely to default on their loans (Oslan and Zoubi, 2011; Sufian et al., 2009).

- *Operating income to total asset(V6)= Operating Income/ Total Assets*

The ratio of operating income to total asset measuring asset management efficiency, it is an important measure of bank efficiency as it focuses on the profit earned on interest activities. Its expected relationship with banks profitability is positive relationship (Alper and Anbar, 2011).

- *Asset share ratio (V7) = Bank asset / Total assets of Egypt Banks*

Bank Assets to total assets of all Egyptian banks as indicator of the market power of each bank. It is expected that the higher market share of the banks, the higher banks profitability (Liu and Wilson, 2010; Mirzaei and Mirzaei, 2011).

- *Banks assets to GDP (V8) = Total assets of Egyptian banks / Egyptian GDP*

The relative size of the banking system to the entire Egyptian economy, calculated through the Total assets of Egyptian banks to Egyptian GDP in a quarterly basis. The expected relationship between banks assets to GDP and banks profitability is positive relationship (Growe et al., 2014).

4.4. Developing research hypotheses

Due to numerous studies (Growe et al., 2014; Alper and Anbar, 2011; Oslan and Zoubi, 2011; Mirzaei and Mirzaei, 2011), there is a significant statistical relationship between determinants of banks profitability and banks' profitability before and after financial crisis. Accordingly to; we can state the first hypothesis as

H1: "There is a significant relationship between the study explanatory variables (banks assets to GDP, capital adequacy, credit quality, equity to loan growth rate, deposits to total asset, loan to asset rate, market share ratio and operating income to total asset) and banks' profitability before and after financial crisis"

Most of the previous researchers found that there is a significant relationship between banking profitability as dependent variable and Bank Specific as independent variables, which are: credit quality, capital adequacy, operating income to asset rate, equity to loan growth rate, deposits to asset rate, loan to asset rate, market share and Egyptian banks' assets to GDP rate. Accordingly, the second hypothesis is stated as

H2: "All the independent variables, jointly, have equal relative impact on banks' profitability before and after financial crisis"

5. DATA ANALYSIS AND TESTING HYPOTHESES

The main objective of this section is to investigate and explain variables descriptive statistics in addition to test the research hypotheses.

5.1. Descriptive analysis

The following Table 2 shows the descriptive statistics for all variables indicating mean, median, maximum number, minimum number, standard deviation and number of observations at the entire period, pre-crisis period and post-crisis period.
Table 2 indicates that regarding to the entire period, except equity growth minus loan growth rate, the mean of all variables are near to their medians which denote the normality of the data. In the sample, the mean recorded 0.03% and .3% for return on asset and return on equity respectively, the mean of capital adequacy ratio registered .9%. Regarding to standard deviation, the majority of all variables are close to zero which indicates that the data achieves a low level of dispersion and the small standard deviation refers to the data set is disposed to be close to the mean and vice versa. Regarding to pre-crisis period, all variables means are near to their medians except equity growth minus loan growth rate, which denote the normality of the data. In the sample, the mean recorded 0.03% and .29% for return on asset and return on equity respectively. With reference to standard deviation, the majority of all variables are close to zero which indicates that the data achieves a low level of dispersion.

Table 2. Descriptive Statistics

	Entire Period					Pre-crisis Period					Post-Crisis Period				
	Mean	Median	Maximum	Minimum	Std. Dev.	Mean	Median	Maximum	Minimum	Std. Dev.	Mean	Median	Maximum	Minimum	Std. Dev.
ROA	0.00	0.00	0.03	-0.03	0.01	0.00	0.00	0.03	-0.02	0.01	0.00	0.00	0.02	-0.02	0.01
ROE	0.03	0.04	0.33	-0.23	0.05	0.03	0.03	0.33	-0.23	0.06	0.04	0.05	0.14	-0.17	0.05
Cap adeq.	0.10	0.09	0.31	0.02	0.05	0.09	0.08	0.31	0.02	0.05	0.11	0.10	0.29	0.04	0.04
Cre qual.	0.17	0.11	0.57	0.00	0.15	0.17	0.13	0.50	0.00	0.12	0.17	0.11	0.57	0.03	0.17
Dep to Asset	0.91	0.93	0.99	0.56	0.07	0.91	0.93	0.98	0.67	0.07	0.91	0.92	0.99	0.56	0.06
Equity g minus loan g	0.01	0.00	0.99	-0.57	0.18	0.01	0.00	0.91	-0.50	0.19	0.02	0.01	0.99	-0.57	0.17
Loan rate	0.43	0.44	0.80	0.08	0.12	0.44	0.45	0.80	0.18	0.13	0.41	0.42	0.66	0.08	0.10
Op income to asset	0.02	0.02	0.04	0.00	0.00	0.02	0.02	0.04	0.00	0.00	0.02	0.02	0.03	0.01	0.00
Asset share	0.02	0.01	0.07	0.00	0.02	0.02	0.01	0.05	0.00	0.01	0.02	0.01	0.07	0.00	0.02
Bank Assets to GDP	1.25	1.22	1.51	0.96	0.21	1.46	1.46	1.51	1.38	0.04	1.06	1.02	1.23	0.96	0.09

