Economic Reform, Banks' Efficiency and Market Structure in Egypt

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Economic Reform, Banks' Efficiency and Market Structure in Egypt

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"يظل الانسان عالما ما جهل، فاذا قال علمت فقد جهل"

My father's (Dr. Alsayed Ahmed Ibrahim) lessons from Khalil Gubran

To my father, my mother Soheir, my wife Rania, Tia my daughter and Seif my son, thank you.

Abstract

Egypt during the period of 2000 until 2010 witnessed major activities of economic cycles, financial reform, bank reform, development and restructuring that changed the face, structure and size of banks and the banking industry. New regulations, new laws, and Nazif's government that was appointed in 2003, fostered the change especially during worldwide recession, economic boom, tighter regulation on the financial sector and financial crises.

This thesis assessed the changes that happened in the Egyptian-banking sector during the period of 2004 until 2010, in term of efficiency change and industry structure. The research investigated the hypotheses that the lower the number of banks and the larger capital available for them, the higher the efficiency. The research used Data Envelopment analysis (DEA) methodologies to test the hypotheses on 27 banks out of 39 banks in Egypt that account for 90% of banking activities in Egypt. The input variables were the available funds and the owners' equity. While the output variables were net loans, securities, operating profits and net profit. Output oriented tests were conducted using the BCC (Banker – Charnes – Cooper), CCR (Charnes – Cooper – Rhodes) and Window analysis. In addition to the full sample, segmentation between private vs. public and international vs. local & regional were conducted. Moreover, the research also includes a descriptive analysis of the banking activities and changes that occurred during the period of study, and conducted a concentration index for the banking sector.

The research indicates that there was slight improvement in efficiency during the period of study, and that having more funds, resources may lead to improvements in efficiency. Although the banking industry increased in size (deposits, loans, profits and branches), the concentration ratio increased slightly, which indicates the dominance of few banks on the sector.

The thesis recommends that banks and the central bank could work on different dimensions to improve efficiency by having better reach, products and better assets utilization, and continue in the reform to reduce the concentration ratio, especially that the public sector still has ownership in 17 banks out of the sample of the 27 banks.

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Glossary of Abbreviations

Abbreviation	Full Name
BCC	Banker – Charnes – Cooper
CBE	Central Bank of Egypt
CCR	Charnes – Cooper – Rhodes
CGC	Credit Guarantee Company
CMA	Capital Market Authority
CR	Concentration Ratio
DEA	Data Envelopment analysis
DFA	Distribution-Free Approach
DMU	Decision Making Unit
ECA	Egyptian Competition Authority
ECMA	Egyptian Capital Market Association
ECRA	Egyptian Credit & Risk Association
EFSA	The Egyptian Financial Supervisory Authority
EGP	Egyptian Pound
EGC	Export Guarantee Company of Egypt
EGX	Egyptian Stock Exchange
EIoD	Egyptian Institute of Directors
EJSA	The Egyptian Insurance Supervisory Authority
ELA	Egyptian Leasing Association
EPEA	Egyptian Private Equity Association
ESSA	The Egyptian Society of Accountants and Auditors
FDH	Free Disposal Hull approach
GAFI	the General Authority for Investment
GCC	Gulf Cooperation Council
IDSC	Information and Decision Support Center
IFC	International financial Corporation
IFE	The Insurance Federation of Egypt
IMF	The International Monetary Fund
I-Score	The Egyptian Credit Bureau "I-Score
MENA	Middle East and North Africa
MOI	Ministry of Investment
Nilex	Nile Stock Exchange for Small & Medium companies
NPL	non-performing loans
SFA	Stochastic Frontier Approach
SFD	Social Fund for Development
SME	Small and Medium size Enterprise
TFA	Thick Frontier Approach

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1. Chapter 1- Introduction

1.1. Research Context

This research will assess change of efficiency, size and industry structure that occurred at the banking industry in Egypt from 2004 to 2010.

The banking system is considered one of the bases for a healthy and solid economy. By having an efficient and effective banking system the economy and the general business will operate much more smoothly and will be able to grow faster by having better money transfer, available liquidity, credit given, competitive cost of funds and production. (Saunders 1993 and Mishkin 2007). The financial sector is among the most complicated and integrated sectors, which embraces different entities competing and compromising each other and includes private and public organizations and it is heavily regulated by the government. (Mishkin 2007). 'Banking' as a term could be used to represent different financial transactions and contracts based on Heffernan (2005). Banks are considered the financial intermediaries that the normal person and companies are interacting and dealing with more frequently compared to other financial institutions (Mishkin 2007).

The main role of banks is to channel funds and money from the depositors to the borrowers, in addition to make sure that the borrowers have a sound case and capable of repaying the principle and the cost of finance as stated by Fabozzi, Modigliani and Jones (2009), Berger, Molyneux & Wilson (2012), Diamond & Rajan (2003) and Mishkin (2007). Based on Saunders (1993) having a solid financial sector and banks that investigate the loan and investment proposal thoroughly will result in a better business environment. This environment is associated with reduced risk of default and creates better competition for available credit so better cases will be able to get the money needed with the affordable cost while unforeseen or high risk cases that might default will not be able to get the required funds. This argument is supported by Kroszner (1998) and the studies that Jayaratne and Strahan (1996) Levine

and Zerovos (1998) and Beck & Levine (2004) conducted on selected banks and financial performance during the 1970's 1980's and 1990's. These studies were conducted to identify that regulating, monitoring, enhancing the efficiency and developing the banking system and the financial sector, are considered main contributors to a healthy economic environment and growth which protect depositors' money and ensure the survival of the sound business and financial companies. Although banks are considered strict in giving credit, but the banking sector is criticized for being the reason for the financial crises that hit the world's economy by exposing depositors' funds to high risk financial instruments and by transforming the bad credit to complicated securities that are sold to others as premium investments. Boot and Thakor (2009), claimed that because of the world wide crisis that happened in the late 1990's and in the late 2000's the need to reform and to find cross border coordination in the banking sector in monitoring, regulation and supervision is required. This is what has been happening lately especially in the application of BASEL committee on banking supervision which contain the risk factors in banks by having a solid and covered balance sheet and financial statements of banks.

Egypt passed through many economic development stages. During the period of 2003 – 2010 and with the appointment of the prime minster Nazif and his cabinet, supported by the economic recovery and growth worldwide, the Egyptian economy witnessed an impressive growth period especially in the GDP growth that reached 6% growth rate. In addition to the GDP's growth, there was increase in number of tourists, increase of revenue per tourist, increase in exporting, increase in company establishment, foreign direct investment, increase in companies' paid in capital, appreciation in the Egyptian stock market price level and value of trade that made the Egyptian stock market the best performing market in the world for 3 years. For the banking sector, there was increase in banking activity of deposits, loans and number of branches. (Central Bank of Egypt 2011)

Early 2004, Egypt's government decided to stimulate the banking and the financial sector and to enhance its structure by making economical and financial reforms (Alissa 2007). The Nazif cabinet and the governor of the central bank implemented new regulations and laws including tax rate reduction, privatization of the state-owned banks, selling their share in private banks and encouraging the merging and acquisition in the banking sector, refusing to issue new banking licence, which resulted in reducing the number of banks from 64 in 2003 to 39 in 2010 (Central Bank of Egypt 2011). Many foreign banks acquired small local ones in order to get the licence to be able to operate in Egypt. This increased the foreign direct investment that flowed to Egypt during this period for the banking sector in addition to other sectors. Moreover, it improved the capital adequacy ratio from 12% to 15%, deposits increased, loans increased, branches increased, non-performing loans decreased from 26% to 11%, net spread income

declined from 5.9% to 4.8% and loan to deposit ratio increased to be 54%. (Herrera, Hurlin and Zaki 2013). All these activities and results establish a unique setting that needs further investigation for the effect of the reform and the regulations implemented by the government in the financial sector in term of efficiency and market structure.

The government regulations also covered other non-banking financial sectors that could support the financial reform of the Egyptian economy. These regulations covered brokerage firms, investment banks, asset and portfolio management firms, private equity firms, venture capital firms, leasing and factoring companies (Nasr 2006).

The government were claiming that these activities would result in bigger institutions with relative similar sizes, that can provide better services to the customer, higher competition which will result in increase in efficiency and resources management, and reduction of fees and cost of services. This might contradict with some of the literature that indicates that reducing the number will create more market concentration, as will explain in later chapter.

Many arguments were made of the effectiveness of the reform on banks and how banks performance. Moreover, how the customers were affected by these changes and whether the customer really benefited by having better services, reach, and lower cost or benefited the banks by having more industry control that lead to larger profits. Alternatively, it just makes the current entities to gain more by reducing the competitive pressure. This thesis will investigate the effect of the reform on the banking sector and make policy recommendation for future development.

1.2. Research Aim

It is more than 10 years since the Nazif's government pursued economic and financial reform in 2003. Many researchers were arguing the effectiveness of these activities, and questioning the real winner of it. As it will be stated in the literature review on the following chapter, the studies that were conducted on the effectiveness of the bank reform lack the consensus and provide contradictory evidence and findings on the effectiveness.

The main aim of the study is to assess changes that occurred to the Egyptian banking industry in term of structure, size and efficiency. The outcome of the analysis will be related to the reform with further recommendation for better development for the government and for the banks to improve efficiency. The study will further add to the academic and practitioner literature on bank structure and concentration on bank efficiency in Egypt and developing countries.

1.3. The Research Question

The main research question is whether there was a change in bank structure, concentration and efficiency in the banking sector during 2004 and 2010 or not. It is worth noting that efficiency is defined in this research by the extent banks were able to utilize their input resources, which are the funds available to generate output, which is the loans and profits. (Welch and Mann (2001) in Anderson and McAdam (2004).

1.4. Research Objective and Methodology

To address the research question, a deductive approach will be conducted, using the financial intermediation theory and using Data Envelopment Analysis (DEA) methodology on the sample of the largest 27 out of 39 banks in Egypt for the period of 2004 to 2010. Year 2007 which was the deadline for reform implementation, was taken as a break year between pre reform and post reform. The study will end at 2010 to exclude the effect of the 2011 revolution on the economy and the financial results of the banks. Different DEA applications such as are Banker – Charnes – Cooper (BCC), Charnes – Cooper – Rhodes (CCR) and Window Analysis will be used. Along with many of similar bank efficiency research, the input variables are funds available and owner's equity, while the outputs variables are net loans, securities, operating profit and net profit. Contrary to most of similar research, this thesis will apply output orientation. These tests will be applied on different segments on the full sample which are the public vs. private sample and finally local and regional vs. international sample.

Then a descriptive analysis of the development of the banking sector will be conducted, followed by a concentration index methodology using the largest 3, 4, 5 and 7 banks index (CR3, CR4. CR5 and CR7).

1.5. Research Hypotheses

To be able to address the previous research question and objective, consequently we hypothesize:

Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.

Hypothesis 2: The lower the number of operating banks in Egypt, the lower the concentration.

1.6. Research Contribution

The researcher argues that this thesis will contribute to the literature and practice in different forms.

- **To literature**

From the preliminary research and as far as the researcher's knowledge there are no comprehensive performance tests that were conducted that used the same tools with the same perspective on the Egyptian banking sector during the period of the study. The studies conducted in Egypt on banks which might cover part of the period of study that used the DEA approach looked at the data from an input oriented approach, used a maximum of one or two DEA applications, which are either the BCC, CCR, Window or Malmquist approaches. This research adds to the literature by having a methodological contribution in the number of tests employed which is different to the communally applied. This thesis runs four main tests on the sample of banks, which provided a comparison among the results when using different tests. Moreover, segmenting the sample into another four tests based on ownership and origin, and each of these test will be conducted using constant and variable return to scale.

Although few previous studies segmented the sample based on privatized and public banks, none has segmented based on government or private ownership and local or international banks during the same period of study.

Therefore, a gap could be identified concerning latest coverage of banking sector and its reform in Egypt in either term of period of study, the number of banks in the sample, the output orientation, different DEA application or the segmentation of the sample.

Moreover, this thesis supplements the literature on bank concentration and structure and their effect on bank performance and efficiency in developing countries with low bank penetration rate. The thesis adds to the knowledge of reform and concentration especially in a controlled economy in transition.

Therefore, this thesis adds to the knowledge base and forms a solid resource for researchers who are interested in the banking sector, in developing countries, MENA region and the Egyptian financial market for period of 2004 to 2010. The thesis contributes to the literature by assessing the effect of financial sector and bank reform on the performance of banks and understands the effect of consolidation and bank size on efficiency of banks in Egypt. It adds to the literature of using the non-parametric DEA methods to assess banks' efficiency especially using the output orientation versus the input orientation that is communally used.

Moreover, this thesis is among the very few that used the output oriented methods in assessing efficiency.

- **To practice**

This thesis explores the economic reform and antecedents of the 2011 revolution and the subsequent unrest to overcome its effect on bank performance. The beneficiaries of this research from the practical perspective could be grouped into three categories; Banks, Government and investors.

For banks: The study forms an overview of the performance of the industry as a whole, to be able to select how banks can compete and how to analyse the efficiency in the banking sector in Egypt. It addresses the efficiency in the banking sector and provides best practices versus worst practices so bank management can further study action and strategy applied by those best practices and overcome the ones performed by the least efficient. Moreover, by applying the input / output variables, bank management can work on enhancing their performance and efficiency apart from relaying on the general operational and financial results generated from the financial statements.

For Government and Central bank: the thesis assesses the change of efficiency and the market structure on the banking sector. The government and the central bank can apply the results as one of the measurements to assess the effectiveness of the reform program, which includes regulations and institutions established, and their effect on size and performance of banks and the overall economy. The government were assuming that by reducing the number of banks, the financial sector would become more efficient and competitive. It provides a policy recommendation for the government based on the assessment conducted in bank performance, and it adds to the criteria of evaluation that the government and the central bank should look at when making policy changes.

For investors: the thesis can add to the research that analyse banks especially the ones listed in the stock market. This can help investors or fund managers to select a high efficient bank to buy their stocks in the stock market.

1.7. Ethical Consideration

The ethical consideration in any research is crucial to ensure that the data and information will not harm any related entities. As the nature of this research deals to a great extent in public information and data of both banks and firms, which are gathered from the original published sources such as the financial statement and annual reports of banks that are published in their website. Other data are gathered from published research from investment banks, research houses, and the central bank. The author confirms that all data are gathered from published non-confidential information.

1.8. Structure of the Thesis

This research explores the effect of consolidation in the Egyptian banking sector on competition, performance and efficiency during 2004 to 2010.

The first chapter is the introduction, in which it describes the research context, background and lays the foundation of the whole research. It states the objective of the study, which is to assess the effectiveness of the banking reform, the thesis structure and the contribution of the thesis to literature and practice

The second chapter is the Theoretical Framework and Empirical Literature Review. The first part of the chapter is the theoretical framework. In keeping with most banking studies, four theories were covered and discussed in the research; these theories are Institutional Theory, Resource dependency Theory, Competition Theory in Economics and Banking Theory (the Financial Intermediation Theory). The Competition Theory and The Financial Intermediation theory will be used in the thesis. In the second part of the chapter a presentation of the banking sector and the financial institutions will be made especially the importance of the financial sector and how financial institutions work as intermediaries among depositors and lenders. Highlight on the banking strategy and competition will be covered such as the generic strategy of customer oriented versus cost leadership entities and the differentiation among banks within a controlled and highly regulated sector. The strategy of merger and acquisition to grow or to access new market will be covered. Moreover an overview of industry structure and comparison between monopoly and perfect competition will be made to reflect on banks concentration. Detail description of bank performance and evaluation approach will be discussed. Then, the different analysis tools that are used to assess performance especially in the banking sector will be presented thoroughly. In addition to the main analysis tools that will be used in the research – DEA, will be discussed with its different

forms and applications. The following section provides a description of the researches conduct on Egypt in the banking sector assessing efficiency and performance during the different period. Finally, the outcome and the gap analysis of the literature review will be presented.

Chapter three will cover Egypt's economic, financial and banking sector. The chapter starts with the history of the Egyptian economy throughout different periods. Then the chapter will cover the economic reform that was used by the Egyptian government during 2004 to 2010, followed by a brief description of the various players in the financial sector in Egypt from government entities, private entities, different sectors and associations and the different changes that took place in them during the period of the study. The chapter also covers the descriptive analysis and the development that happened in the banking sector over the years especially in branches development, deposits, loans, and comparison among the retail, corporate and government sectors and their share in the banking sector.

Chapter four is the research methodology. It started with the research framework that is followed then the research philosophy, approach and design. This part reflects on the research at hand and the sample selected for the analysis. The following section covers the development of hypotheses and variables. It reflects on the variables that were used in different research and why these variables were selected. Moreover, it describes the process followed to test and select the software that is used in the analysis. Most of the operations of the thesis were covered in the second part of this chapterr. The selection criteria of the banks were covered, how data was gathered, adjusted, modified and standardized to be able to test them. The detail description of the tests that were selected was described in this chapter as well.

In chapter five, the findings and analysis were made. There are three different DEA tests that were conducted (BCC, CCR and Window analysis). In the window analysis, two runs were made based on constant and variable return to scale orientation. From the results of the Window analysis, different segmentations were made. For each of the 12 tests that were conducted, a description of the outcome was made. The second part of the chapter is the findings and the analysis of the K Bank concentration ratios that were conducted. Four-concentration index (CR3, CR4, CR5 and CR7) were developed once for the deposits and another for the loans.

Chapter six covers the Discussion and the Conclusion of the study. This chapter highlights on the understanding of the outcome of the research and the in addition to the recommendation for government, banks and further studies. The limitations of the research was also were also conducted.

The following section is the appendix, which provides the detail outcome of the 12 tests that were conducted to be able to compare the efficiency of each bank for the period of the study.