Post crisis period shows that all variables means are near to their medians which denote the normality of the data and also equity growth minus loan growth was become more normal than pre-crisis period. In the sample, the mean recorded 0.04% and .4% for return on asset and return on equity respectively, the mean of capital adequacy ratio registered 10% With reference to standard deviation, the majority of all variables are close to zero which indicates that the data achieves a low level of dispersion.

5.2. Testing Hypotheses

The following section assigned to test the study hypotheses in addition to discuss the findings.

5.2.1. Testing Hypothesis one which stated that

"There is a significant relationship between the study explanatory variables (banks assets to GDP, capital adequacy, credit quality, equity to loan growth rate, deposits to total asset, loan to asset rate, market share ratio and operating income to total asset) and banks' profitability before and after financial crisis"

Pearson's correlation test is used to explore the relationship between determinants of banks' profitability and banks' profitability ratios.

Table 3. Correlation Test for Entire Period

	ROA	ROE	CA	CQ	DA	EGLGR	LR	OIAR	Asset share	BA to GDP
ROA	1.000									
ROE	0.895 ***	1.000								
Capital Adeq.	0.324 ***	0.110 **	1.000							
Credit Qual.	-0.302 ***	-0.341 ***	-0.030	1.000						
Deposit to Asset	-0.055	-0.008	0.161 ***	0.070	1.000					
Equity Growth minus Loan Growth	0.048	0.077	0.019	0.047	-0.009	1.000				
Loan Rate	-0.174 ***	-0.162 ***	-0.272 ***	-0.393 ***	-0.351 ***	-0.040	1.000			
Operating Income to Asset	0.280 ***	0.225 ***	0.175 ***	-0.163 ***	0.208 ***	-0.002	-0.210 ***	1.000		
Asset Share	0.329 ***	0.349 ***	-0.173 ***	-0.365 ***	0.050	0.046	0.195 ***	-0.006	1.000	
Bank Assets to GDP	-0.163 ***	-0.153 **	-0.111 **	0.018	-0.007	0.002	0.180 ***	-0.447 ***	-0.160 ***	1.000

*Note: *** Correlation is significant at the 0.01 level; ** Correlation is significant at the 0.05 level; * Correlation is significant at the 0.10 level.*

Table 3 illustrates the following:
- Banks Profitability: The majority of explanatory variables are significantly correlated with the at least one of profitability ratios except deposit to asset rate and equity growth minus loan growth rate.
- Capital adequacy: is significantly positively correlated with the two profitability ratios employed in the current research.

- Credit quality: is significantly negatively correlated with both profitability ratios conducted in the current research.
- Deposits to total asset: is insignificantly correlated with the profitability ratios.
- Equity growth minus loan Growth rate: is insignificantly correlated with the profitability ratios.

- Loan to asset rate: is significantly negatively correlated with the profitability ratios.
- Operating income to total asset: is significantly positively correlated the two profitability ratios employed in the current research.

- Asset share ratio: is significantly positively correlated with profitability ratios at the three different periods.
- Banks assets to GDP: is significantly negatively correlated with both profitability ratios.

Table 4. Correlation test for pre-crisis period

	ROA	ROE	CA	CQ	DA	EGLGR	LR	OIAR	Asset share	BA to GDP
ROA	1.000									
ROE	0.882***	1.000								
Capital Adeq.	0.397***	0.190***	1.000							
Credit Qual.	-0.042	-0.168***	0.214***	1.000						
Deposit to Asset	-0.002	-0.046	0.204***	0.178***	1.000					
Equity Growth minus Loan Growth	0.110**	0.152***	0.052*	-0.005	0.063	1.000				
Loan Rate	-0.321***	-0.190***	-0.604***	-0.412***	-0.458***	0.007	1.000			
Operating Income to Asset	0.168***	0.109**	0.213***	-0.113**	0.286***	0.043	-0.240***	1.000		
Asset Share	0.202***	0.310***	-0.272***	-0.480***	-0.179***	0.040	0.290***	-0.047	1.000	
Bank Assets to GDP	-0.040	0.023	-0.043	-0.022	0.002	0.120**	0.130**	-0.148**	-0.107**	1.000

*Note: *** Correlation is significant at the 0.01 level; ** Correlation is significant at the 0.05 level; * Correlation is significant at the 0.10 level.*

Table 4 shows the following:
- Banks Profitability: The majority of explanatory variables are significantly correlated with the at least one of profitability ratios except deposit to asset rate and equity growth minus loan growth rate.
- Capital adequacy: is significantly positively correlated with both profitability ratios used at the current research.
- Credit quality: is significantly negatively correlated with ROE and insignificantly correlated with ROA.
- Deposits to total asset: is insignificantly correlated with the profitability ratios.

- Equity growth minus loan Growth rate: is significantly positively correlated with the two profitability ratios.
- Loan to asset rate: is significantly negatively correlated with the profitability ratios.
- Operating income to total asset: is significantly positively correlated the two profitability ratios employed in the current research.
- Asset share ratio: is significantly positively correlated with profitability ratios at the three different periods.
- Banks assets to GDP: is insignificantly correlated with both profitability ratios.

Table 5. Correlation test for post-crisis period

	ROA	ROE	CA	CQ	DA	EGLGR	LR	OIAR	Asset share	BA to GDP
ROA	1.000									
ROE	0.895***	1.000								
Capital Adeq.	0.174***	-0.065	1.000							
Credit Qual.	-0.548***	-0.506***	-0.132**	1.000						
Deposit to Asset	0.150**	0.062	0.086	-0.004	1.000					
Equity Growth minus Loan Growth	0.014	0.021	0.034	0.107	0.025	1.000				
Loan Rate	0.081	-0.088	0.213***	-0.429***	-0.186***	-0.161***	1.000			
Operating Income to Asset	0.337****	0.299***	0.008	-0.226****	0.119**	-0.015*	-0.082	1.000		
Asset Share	0.428 ***	0.374****	-0.153**	-0.302****	0.243****	0.036	0.176***	-0.112**	1.000	
Bank Assets to GDP	-0.051	-0.078	0.135**	-0.002	0.010	-0.007	0.136**	-0.630****	-0.041	1.000

*Note: *** Correlation is significant at the 0.01 level; ** Correlation is significant at the 0.05 level; * Correlation is significant at the 0.10 level.*

Table 5 illustrates that:
- Banks Profitability: The majority of explanatory variables are significantly correlated with the at least one of profitability ratios except deposit to asset

rate and equity growth minus loan growth rate.
- Capital adequacy: is significantly positively correlated with the ROA and insignificantly correlated with ROE.

- Credit quality: is significantly negatively correlated with both profitability ratios conducted in the current research.
- Deposits to total asset: is significantly positively correlated with the ROA and insignificantly correlated with ROE.
- Equity growth minus loan Growth rate: is insignificantly correlated with the profitability ratios.
- Loan to asset rate: is insignificantly correlated with the profitability ratios.
- Operating income to total asset: is significantly positively correlated the two profitability ratios employed in the current research.
- Asset share ratio: is significantly positively correlated with profitability ratios at the three different periods.
- Banks assets to GDP: is insignificantly correlated with both profitability ratios.

5.2.2. Testing Hypothesis Two

H2 Stated that: "All the independent variables, jointly, have equal relative impact on banks profitability before and after financial crisis in Egypt".