2. Chapter 2 – Theoretical Framework and Empirical Literature Review

2.1. Part one: Theoretical Framework

2.1.1. Introduction

The theoretical framework is the lens that is used to help in understanding behaviour of organizations and people (Bryman 2012). Based on Miner (2002 and 2005), theories should be investigated and analysed, first to separate good theories from bad theories, then to be able to select the most relevant theory or theories to conduct your research (Saunders, Lewis and Thornhill 2009; Sekaran 2005). He claimed that a theory should support the goal of science, which is to give better understanding of phenomena and behaviour and add to the knowledge of it, the domain of the theory should be clear and identified, and it should focus on important issues that can make big differences. Theories should also be testable with clear boundaries and constraints to enable either proof or disproof and finally to be simple in presenting it. Bryman (2012) and Bryman and Bell (2011) claimed that there are two main kinds of theories, Grand Theory and middle range theory. The grand theory is the general one that is highlighting on general business and management understanding, while the middle range one – the mostly used theories in research- is the theories that are focusing on one domain and empirical study.

To be able to conduct the research on the banking sector in Egypt, different activities were conducted. To answer the research question, different studies and theories were explored, examined and investigated to identify the relevance, compatibility and the applicability of them to the research and question under investigation.

The research question could be summarized as follow: based on the economic and financial reform, which started in Egypt in 2004, banks were forced either to increase their paid in capital or to go into merging and acquisition, those activities reduced the number of banks from 72 to

39. So did the concentration and reducing the number of banks affect the competition, performance and efficiency?

Among the different theories that could be applied in this research, four main theories were found that could reflect and be applied for the study; these are the Institutional theory, the resource dependency theory, competition theory and the banking theory.

This part of the chapter will cover and review the previous theories that are commonly used in bank performance and competition to select the most suitable to the current study.

2.1.2. Institutional theory

The institutional theory is considered among the socioeconomical theories that were commonly used in social science. An institutional approach of looking at general or economic phenomenon within the context of the surrounding environment can include all influencing factors such as trends, social, culture, political ideological and religion (Scott and Richard 1987, 2003 & 2004). It is a dynamic approach, which analyses actions based on external drivers and forces. It explains in more depth the behaviour of an organization from another angle other than the economic theory. This could be achieved by looking at the cultural and normative dimensions of norms, structure, routines and rules and how they affect the behaviour of individuals and organizations. Institutional theory studies and reflects on the surroundings of the organization and what shapes that organization and its behaviour. In this manner, the institutional theory considers the organization as reactive to its environment and the driving forces. The word 'Institutional' in itself might be looked differently, based on Scott and Richard (1987) the institutionalization is mainly the process by which actions could be understood and repeated. Furubotn and Richter (2005) added on this definition by stating that institutions when they operate effectively, could help in reducing uncertainly, simplify decision-making, support teamwork and can reduce cost and maximize effect.

Based on Furubotn and Richter (2005), there is different perspectives of the institutional theory; the one, which is more popular among the researchers, is the Old Institutional Economics, which is more focused on the culture, behaviour and norms of the individuals and society. This is the original theory that was developed to analyse why some organizations are not following the economic theory and taking rational decision to maximize their profit. Old Institutional theory identifies three factors that influence decision and behaviour which are normative (internal processes), culture-cognitive (beliefs and assumptions) and regulatory (the rule and system). New Institutional theory is concerned with the systems that control the transaction and consider it as the main determinant of behaviour. The last one is the New

Institutional Sociology, which is concerned with the external institutions that form, affect and shape an industry (DiMaggio and Powell (1991).

Meyer and Rowan (1977) claimed that institutional theory is more relevant when used to understand specific behaviour or when the organization is faced with change, and how it will behave to this change based on the normative, cognitive and regulatory forces. DiMaggio and Powell (1991) claim that institutional theory explains why organizations will act similarly based on the external forces that shape the legal and the understanding and behaviour of the people.

Tolbert & Zucker (1994) criticized the institutional theory by stating that the theory has in itself different standards. They assumed that although the theory is mentioned and used extensively in research, it does not have a set of standards, measurement or even basic assessment approach making it mainly suited for qualitative research. As they put it:

"Ironically, the institutional approach is not highly institutionalized" (page 4).

Peters (2000 & 2005) support the argument that lack of measurement and a clear definition of intuitional theory might limit the outcome of it. He suggested that Institutional theory is a good starting point for research but you should not conclude your research with it.

Although Institutional theories have been used in different studies, using them as lenses to look at the current research, might not be the best theoretical framework to apply in the research at hand. The author believes that the Institutional theories could be used better to assess the behaviour, rules, regulation and believes that form the banking and financial sector more than assessing the efficiency and the performance as the current research question.

2.1.3. Resource Dependency Theory

Another theory that attracts a lot of attention by researchers in the field of organizational behaviour and inter-organization relations is the Resource Dependency Theory (Galaskiewicz 1985). The early development of the theory was in the late 1970s based on the research conducted by Salancik, and Pfeffer (1978). The theory focuses on the organization unit level and its relation with the external constraints and implies that organizations can adapt to changes and influence their chances of survival based on their selection of resources and its dependency upon these resources (Miner 2006 and 2007; Pfeffer 2003 and 2005). The main assumptions of the theory are highlighting that organizations are in an economic world in which resources are scarce, to get the needed resources to operate; organizations engaged in different coalition and interdependency transactions and relations with other organizations and people which creates a dependency model in which everybody is depending on the others for survival. So, organizations became in a power struggle internally or externally either for the

resource acquisition or in dependency on these resources (Ulrich & Barney 1984). Power is measured by the amount of dependency that the organization is operating within and depending upon, so highly dependent organizations are weak and lower independent organization are strong, more likely to survive and to grow (Salancik and Pfeffer 1978; Pfeffer 2003 and 2005). This implies that the main objective and strategy of any organization is to minimize their dependence on others and increasing others' dependency on them. Based on Salancik and Pfeffer (1978) the role of the manager is to understand the external constraints, identify the required demand, and make decision to acquire the needed resources to satisfy this demand in a way to ensure the survival and reducing dependency to maximize independence, which will result in more profit. In this approach, Miner (2006) argued that an organization should acquire or merge with other organizations or industries that might cause for them the greatest problems in controlling their independence, affect their market growth or profit margin.

The criticism of the resource dependency theory is mainly focused on few points. One of these points which was presented by Astley and Zammuto (1992) by stating that the wording used to describe the main concept of the theory which are power, resources dependency and coalition are very ambiguous and could be interpret and measured in different ways. Apart from the previous criticism of the theory, Miner (2006) debated that most of the counter argument against the theory is around the areas that the theory did not cover or could not provide answer to, more than what it addressed. Among those areas to be investigated is to include other variables that might change the results such as the effect of cartel, monopolistic behaviour and looking at different industry structure and different economic cycles. The previous argument is supported by Galaskiewicz (1985), who did an intensive research about the argument either for or against the theory. He added that the theory is more focused on industry and manufacturing organisations more than service or consumer oriented organizations.

The resource dependency theory might give a good lens to look at the current study especially in the area of banks' dependency on the depositors to get the required resources and the lenders to utilize these resources. However, it looks more on the decision taken by the manager either to get resources or in merging and acquisition which are considered an organizational management and strategy decisions more than industry level decisions. Moreover, the theory will not give support in making an industry assessment. As the criticism of the theory highlights that it fits more with the industrial organization more than the service one.

2.1.4. Competition Theory in Economics

Literature on Competition among organizations is considered one of the oldest domains in economics. Back then, it was mainly for nations more than organizations. Adam Smith is among the early researchers who analysed competition, allocation of resources and profit in his famous book Wealth of Nations. Smith (2009 edition) was referring to the competition based on the demand and supply and scarcity of products, and the extra profit that a dealer can make if demand is more than supply or if there is not so many similar dealers who provide the same product (Dasgupta 1981). This idea were developed more by other researchers such as Bertrand and Edgeworth (as in Dixon 2001) who used a model which focuses on price competition with constant quantity demanded, Cournot (as in Dixon 2001) who used a model that depend on quantity competition and fixing price. Those researchers were looking at competition as a mean of transactions. It is not until the work of J. B. Clark and Frank Knight who contributed to the subject by combining the idea of competition, perfect competition and market structure to develop the models that are widely studied later (McNulty 1968 and Dixon 2001).

There are different theories that form the general literature of the competition theory. As Lipczynski et al (2009) described it, in Neo classical economic theories, competition is highly related to market structure, and in this domain, there are four main perspectives and theories: Perfect competition, monopolistic competition, oligopoly and monopoly. They also stated the criteria according to which the industry is considered perfectly competitive such as large number of buyer and seller, knowledge is available to all parties at no cost, no product differentiation, each firm is independent and are after profit maximization, there is no entry or exit barriers, and that current market price can absorb all output. Perloff (2013) argued that among the main reasons of having monopolistic or oligopolistic firms are cost advantage or government intervention. The first one he called it natural monopoly, which exists according to patent, supreme production facility or supreme technology. While the second is created by government by limiting licence to operate, grant to be a monopoly either by auction or by direct order. Pindyck & Rubinfeld (2012) added that the elasticity of demand, number of firm and the dynamics of competition might create the monopoly power.