The analysis used the panel data as it the best tool to analyze both cross-sectional and time-series data. The data set covers 11 banks out of 40 banks in Egypt covering 10 years started from 2004 to 2013. Our data base contains quarterly financial data from listed banks in Egyptian Stock Exchange. GMM method is used through Eviews software because literature suggests that it is the best valid method where variables show stable relationship across the banks (Liu and Wilson, 2010). We followed (Blundell and bond 1998; Garcia-Herrero et al. 2009; Dietrich and Wanzenried 2011; Grower al. 2014) in using GMM.

Jarque-Bera test employed to test data normality and showed that all variables are normally distributed. Koizumi et al. (2009) stated that Jarque-Bera tests for assessing multivariate normality.

The Variance Inflation Factor (VIF) test was used to detect multicollinearity. We found that there is no any multicollinearity between all explanatory variable and banks' profitability ratios as showed on tables 6 and 7. Hair et al., (2006) stated that up to 10 in VIF indicates that there is no multicollinearity.

The following Table 6 shows the multiple regression analysis model results and the goodness of fit statistics of the ROA model.

Table 6. ROA Model using GMM

Variable	Pre-Crisis			Post-Crisis			Entire Period		
	Coeff.	Prob.	VIF	Coeff.	Prob.	VIF	Coeff.	Prob.	VIF
Explanatory									
Lag ROA	-0.009	0.903	1.300	0.416	0.000	2.770	0.231	0.000	1.620
Capital Adeq.	0.030	0.140	1.870	0.021	0.100	1.340	0.029	0.100	1.290
Credit Qual.	-0.004	0.475	1.560	-0.009	0.000	2.310	-0.009	0.000	1.650
Deposit to Asset	-0.021	0.004	1.460	-0.007	0.008	1.290	-0.017	0.000	1.290
Equity Growth minus Loan Growth	0.003	0.219	1.050	0.001	0.682	1.060	0.002	0.145	1.020
Loan Rate	-0.011	0.035	2.380	-0.009	0.000	1.580	-0.011	0.000	1.620
Operating Income to Asset	0.342	0.012	1.240	0.512	0.000	3.200	0.401	0.000	1.550
Asset Share	0.111	0.027	1.570	0.052	0.000	1.880	0.055	0.000	1.490
Bank Assets to GDP	0.011	0.328	1.060	0.007	0.073	2.450	0.004	0.200	1.360
Model Goodness of Fit Statistics	**Pre-Crisis**			**Post-Crisis**			**Entire Period**		
R Squared		0.189			0.721			0.469	
Durbin-Watson Stat.		2.111			2.176			2.171	
Prob. (J-Test)		0.000			0.000			0.000	
Total Observations		177			190			400	

With regard to the overall model results displayed in Table 6, R squared result denotes in the pre-crisis period, the independent variables explains 19% of ROA model variance and F-test approved that the model is significant. At the post-crisis period, R squared result denotes that the independent variables measure 72% of ROA model and F-test approved that the model is significant.

Regarding to the entire sample period, R squared result denotes that the independent variables measure 47% of ROA model variance and F-test approved that the model is significant. Standard Error of regression is 0.005 for the pre-crisis period, 0.003 for the post crisis period and 0.004 for the entire period which showed that a very weak value of standard error of regression which is better because it indicates that the observations are closer to the fitted regression line. Field (2009) stated that Durbin-Watson is a test for serial correlations between errors; it tests whether adjacent residuals

are correlated, and if its values closer to 2 may still be problematic and thus, there is no autocorrelation between variables in the three periods given in our research; it recorded 2.1 in pre-crisis periods, 2.1 in post-crisis period and 2.1 in the entire period.

Tables 7 show the multiple regression analysis statistical results and the goodness of fit statistics of the ROE model.

With reference to the overall model results displayed in Table 7, R squared result denotes in the pre-crisis period, the independent variables measure 27% of ROE model and F-test approved that the model is significant. At the post-crisis period, R squared result denotes that the independent variables measure 63% of ROE model and F-test approved that the model is significant. As for the entire sample period stated that credit quality, R squared result denotes that the independent variables measure 36% of ROE model and F-test approved that the model is significant.

Table 7. ROE Model Using GMM

Variable	Pre-Crisis			Post-Crisis			Entire Period		
	Coeff.	Prob.	VIF	Coeff.	Prob.	VIF	Coeff.	Prob.	VIF
Explanatory									
Lag ROE	0.090	0.191	1.300	0.553	0.000	1.940	0.254	0.000	1.410
Capital Adeq.	0.126	0.220	1.730	-0.062	0.224	1.200	0.054	0.260	1.140
Credit Qual.	-0.057	0.168	1.540	-0.052	0.005	2.070	-0.088	0.000	1.560
Deposit to Asset	-0.136	0.034	1.360	-0.006	0.877	1.310	-0.091	0.009	1.260
Equity Growth minus Loan Growth	0.040	0.052	1.040	0.018	0.126	1.080	0.022	0.051	1.010
Loan Rate	-0.149	0.001	2.190	-0.050	0.038	1.870	-0.120	0.000	1.640
Operating Income to Asset	1.200	0.366	1.210	2.487	0.023	2.720	1.574	0.039	1.480
Asset Share	1.460	0.000	1.630	0.323	0.022	1.800	0.752	0.000	1.510
Bank Assets to GDP	0.169	0.118	1.080	0.045	0.210	2.380	0.003	0.817	1.390
Model Indicators	Pre-Crisis			Post-Crisis			Entire Period		
R Squared		0.272			0.633			0.366	
Durbin-Waston Stat.		2.061			2.390			2.082	
Prob. (F-Test)		0.000			0.000			0.000	
Total Observations		168			180			378	

Standard Error of regression is 0.05 for the pre-crisis period, 0.02 for the post crisis period and 0.04 for the entire period which showed that a very weak value of standard error of regression which is better because it indicates that the observations are closer to the fitted regression line. Regarding to Durbin-Watson test, the autocorrelation between variables is not found in the three periods given in our research; it recorded 2.0 in pre-crisis, 2.3 in post-crisis and 2.0 in the entire period.

The multiple regression model results showed the following:

- Lag ROA: Is positively correlated with ROA at the three periods used in the analysis. The positive relationship between ROA and lag ROA is consistent with the results of Ana et al. (2011), Dietrich and Wanzenried (2013), Béjaoui and Bouzgarrou (2014) and Growe et al. (2014).

- Lag ROE: is positively correlated with ROE at the three periods used in the current study. The positive relationship between ROE and lag ROE is consistent with the results of Ana et al. (2011), Dietrich and Wanzenried (2013), Béjaoui and Bouzgarrou (2014) and Growe et al. (2014).

- Capital adequacy: is not significantly correlated with ROA at the three periods employed in the current study. And also it is not significantly correlated with ROE at the three periods employed in the current study as the rate of capital adequacy at all periods and in all banks has not a remarkable change due to the Central Bankcontrol and also as the debt increase the profitability decrease. The insignificant relationship result between capital adequacy and banks' profitability is similar to the result of Alper and Anbar (2011).

- Credit quality: is negatively correlated with ROA at post-crisis period and entire period as well, whereas it recorded insignificant correlation with ROA at the pre-crisis period. It also registered a negatively significantly correlated with ROE at post-crisis period and entire period as well, whereas it registered insignificant correlation with ROE at the pre-crisis period due to the increasing in loan provision that affect inversely on profitability and also after crisis, Egyptian banks concentrated on credit quality importance. The negative relationship between credit quality and banks' profitability is similar to the results of Sufian, and Chong (2008), Ana et al. (2011), Mirzaei and Mirzaei (2011), Zhang and Daly (2013) and Béjaoui and Bouzgarrou (2014).

- Deposits to total asset: it registered a negatively

correlation with ROA and ROE at the three periods employed in the current study due to low investment opportunities in the majority of Egyptian banks. The negative sign between deposit to asset rate and banks' profitability is consistent with the result of Alper and Anbar (2011) and on the contrarian to the result of Ana et al. (2011).

- Equity Growth minus loan Growth rate: is insignificantly correlated with ROA and ROE at the three periods employed in the current study. The result contradicts with the result displayed on the study of Growe et al. (2014).

- Loan to asset rate: is negatively correlated with ROA at the three periods employed in the current study. And it recorded a negatively significantly correlated with ROE at the three periods employed in the current study due to low investment tools in the majority of Egyptian banks. The negative relationship between loans to asset rate and banks' profitability is consistent with the results of Sufian and Habibullah (2009), Liu and Wilson (2010), Alper and Anbar (2011), Ana et al. (2011) and Growe et al. (2014).