Based on McNulty (1968) some people might look at perfect competition as it is the opposite of monopoly, however, although they might have some communality but they are not antonym. McNulty (1968) debated that:

"perfect competition is an ideal state; incapable of actual realization… perfect competition itself means the absence of competition in quite as complete a sense, although for different reasons, as does pure monopoly." (Page 641).

He added that in perfect competition the market situation allows any organization to enter and that there is "no *further competition is possible".* He then discussed that within perfect competition, companies profit will be minimized and the growth will depend on market growth, so what will be the motive for companies to enter a perfectly competitive market in which profit and growth were limited and there is no differentiation. As he raised the question of *"How may a business firm be expected to compete without monopolizing?"* this idea was supported by Hunt (2000) who confirmed that the objective of any organization is to maximize wealth or profit. Moreover, Lipczynski et al (2009) claimed that some researchers are rethinking the idea that if a firm is making abnormal profit, this does not mean that it is harming the customers or abusing their power. Among those researchers are Schumpeter (1928 & 1942) – who considered that competition is fosters by innovation, and the Australian school of economics lead by Kirzner (1997) – who deliberated that competition as a dynamic model incorporates all stakeholders to make the decisions that shape the industry and are affected by entrepreneurs who make changes in the sector based on innovations. Azid, Toseef, Mehmet Asutay and Umar Burki (2007) argued that if firms collaborate together for the welfare of the society, the market formation will not make any difference.

Another branch in competition is the game theory. Among the researchers who contributed to the competition area; especially the game theory area and developed on Cournot's research is John Nash. Nash worked on and developed the Nash equilibrium, which is a non-cooperative game (Dixon 2001). Based on Dixon (2001) although the Nash equilibrium was used communally in oligopoly theory, but it did not address the model of continuous or repeated game and how this might affect decisions.

The idea of market structure and the effect of monopolistic activities were discussed by Motta (2005) who argued that the reasons behind fighting monopoly is to ensure social and customer welfare, to support and protect small companies, to ensure that organizations are after efficiencies, and to foster innovation. However, he also claimed that increasing the number of firms in the same industry might lead to many inefficient firms that can't grow to feasible and profitable size and might lead to a distortion in allocation of resources and price level. Motta (2005) defined monopoly as a firm that has market power enough to set its own desired outcome such as prices, quality and standards. Among the comment on the oligopoly behaviour is the switching cost that some companies might apply to lock customer with them without being accused of monopolistic act, this could be seen in loyalty programs, frequent flyer and some sunk cost (Motta 2005). Lipczynski et al (2009) discussed that although perfect competition in the short term might increase number of firms, but on the long term, they will discover that efficiency and economy of scale are pre-requests for survival and competition.

Therefore, some merging and acquisition might occur and the un-competitive companies will be forced out of the industry, which will lead to decrease in number of firm in the sector.

Shy (1996) and Shaked & Sutton (1982, 1983 & 1987) claimed that there is a natural oligopoly which could occur. The natural oligopoly is the case in which there will be price discrimination due to spending in research and development, patents or marketing, and consumer will be able and willing to purchase the good because of quality or taste or both. This implies that there will be sunk cost for entry and running cost for quality improvement and development, which will make a natural barrier to entry in the sector and will make a natural oligopoly. Lipczynski et al (2009) are adding to this idea by stating that in oligopoly, because of the small number of firms, they either go into price competition or war in which they all loose, or they collate and make joint decision about nature of competition especially price level and output level.

Hunt (2000) had a different view in looking at competition theory and especially the perfect competition one, he debated that the theory did not help in projecting many phenomena in the economy and that it lacked and missed many variables that should be taking into consideration such as differentiation, price discrimination, and service level. His views were mainly taken from the marketing theories that depend more on actual behaviour of organisations, positioning and marketing activities, apart from the pure economical and mathematical unrealistic hypothesis as he argued. He debated that the main characteristics of perfect competition mentioned above are not real and does not happen in real life and those different views and theories should be reconsidered. One should mention that Hunt was presenting his theory of Resource Advantage, which, as he claimed, should be the new theory to look at competition because it is based on actual constraints and limitation of output, differentiation of product and price discrimination.

Based on Shy (1996) and Lipczynski et al (2009), among the methods used to assess the competition and the market structure in sectors, are the concentration measurements, which were discussed in the literature review. The most commonly used measurements are the Concentration Index, Herfindahl – Hirschman Index (HHI), the entropy coefficient and the Gini coefficient.

As the research at hand will be assessing the concentration in the banking sector and the nature of industry structure, the competition theory perspective will be applied in the second hypothesis. The theory will serve as the framework to test the concentration of the banking sector in Egypt.

2.1.5. Banking Theory (The Financial Intermediation Theory)

Based on Matthews & Thompson (2005) in perfect capital market, lenders and borrowers will be able to meet and to transfer funds among them without any barriers and without extra cost paid so they will need no financial intermediate or bank to facilitate this transaction. Bhattacharya et al (1998) and Matthews & Thompson (2005) raised the question of the need of having financial intermediations, which make things more difficult and increase the cost of the transaction. They argued that the Financial Intermediation (FI) theory which as Allen and Santomero (1997) stated as well, is based upon the resource allocation model which depends on perfect market and that the intermediation reduce cost by sharing transaction cost among different people or organizations. Moreover they stated that the early financial related theories were mainly focusing on the transactions cost and asymmetric information and then on later research focus were more on the intermediation approach.

Mishkin (2007) defines the financial intermediaries as all the financial institutions that act on this domain and contribute of financial transfer and transactions. The institutions could fall into three main categories: Depository institutions such as banks, contractual saving institution such as insurance and pension, and investment intermediaries such as fund & asset management, leasing and stock market related firms.

The Financial intermediation theory and banking theory are two broad theories that are composed from many other theories. It is considered the base for the research concerning the financial institutions as it describes the nature of the financial institutions and what they are and what they do. Based on Bhattacharya and Thakor (1993), Bhattacharya et al (1998), and Mishkin (2007), banking and financial intermediation theories are rotating around few main questions that the theories try to solve and answer. These questions are summarized as follow:

1. Why financial intermediaries do exists?
2. Why banks sometimes deny credit rather than charging higher rates?
3. Why banks funds loans (long term) with deposits (short term)?
4. Why banks do risk transfer by issuing a loan to be sold as security afterwards?
5. How banks should be regulated?

The literature answered many of these questions from different angels with different theories such as monitoring commissioning, information processing, liquidity transformation, credit rationing and commitment method. These theories answered many of the questions that the Financial Intermediation (FI) theory raised. These could be described as follow (Allen and Carletti 2012, Harker & Zenios 2000, Bhattacharya and Thakor 1993, Bhattacharya et al 1998,

Allen and Santomero 1997, Matthews & Thompson 2005, Diamond 1984, Diamond & Dybvig 1986, Diamond & Rajan 2003 and Boot & Thakor 2009):

- FI act on behalf of the depositors to utilize, invest and monitor the money.
- FI act as saving collectors from small savers and lend large borrowers.
- FI help in channelling money.
- FI serve as Maturity transformation in which they match between the short term lender needs and the long term borrower needs.
- FI reduce transaction cost because of their economy of scale especially in searching cost, verification cost, contracting cost, monitoring cost, collection cost and enforcement cost.
- FI conduct an investigation about the borrowers, assess his financial and feasibility of contract to insure his ability to repay to reduce risk.
- FI role is to manage credit risk and make risk transformation.
- FI work as information sharing alliance among them.

In general, FI resolve the amount, information and time problems, either by matching supply and demand, making investigation about the borrower, follow up or manage credit risk and rationalizing credit. As Allen and Santomero (1997) put it:

"They (Financial institution) are facilitators of risk transfer and deal with the increasingly complex maze of financial instruments and markets" (Page 1462).

Diamond & Rajan. (2000) highlighted that based on the financial intermediaries' theory, the financial institutions are middle agent that conduct the duties mentioned above, but they need to have a good capital adequacy rate to be able to manage the liquidity issue and to project a solid financial statement for depositors so they can trust the financial institution with their money. Based on these assumptions, most central banks asked the banks in adjust to increase the capital adequacy requirement. Based on Altman & Saunders (2001) implementing the new regulation in US in late 1990's and early 2000's made banks to maintain 8% of risk based capital ratio with the objective that banks will form their own monitoring system to select best projects to lend. The liquidity problems might occur because some banks are financing long-term loans with short-term deposits that might be on call. Blum & Hellwig (1995) and Blum (1999) argued that although the simple argument with the capital adequacy requirement is to help banks from being exposed to bankruptcy risk today, they make banks go more into riskier loans to secure profit of future. Moreover, in case of reaching their limit, banks have to stop lending new loans, until old one is matured or they have to increase their paid in capital that might take long time. This will make banks reluctant to get new deposits as they will not be able to utilize them and this will form extra liability on it, so the whole system might not the serve the *raison d'etre* of the bank.