- Operating income to total asset: is positively correlated with ROA at the three periods employed in the current study. And it showed a positively significantly correlated with ROE except pre-crisis it recorded insignificant correlation with ROE in the current study. The positive relationship between operating income to asset ratio and banks' profitability is similar to the results of Alper and Anbar (2011). The positive relationship between asset share and banks' profitability is in contrarian to the result of Liu and Wilson (2010) and Mirzaei and Mirzaei (2011).

- Asset share ratio: is positively correlated with ROA at the three periods employed in the current study. And also it is positively significantly correlated with ROE at the three periods used in the current study due to the increase in the market share. The positive relationship between asset share and banks' profitability is in contrarian to the result of Liu and Wilson (2010) and Mirzaei and Mirzaei (2011).

- Banks assets to GDP: is insignificantly correlated with ROA and ROE at the three periods employed in the current study due the bit effect of the industry factors on the banks' profitability. The output contradicts the result of the study of Growe et al. (2014).

6. CONCLUSION AND FUTURE RESEARCH

6.1. Conclusion

This research investigates the determinants of Egyptian banks' profitability in three periods; pre-crisis period, post crisis period in addition to both of the same using a dynamic statistical model; Generalized Method of Moments (GMM) through Eviews software. The analysis showed that the majority of outcomes are consistent with the previous research results especially research applied on the developing countries. The results show that there is no essential difference in the banks' profitability between both periods; pre-crisis period and post-crisis period due to high restrictions applied on Egyptian banks. This result gave the banking sector the power to overcome global financial crisis without a negative effect, while there is a remarkable differences between the impact of the banks' independent variables on the profitability at both of the two periods which reflects the alteration of Egyptian banks policies and also this deviation indicates that the model used in the present research was more stronger in the post-crisis period than pre-crisis counterpart. The performance of the Egyptian banks were very good after the financial crises.

Actually, the main findings of the current research conclude that R squared result denotes that the explanatory variables measure 19% of ROA model at the pre-crisis period while R squared result denotes that the explanatory variables measure 72% of ROA model at the post-crisis period showing a noteworthy positive increasing in R squared which illustrate the reliability of the model used in the current research after the financial crisis. With reference to ROE model, R squared raised from 27% to 63% after financial crisis. The empirical outcome of both periods show the alteration of the significance effect of the exogenous variables on the explained variables before and after financial crisis; credit quality converted to become significant at the post-crisis in both ROA and ROE model and lag ROE and management efficiency were converted to be significant in ROE model at post-crisis period due to the change of banking sector policies after financial crisis in order to improve banks' management efficiency. Liquidity was not become significant at post-crisis period in both ROA and ROE model.

Overall, the empirical outcomes suggested that after financial crisis period, the majority of the determinants of the banks influence their profitability are consistent with our expectation. The results prove that Egyptian banks with higher capital strength, asset share and efficient management exhibit higher profitability level, whilst Egyptian banks with higher credit risk and loans intensity exhibit lower profitability level. GMM in data analysis approved that the majority of R squared results recorded a higher rate in using GMM than OLS in addition to more accurate results due to its advantage in fixing autocorrelation which appeared in the result of Durbin-Watson test.

6.2. Recommendations

- Banks should take an interest and monitoring these variables in order to improve its profitability levels, especially, quality of credit, loan intensity and management efficiency.
- The central bank should continue setting its retraction rules that hedge the Egyptian banks' operation from facing unexpected crisis.
- The central bank should encourage the Egyptian banks to increase their investment opportunities and not depend only on loans.

6.3. Future researches

The following topics are proposed for future research
- Drivers of banks' Profitability before and after financial crisis in MENA Region
- The effect of industry factors on banks' performance in Egypt comparing to MENA region.