Based on Bhattacharya and Thakor (1993), Matthews & Thompson (2005) and Allen and Carletti (2012), The Credit Rationing theory passed through different stages, the current theory

assumes that banks should balance between revenue and risk. Normally bank's revenue will increase by increasing interest rate for clients, but this will be true until a point that the bank will only attract risky projects and customers that were refused by other banks and push away less risky opportunities, that can get less expensive money from other banks. So even by increasing the interest rate the bank may not be able to increase revenue, but it will increase risk. Therefore, the theory is highlighting that risky loan, which might default, will not be covered by increase in interest rate and it will always hit the profitability of the bank. Therefore, a maximum profit could be achieved given the interest rate level and the risk level beyond which the bank will lose. So bankers should think rationally in each credit given because after certain point taking a risky project is not adding to profit.

Allen and Santomero (1997 and 2001) argued that most of the researches on the intermediation theory solve some of the questions, which are related to the reason of having financial intermediaries more than other factors. They stated that the researchers address the transaction cost and asymmetric information, but didn't tackle other issues such as why the financial institutions do hedging and risk management and if financial institutions are the most suitable entities to do that? They claimed that another way of thoughts is to look at the financial sector as functional not as institutional, as functions will always be there and needed but institutions might change, evolve or disappear. Functions are identified as origination, distribution, servicing and funding (Merton & Bodie 1995, Merton 1989, 1995 and Oldfield & Santomero 1997). Allen and Santomero (1997 and 2001) debated that this could be supported by comparing size development in the banking sector in the United States versus the development of the financial institutions which sizes has increased dramatically.

By comparing the previous theoretical framework, the Financial Intermediation theory is contributing to a large extends to the analysis and the understanding of the performance of banks in the banking sector especially in measuring bank performance and efficiency. The financial intermediation theory can be the foundation of studies that cover banks as they describe the main role and the reason of existence of the financial sector. Moreover, the Competition theory will be used to look at the concentration and the industry structure of the banks during the same period. Studies that used the FI theory and the competition theory in Egypt during the period of 2003 to 2010 are limited to few numbers. The researcher is planning to use the financial and banking theory as a lens to look at the performance and the efficiency of the banking sector in Egypt during the studied period of 2004 to 2010. The FI theory relies on the factor of the capital adequacy rate to form a solid financial institution, Egypt during the period of this study, will be a good case to assess the effect of the capital adequacy on performance and efficiency and the changes in the industry structure.

2.2. Part two: Empirical Literature Review

As mentioned in chapter one, the financial and the banking sector is among the most regulated sectors that affect the performance of the economy. (Fabozzi et al 2009, Berger et al 2012, Diamond & Rajan 2003 and Mishkin 2007). This chapter will present the literature review on the different aspect of the banking and financial sector, to be able to lay the foundation for the research on bank efficiency using the Data Envelopment Analysis and bank concentration.

This part of the literature review will start on the financial and the banking sectors by introducing the financial sector and its role, structure and contribution to the economy in addition to different views of the banking sector. Then the chapter will cover the strategy applied by different banks including sector served, location and the generic strategy followed. Then a review of bank positioning and marketing strategy and segmentation. The banking strategy will highlight as well on the comparison between organic growth and acquisition of other banks. How merging and acquisition could be used as growth strategy versus the generic growth will be covered. Then the chapter will highlight on competition in banking sector, highlighting on the industry structure and its effect on performance and efficiency of banks in term of product differentiation, client requirements, branches expansion, cost, and credit management. This part will focus on the different attempts and methods developed to look at competition and to measure competition in the financial sector. The next section will compare and present the literature of firm and bank performance. In bank performance, some performance evaluation methods will be discussed focusing on the most widely used methods which will be relevant to the current study, such as the structured – conducted – performance, the bank concentration and the performance index. The following section covers the bank efficiency, using different approaches in assessing the financial institutions and the methods used to evaluate efficiency. Then a section about some macro observation of the literature concerning banks dynamics, portfolio management and risk management in relation to the bank size will be covered. The literature review will then conclude by highlighting on the general outcome and gap identified.

2.2.1. The Financial and Banking Sector

This part of the literature review will cover the financial and the banking sector and their role in the economy and the effort conducted to reform and regulate the sector to make it perform more efficiently and stable. Among the widely asked question in the economic domain, is the role of the banks and the financial institution in the economy. Are they a main driving sector in the economy or it is just a service provided to the real economy drivers of industrial, trade and mining sectors? This question is also raised after every financial or economic crisis which pinpoints to the financial sector as the main reason for the crisis (Allen and Carletti 2012).

The simplest form of the role of the banking and the financial sector is match making between surpluses and shortage of money for the short, medium and long term needs. This is elaborated based on Allen and Carletti (2012), Matthews & Thompson (2005), Allen and Santomero (1997) Harker & Zenios (2000), Boot & Thakor (2009), Bhattacharya and Thakor (1993), Bhattacharya, Boot & Thakor (1998), Diamond (1984), Diamond & Dybvig (1986) and Diamond & Rajan (2003) as follow:

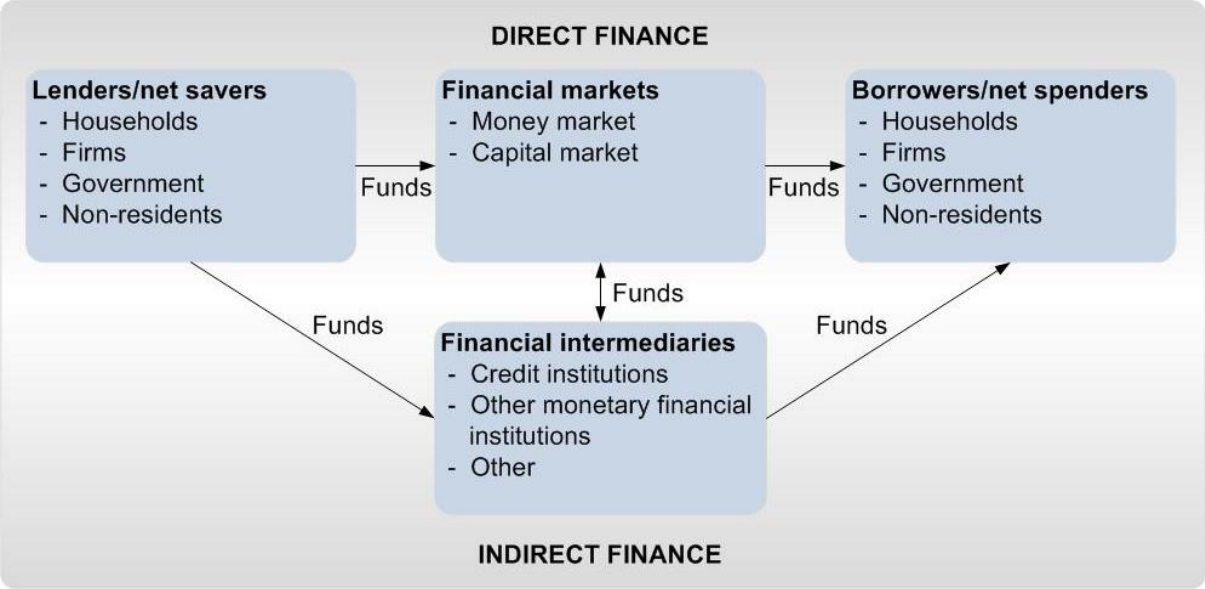
The role of the financial sector is to…:

- Act as a safe and guarantee of your saving
- Help in planning and securing your financial needs
- Act on behalf of the depositors to utilize, invest and monitor the money
- Act as saving collectors from small savers and lend large borrowers.
- Help in channelling money
- Serve as Maturity transformation in which they match between the short term lender need and the long term borrower need.
- Reduce transaction cost because of their economy of scale especially in searching cost, verification cost, contracting cost, monitoring cost, collection cost and enforcement cost.
- Conduct an investigation about the borrowers assess his financial and feasibility of contract to insure his ability to repay to reduce risk.
- Manage credit risk and make risk transformation.
- Work as information sharing alliance among them

Diamond & Rajan (2000) assume that although the financial institutions are middle agent between depositors and investors, they need their own capital to have a good capital adequacy rate to be able to manage the liquidity issue they may face especially that most of the deposits are callable and most of the loans are of a longer term.

The following diagram illustrates the flow of the funds in the financial sector.

Figure 2-1 : Fund transfer in the Financial Sector



Source: European Central Bank as in Bank of Finland website (accessed on 10-1-2014).

Based on the previous diagram, financial institutions have different roles. Mishkin (2007) categorized the financial institutions based on the nature of their work nature of relation into three main categories: Depository institutions, Contractual saving institution and Investment intermediaries.

Depository institutions are banks that accept deposits and provide to individual and corporate different financial services. Contractual saving institution are insurance and pension funds which make a contract for specific services. Investment intermediaries are fund & asset management, leasing and stock market related firms.

However, according to Boot & Thakor (2009), the worldwide crisis that occurred in the late 1990's and the 2000' happened because of the practice of the financial institutions and banks. They claim that to make sure that the world doesn't face another financial crisis, the need to reform and to find a cross border coordination in monitoring, regulation and supervision is required and this is what has been happening lately especially in the application of BASEL committee on banking supervision. According to Boot & Thakor (2009), the research on Bank efficiency and performance will be a key measure to overcome financial or economic downturn.

2.2.2. Banking Strategy

Strategy is defined as the pattern or plan that integrates an organization's major goals, policies and action sequences into a cohesive whole over the long term, which achieve advantage for the organisation through its configuration of resources within a changing environment (Johnson & Scholes 2002 and Mintzberg & Quinn 1996). However, as the topic of strategy as a domain and literature is large and diversified, this part of the literature will only focus on what could be relevant to the current research context of banking strategy.

Moutinho & Phillips (2002) in their research assert that when top management believe in strategic planning of the bank, it has a positive effect on performance, however, as the bank grows in size, planning intensity weaken because of the complexity of the variables.

Harker & Zenios (2000) claim that performance of the financial institutions is derived from three broad areas:

- Outward Strategy: it includes strategic choices such as, product mix, client mix, geographical location, distribution channel and organizational form.
- Inward Strategy Execution: which includes operational decisions and system such as marketing activities, human resource management, organization structure, use of technology, process design, and efficiency.
- The external environment: these are the factors that are not directly related to the bank but the bank's performance is affected by them such as general technology level, customer taste and preference, banking industry and economic cycle.

Using Porter's generic strategies framework, Powers & Hahn (2004) conduct research to evaluate strategy applied by banks in USA. Ninety-eight bank executives responded to the survey stating whether their bank is a cost leader, differentiator, focused or in the middle. The financial performance of the responding banks was compared with the output of the survey. Results showed that the claimed cost leader banks were performing better than the other banks. Powers and Hahn (2004) did not find any obvious performance advantage for differentiator banks over the focused and the stuck in the middle. They argued that using products, service and facilities as a mean for differentiation is not recommended, as they could be easily copied and imitated. They recommend that cost leader banks should invest in IT to reduce cost, develop and refine existing products and invest in training. One limitation could be identified to the study, which is the sample itself. As the sample did not highlight on the total number of banks that are operating, and that these banks are all in the USA which might not be generalizable to different countries.

The argument of cost leadership strategy and size advantage is supported by Peristiani, (1997), Lim & Randhawa (2005) and Hughes, Mester & Moon (2000). They all claimed that size growth –either organic or through merging or acquisition, gives the bank the potential to perform better as large banks will be able to diversify the risk and expand in its loan portfolio and its services. However, when they tried to analyse the reason behind the increase in performance or the driving factors that make large bank perform better, they failed to identify which factor that really contributed the most. The cost associated with the increase in size is the point that Hughes et al (2000) and Lim & Dipinder (2005) did not agree on. As Hughes et al (2000) claimed that when the bank diversified the risk it would incur more cost as more people, work, steps and procedures will be followed to execute each deal or transactions. However, Lim & Dipinder (2005) and Strahan (2008) claimed that the increase in scale and/or scope would reduce cost per transaction.

Mester (2008) states that consolidation in the banking sector and by having bigger institutions, will help in having efficient scale, product mix, better diversification and X-efficiency (managerial efficiency). However, at the same time it will lead to less competitive market and having the industry controlled by a few players, and might be “too big to fail” which might force the government to support the big banks in order to prevent their failure. Peristiani (1997) claims that surviving banks after merger showed improvements in profitability and operating costs because of the scale and the increase of the size of the balance sheet not because of increasing in efficiency of the core operation.

Lim & Dipinder (2005) argue that although big banks will have better access to fund with better cost, they will be under pressure to utilize it, which might force them to accept higher risk. On the contrary, as small and medium banks have limited sources of funds, which is generally higher in cost, they might be able to utilize these funds to their existing customers, and will have less pressure to transform these deposits into high-risk loans, as a last resort they may invest it in money market instruments. This is supported by Strahan (2008) as he claims that average lending of large banks (above $1 billion of assets) is 64% while smaller banks has only 59%. This will make the revenue and profit of large banks better, due to better utilization of their funds.

Cardone-Riportella and Cazorla-Papis (2001) argue that in pursuing scale and growth strategy, banks could expand into new markets and new area. They identified two-entry strategies:

a. Gradual approach: step by step trial investment into a target market
b. Opportunistic approach: full-scale acquisition.

The first approach indicates that the bank grows through an incremental and organic growth depending on the capacity and the capability of the bank. The second approach is the one supporting the merging and acquisition trend in which banks are buying market power, market share and customers from day one. Based on Mester (2008), around 62% of mergers and acquisitions are among banks. Sudarsanman (2003) claims that any company should review the value of the acquisition and be clear about the objective, the return, the cost and the integration between the two entities before going into the transaction. According to a study conducted by Berger & Humphrey (1991) and Pilloff and Santomero (1998) in US and Vennet (1997) in UK proved that one of the main causes of acquisition if that the target bank is less efficient than the acquiring bank and that the new management transform their business model to the target bank to increase efficiency. Moreover, Fairburn & Kay (1989) claim that among the main purpose for an acquisition will be to overwhelm competition and create more cost saving by concentrating activities and using shared facility.

Conversely, this assumption on the acquisition and entry strategy advantage, contradicts with the findings of Berger, Leusner & Mingo (1997) when they were assessing the efficiency of 760 bank branches from 1989 to 1991 in the US banks. They argued that performance, efficiency and large cost saving will depend on the manager of the branch rather than through merging and acquisition.

Rhee & Mehra (2006) presented strategy differently, where they claimed that strategy in itself would not guarantee better performance in market share, profitability or sustainability. They argue that there should be a balance between operations and marketing where strategy will play the role of a moderator is needed.

a. Operation: efficiency and cost oriented
b. Marketing: how to maintain customer satisfaction and to be market oriented.

Young (1999) claims that in order to have positioning stand to generate more profit, the strategy that a bank should follow has to be derived from the market it operates in. He identifies that the strategy should focus on specific segments and provides them with competitive offerings that satisfy their needs.

As mentioned before in the bank strategy, other factors can affect the banking industry, namely banking awareness, culture, marketing approach, service quality, how banks provide their services. Among these other factors is the existence of foreign banks competing with local ones. The following section will highlight on the different arguments of the effect of having foreign banks among local one. Streams of researches claim that foreign banks have a negative effect, and another group of researchers are supporting the diversity of having foreign banks. Supporters of the diversity are arguing that it will intensify competition and get know-

how transfer of latest systems, approaches and packages. Among these researchers Claessens, Demirguc-Kunt & Huizinga (2001) who investigated how foreign entry affects domestic banking market, looked at 7900 bank observation in 80 countries including Egypt from 1988 to 1995. They conclude that foreign banks in developing countries are performing better in terms of profit, interest margin and tax payment. Therefore, foreign banks take part from the market share of domestic banks. Nevertheless, Oteify (2006) argues that the new foreign banks that are entering the Egyptian banking sector will bring with them higher competitive mind-set that could negatively reflect on the current local banks and can take form their market share.

On the contrary, the argument provided by Berger and Humphrey (1997) claimed that liberalization of the banking sector does not guarantee increase in efficiency of banks. They argued that increase in efficiency would depend on the sector and industry condition even before liberalization. Mukherjee et al (2002) strongly supported this argument after assessing the Indian banking sector and the performance of private, foreign and public banks. They claimed that public banks in India are more efficient because they have larger number of customers, and are more spread nationwide across India through a large network of branches. They claimed that until now the private and foreign banks are focusing on niche market either in term of geographical location such as the main cities or customers' profile such as large corporate or high net worth individuals. Moreover, private and foreign banks invested heavily in high technology infrastructure that did not provide a return on investment yet. This argument is aligned with the argument of cost leadership and economies of scale mentioned earlier.

One can argue that the literature did not agree on a best practice concerning bank strategy, how to increase profitability or the effect of bank merger on performance and efficiency. Moreover, most of the studies were focusing on USA and few on Europe which have different market structure, banking awareness, regulation and size than other countries in the world especially Egypt.

2.2.3. Industry Structure, Concentration and Competitive issues in Banking

Organizations in different market structures behave differently based on the market conditions and the nature of competition they face. Kroszner (1998) and Mishkin (2007) argue that competition in banking is different than other sectors because in general sectors, competition is mainly driven by efficiency and development, however in banking it is mainly driven by regulation that make the limitation and also protection to the banks. The regulator in the developed world limits the bank activities by determining capital adequacy and leverage accepted by the bank, which product and services the bank can participate in or offer and by which amount. Moreover, the regulator limits the number of branches, set the required reserve non-performing loan ratio and required provisions. For the protection, the regulator is active in preventing non-bank institutions from competing with banks and the difficulty in establishing new bank or acquires the licence. This is supported by Heffernan (2005) who argues that regulation plays a role in monitoring and stopping monopolistic behaviour among banks.