REFERENCES

1. Agustini, M. and Viverita, 2011. Factors Influencing the Profitability of Listed Indonesian Commercial Banks Before and during financial Global Crisis. Indonesian Capital Market Review, Vol. IV.
2. Alper, D. and Anbar, A., 2011. Bank Specific and Macroeconomic Determinants of Commercial Bank Profitability: Empirical Evidence from Turkey. Business and Economics Research Journal, Vol. 2, p.p. 139-152.
3. Amba, M.S. and Almukharreq, F. 2013. Impact of the Financial Crisis on Profitability of the Islamic Banks vs. Conventional Banks- Evidence from GCC. International Journal of Financial Research, Vol. 4.
4. Béjaoui, R. and Bouzgarrou, H., 2014. Determinants of Tunisian Bank Profitability. The International Journal of Business and Finance Research, Vol. 8, p.p. 121-131.
5. Bashir, A., 2000. Assessing the Performance of Islamic Banks: Some evidence from the Middle East. Working Paper, ERF 8th Meeting in Jordan.
6. Chinoda, T., 2014. The Determinants of Commercial Banks Profitability in Zimbabwe (2009-2014). IOSR Journal of Economics and Finance, Vol. 5, p.p. 69-80.
7. CBE Evidence, 2014. Central Bank of Egypt publication. [Online] Available at: <http://www.cbe.org.eg/English/Economic+Research/Publications/>. [Accessed 10 October 2014].
8. Daradkah, D. and Miani, S., 2011.The Banking Industry in Egypt. Transition Studies Review, Vol. 8, p.p. 65-84.
9. Growe, G., Debruine, M., Lee, J. and Maldonado, J., 2014. The profitability and performance measurement of U.S. Regional banks using the predictive focus of the "fundamental analysis". Advances in Management Accounting, Vol. 24.
10. El-Shazly, A., 2009. Efficiency measures for banking groups in Egypt. Working paper 148, The Egyptian Center for Economic Studies, Cairo, Egypt.
11. Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., and Tatham, R.L., (2006), Multivariate Data Analysis, 6th edition, New Jersy, Person Prentic Hall.

12. Herrera, S. and Youssef, H., 2013.Macroeconomic Shocks and Banking Sector Developments in Egypt. Economic Research Forum, Working paper, No.802.
13. Hoffmann, P., 2011.Determinants of the Profitability of the US Banking Industry. International Journal of Business and Social Science, Vol. 2.
14. Jarque, C. M. and Bera, A. K. (1987).A test for normality of observations and regression residuals. International Statistical Review, Vol. 55, p.p.163–172.
15. Kanwal, S. and Nadeem, M., 2013. The Impact of Macroeconomic Variables on the Profitability of Listed Commercial Banks in Pakistan. European Journal of Business and Social Sciences, Vol. 2, p.p. 186-201.
16. Koizumi Messai, A., Gallali, M. and Jouini, F., 2015. Determinants of Bank Profitability in Western European Countries Evidence from System GMM Estimates. International Business Research, Vol. 8.
17. Miller, S. M. and Noulas, A., 1997. Portfolio mix and large bank profitability in the USA, Applied Economics, Vol. 29, p.p. 505–512.
18. Mirzaei, A. and Mirzaei, Z., 2011. Bank-specific and Macroeconomic Determinants of Profitability in Middle Eastern Banking. Iranian Economic Review, Vol. 15.
19. Oslan, D. and Zoubi, T., 2011. Efficiency and Bank Profitability in MENA Countries. Emerging Markets Review, Vol. 12, p.p. 94-110.
20. Rachdi H., 2013. What Determines the Profitability of Banks During and before the International Financial Crisis? Evidence from Tunisia. International Journal of Economics, Finance and Management, Vol. 2.
21. Ramadan, O., Hegazy, A. and Dimian, H., 2009. Egypt Response to the Global Crisis. Egyptian Minister of Finance, Macro Fiscal Policy Unit.
22. Sekaran, Uma 2003. Research Methods for Business: A Skill building approach. United States: John Wiley & Sons.
23. Sufian, F. 2011. Profitability of the Korean Banking Sector: Panel Evidence on Bank-Specific and Macroeconomic Determinants. Journal of Economics and Management, Vol. 7, p.p. 73-72.
24. Sufian, F., 2009. Factors Influencing Bank Profitability in a Developing Economy: Empirical Evidence from Malaysia. Global Business Review, Vol. 10, p.p. 225–241.
25. Touny, M., 2014.Macroeconomic Determinants of Banking Sector Development: A Comparison Study between Egypt and Saudi Arabia. Advances in Management & Applied Economics, Vol. 4, p.p.139-156.