Many studies explored the competition in the banking sector and how prices, performance and service offered are affected by the industry structure. The following part highlights on the main studies that focused on the industry structure and its effect on competition and bank performance.

A bank may pursue a strategy if competing with a large number of small banks, and the same bank may use a different strategy if it is competing with a fewer number of large banks. Linking the banking strategy to competition and the behaviour of organizations in different market structures, will be crucial for understanding the expected strategy that banks will follow. This section will review the competition models.

Berger et al (1997), Berger, Demsetz, & Strahan (1999) and Philip Strahan (2008) argued that bank's size and growth affect their chosen sector to serve. They discovered that when banks grow or mature, their lending to small and medium size enterprises (SME) is reduced and their preference to lending to large and well established corporation is increased. When banks grow, they prefer to conduct large deals to utilize their funds with relatively less risk of default and less transaction cost. Ibbotson & Moran (2005) emphasized the importance of the average size companies to any economy as it absorbs high level of employment. They claimed that the financial sector should help these companies to grow. Ibbotson & Moran (2005) justified this point as many small and medium companies have potential to grow fast and become more profitable to the bank. However, predicting how well and how fast a start-up company will

perform or even will survive is difficult. So many banks prefer to minimize risk and minimize their portfolio loan of small companies compared to well-established corporations. Berger, Demirguc-Kunt, Levine & Haubrich (2004), in their studies on bank concentration, competition and performance found that large banks would follow hard financial data to lend average size companies more than soft data (relationship). They also argue that service delivery will be standardized and non-exclusive. Nevertheless, average size companies will have to accept the rate and the collaterals as with high concentration, companies will have less choice to get their credit. In addition, this argument is expanded by Craig & Hardee (2007) stating that companies will also seek non-banking source of finance because the inflexibility of the banks. When banks cover their large corporates and still have un-utilized funds, they will seek new segment to serve or to expand in, one of these segments is the start-up and small companies. This is due to the increase in the competition and the increase in bank resources that needs to be utilized. Based on the analysis of Berger et al (2004), there are two arguments in developed and developing countries, one in favour of concentration claiming that it will help in growing the economy by supporting average size and banks will be able to absorb shocks. While the other argument not in favour of concentration arguing that banks will be too big to be willing to deal with small and average sized companies because of their risk and effort required to serve them. Moreover, in developing countries, high concentrations are increasing the barriers for small companies to access finance.

According to Hirschey (2008), the market structure defines the competitive environment. Based on his research, there are four main features influence the Market structure:

1. The number and size of active buyers and sellers.

The number of sellers and buyers will lead to the demand and supply curve, which indicates who has the power to control the demanded quantity, supply and the equilibrium price. Therefore, by having a large number of buyers and a few number of sellers or few quantity offered, seller is in a more advantageous position in setting their price.

2. The degree of product differentiation.

If the product has differentiation, then sellers will be able to increase their prices. On the other hand, if there is no differentiation, then buyers will only pay for the normal market price.

3. The market knowledge about product, price & quality.

The market knowledge is another aspect that identifies competition. If there is no market knowledge about the product and only the sellers has protection or patent for the product, no other company can make similar products and the seller will also have

the advantage to set a premium price. This is very clear in the pharmaceutical products that has patent.

4. How easy or difficult is it to enter and exit the market.

Last part is entry and exit barrier, which control the eligibility and capability of entering the market. This will identify the number of sellers in the market. This could be seen in telecom, cement, iron, fertilizers and banks. All these sectors required that they have licence from the government to operate, and most government are limiting the issues license, in addition to the high price required to get the licence, which is mainly based on auction.

Based on Sloman (2000), Lipczynski Wilson & Goddard (2009), Samuelson and Nordhaus (2010) Pindyck, & Rubinfeld (2012) and Perloff (2013), there are four main market structures, Perfect competition, monopolistic competition, oligopoly and monopoly. The definitions and characteristics of the different market types are as follow:

Table 2-1 : Monopoly table

Criteria	**Monopoly**	**Oligopoly**	**Monopolistic competition**	**Perfect Competition**
• **Ability to set price**	Price setter- significant control over price (sometimes has ceiling with government)	Price setter – but set by the main players	Price setter – some control over price	Price taker
• **Price level**	Very high	High	High	Low
• **Market power** P=price MC= Marginal cost	P > MC	P > MC	P > MC	P = MC
• **Entry Condition**	No entry - blocked	Limited entry	Free entry	Free entry
• **Number of firms**	1	Few	Few to many	Many
• **Long run profit**	>=0	>=0	0	0
• **Strategy depend on behaviour of rival firms**	No as it has no rival	Yes	Yes	No as market price is the main criteria
• **Product**	Mainly Single product - exclusive	May be differentiated or similar	May be differentiated	Mainly undifferentiated
• **Example**	Local natural gas utility	Automobile manufacturers Banks	Grocery stores or plumbers	Apple framers

Adapted from Perloff (2013)

The previous table highlights on the difference among the different market structure from the monopoly situation, in which the market is dominated by one player who dictates all the rules.

On the other extreme is the perfect competition in which the market is open to all players and no one can have any control on the rules of the sector in term of prices, quantity and behaviour.

To be able to assess the market structure to identify which category it belongs to, concentration measures are used. Based on Shy (1996), Perloff (2013) and Lipczynski et al (2009) concentration measures help in comparing different industries and countries despite their size, number of firms and distribution of market share. Based on these researchers, among the most common general concentration measure are the Herfindahl – Hirschman Index (HHI) the entropy coefficient and the Gini coefficient. As for the banks concentration ratios, the most common are the K Bank Concentration ratio, Panzar & Rosse's H Statistics, Lerner Index in addition to Herfindahl – Hirschman Index. It is acclaimed that this literature review will cover mainly the measurement and index that are frequently used in the banking sector to measure concentration and industry structure.

Moreover, market structure and competition in banking are explored by Casu & Girardone (2006) who conducted a research on the banking sector at 15 European Union countries during the period of 1997 to 2003 using concentration index of Panzar and Rosse approach and the Data Envelopment Analysis. Using a 3 and 5 bank concentration ratios, they find that concentration did not lead to increased competitiveness, which should lead to benefits for the customers, but led to more market power of the operating banks. They also discovered that the most efficient banking system in Europe is the least competitive not vice versa. They found out that Finland was almost near perfect competition with a score of 0.96 while Greece had almost a zero, which is monopoly. This idea is supported by Berger & Humphrey (1997) who claimed that there is a positive relation between concentration and profitability which could be due to the market power that the bank can have in high concentrated industries. This outcome will be compared with the outcome of this thesis on the effect of the consolidation on performance.

Based on Bikker & Haaf (2002), Berger et al (2004) and then supported in later years by Casu & Girardone (2006) and Degryse, & Ongena (2008), the following are the main approaches in assessing bank industry structure and concentration.

1. Structure-Conduct- Performance paradigm

This approach is based on the industrial economics and industrial organization theory and is considered among the early approaches to assess concentration, competition and efficiency. (Heffernan 2005, Casu & Girardone 2006, Matthews & Thompson 2005 and Shaked & Sutton (1987). This paradigm propagates the idea that the performance of companies will depend on how firms in the industry behave, and that this behaviour is mainly dictated from the structure

and dynamics of the industry. Therefore, firms are reacting to the industry structure and other companies.

The definition of each of its components is as follows:

> *Structure*: concentration of firms in the industry reflected from the market share of the main player which depends on the interaction between the demand and supply.
>
> *Conduct*: behaviour of firms in the industry either by competition, collusion or by external factors such as barrier to entry.
>
> *Performance*: Market power of the firms in terms of price and quality setting which reflect on efficiency and the output the firm can produce.

In this model, it is assumed that reduction in concentration in the industry will led to more competition, which will lead to less market power of the main players on the market which will result in increased efficiency or to have profit over marginal cost and vice versa. Therefore, increase in concentration will reduce efficiency by having more collusion among the main players in the industry. Collusion will make the main players set prices, quality or other related variables and finally have more power on the industry (Heffernan 2005, Casu & Girardone 2006 and Fairburn and Geroski 1989). Degryse and Ongena (2008) add that the structure – conduct – performance hypothesis could be tested by regression of a bank performance on market concentration. Based on Bikker & Haaf (2002), the concentration of an industry does not necessary describe the competitive performance, as some sectors might be highly concentrated but with fierce competition.

Although the Structure – Conduct – Performance (SCP) is widely followed, it has many limitations. Based on the arguments of Berger et al (2004), the SCP method considers only one variable and ignores other variables, which could be viewed as a drawback. Among these variables are the bank variables such as size, number of branches, geographical expansion, cost and marketing. Another variable is the industry variables such as entry barriers, regulation and economic cycle. The SCP as well does not consider the dynamics of the industry such as increase in profit might lead to attracting other players, which will reduce the concentration and then the efficiency. Finally the one-way causality assumption that states that only the structure of the industry dictates the behaviour of the player and then the end performance of each one. Therefore, although the Structure- Conduct- Performance assesses performance, but the assessment is based on the external forces, which is mainly competition, which affect the behaviour of the bank. That is why many research, such as Berger et al (2004), use different methods for assessing performance such as the data envelopment analysis DEA that can include different output variables. The DEA will be covered later in this chapter.

2. The K Bank Concentration ratio CR*k*

The concentration ratios are considered the measurements that could be used to apply the Structure – Conduct – Performance to assess the market structure, and the dominance of specific firms on the market.

The K bank Concentration ratio (CR*k*) is among the most commonly used concentration ratio because of its simplicity. The following is the equation of CR*k*

$$\mathrm{CR}k = \sum_{i=1}^{k} S_i.$$

Whereas the *S* is the market share of bank *i*, *k* is the total number of banks in the sector
It is summing the market share of the leading banks in the sector then divided by the total market. The CR*k* should be within the range of $0<\mathrm{CR}k \leq 1$. Score near 1 means that the market is concentrated and one or few banks are dominating the sector, while score near the 0 means that there is no concentration and that almost all banks have the same market share (Bikker & Haaf 2002 and Tushaj 2010).
The number of the leading banks to be included has no standards and depends on the researcher and the sector structure; however, most researchers use 3,4,5,7 and sometimes 10 leading banks in the model based on the nature of the banking structure and the number of operating banks. The CR*k* ignores the small banks and considered their effect on the sector is minor. The market share calculated in the model could be the credit, the deposits or the asset portfolio of the banks. Bikker & Haaf (2002), Al-Muharrami, Matthews & Khabari (2006) and Tushaj (2010).

There are two general mode of index structure, discrete and cumulative. In the discrete model, only selected sample from the population to run the test is taken. While in the cumulative, all the population are selected. The CR*k* is considered a discrete model, in which you can run the model without the need to compute all the population. The supporters of the discrete models argue that they are simple and easy to conduct and that small banks will not make the difference in the results, as their contribution to the market is very marginal. However, the critics on the other side assume that by not taking the full population the results might be incomplete because it will ignore the effect of the competitive behaviour of small entities that could affect the industry. (Bikker & Haaf 2002).

Among the arguments against using the concentration index as the only measurement to assess competition or performance were raised by Berger and Hannan (1989 & 1998). They

argued that concentration in itself cannot lead to higher profits or better services, as bank efficiency will affect the results by having small efficient banks growing and large inefficient banks lose market share.

3. Herfindahl–Hirschman Index (HHI) of market concentration

Based on Lipczynski et al (2009) and Bikker & Haaf (2002) the Herfindahl–Hirschman Index is also among the commonly used index to assess concentration. HHI identifies the concentration in a given industry based on the output (market share) of every firm and it is considered a cumulative model. The following is the basic equation of HHI

$$H = s_1^2 + s_2^2 + \ldots s_n^2$$

Where S1 is the market share of company 1, S2 is the market share of company 2 etc…
According to Bikker & Haaf 2002, The HHI is the tool used by the American regulator to assess the concentration and the industry structure and apply the anti-trust laws in banking. It overcomes the drawback of the K bank Concentration ratio by including all the population of banks in a given country. Again, one of the main drawbacks of this method, that it takes only one variable into account and disregard either bank variables such as size and efficiency or environment variables such as barriers to enter or to exit the market. (Casu & Girardone 2006, Berger et al 2004 and Tushaj 2010).

4. Lerner Index

Another model is used to assess market power is the Lerner Index. This is a non-structure approach to measure market power of the given industry. It measures the relative mark-up of price above the marginal cost. (Matthews & Thompson 2005, Bikker, Spierdijk & Finnie 2006, and Perloff 2013)

$$L = \frac{P - MC}{P}$$

Where p is the price, MC is the marginal cost and L is the index

The Lerner Index get a result from 0 to 1, where the competitive firms get closer to 0 and firms with more market power or have less demand elasticity will be closer to 1

In case of having different market share, the equation will be the following

$$L=s1\ ((p-MC1)/p) + s2\ ((p-MC2)/p)+ sn\ ((p-MCn)/p)$$

(Casu & Girardone 2006)

Although this method computes more variables, it depends on marginal cost of each bank, which could form a barrier for the research, as these data will be available to insiders only if it

is available and calculated. To operationalize the equation, some researchers use profit / revenue as proxies arguing that (price – marginal cost) could be profit and the price is the revenue. (Matthews & Thompson 2005, and Perloff 2013)

5. Panzar & Rosse's H Statistics

This is a non-structured method to evaluate the degree of competition in a given industry based on the following conditions: Competitive, Oligopolistic, and Monopolistic (Panzar & Rosse 1987, Heffernan 2005, and Casu & Girardone 2006)

Panzar & Rosse is considered among the most widely used methods to assess the competition and industry structure in the banking sector. They developed the H-Statistics. They use a bank level data and test how changes in factor inputs can affect the revenue of the bank. This was presented by Degryse and Ongena (2008), Bikker, Spierdijk & Finnie (2006) and Casu, & Girardone, (2006) as follows:

If $H =< 0$ then it is a monopoly or collusion oligopoly

If $0 < H < 1$ then it is monopolistic competition

If $H = 1$ then it is perfect competition.

Although Panzar & Rosse (P-R) is regularly used, some controversial arguments were raised concerning the definition of revenue of the bank. The earlier studies were defining revenue as the interest income of the bank given that it is the main source of income and the core of the banking activities, however, with the diversification of the activities conducted by banks especially during recessions, non interest-income is considered a main source of income to the bank. This lead some researchers to start adding the non-interest income in the equation as Bikker, Spierdijk & Finnie (2006) and Berger, Demirguc-Kunt, Levine & Haubrich, (2004) were claiming.

2.2.4. Bank Efficiency

The banking market structure and the concentration ratios helped to some extent to understand the behaviour of banks. However, it did not provide the full picture of analysing the banking sector that is associated with high level of merging and acquisition (Degryse and Ongena (2008). Based on Loretta Mester (2008) and DePamphilis (2008), among the mostly repeated reasons is to have economy of scale, scope, increase market power, access to market and to increase efficiency. However, Mester (2008) is claiming that economy of scale could be reached in relatively small banks and that there is no need to go into creating a banking empire to increase efficiency.

Efficiency and Performance is a measurement system that has a set of indicators derived in a consistent manner according to a forward set of rules or guidelines to be able to judge and assess results as stated by Welch and Mann (2001) in Anderson and McAdam (2004). Efficiency is a measure, which compares best or desired performance versus the actual performance (Mester 2008)

Anderson & McAdam stated that some assessments use lagging measures, which depend on past performance or historic data and are mainly financial measures. This is compared to leading measures, which include in addition to the financial measures, non-financial measures that help in predicting the future performance and results of the firm or the bank. These non-financial measures could be called activity measures, as they are the activities conducted by the company through people to achieve the financial results.

There are many methods to assess firms' performance; the most common used ones are financial assessments, which are based on financial and accounting figures. The financial and investment analysts developed more advance methods based on the cash flow and future earning to predict the performance of the firm to assess its current value. As many of the companies are listed in the stock market, most investors are more concerned with the financial results and either performance that mostly indicate the change in the stock price or the dividend that will be distributed (Damodaran 2012).

The following section will cover the literature of efficiency especially in the financial sector.

2.2.4.1. Bank Output and Productivity

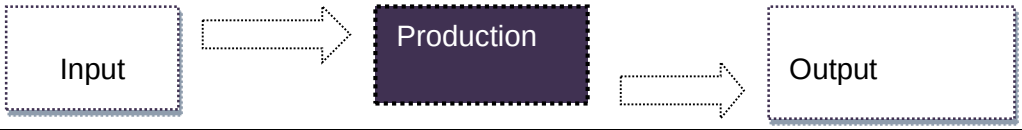
Based on Heffernan (2005), banks and financial institutions are in the service business, and defining and measuring output and productivity in services sector could be a complicated task. He claimed that the definition of output and productivity could be represented by number of transactions, value of accounts, profit or by dividing these numbers by the number of employees to measure efficiency.

Researchers have assessed the banking industry performance from various angles. Mostafa (2007), Lim & Randhawa (2005) and Matthews & Thompson (2005) were taking a developed approach when reviewing the banking industry. They looked at the bank from two different approaches: 1- the production approach and 2- the intermediation approach.

The Production Approach:

Based on Mostafa (2007), Mester (2008), Heffernan (2005) and Matthews & Thompson (2005), in the production approach, the bank is considered as any company or factory that uses its resources such as capital and people to generate the output required which is the number of transactions for transfer, deposits and loans account. The following diagram illustrates the production approach.

Figure 2-2: Production Approach



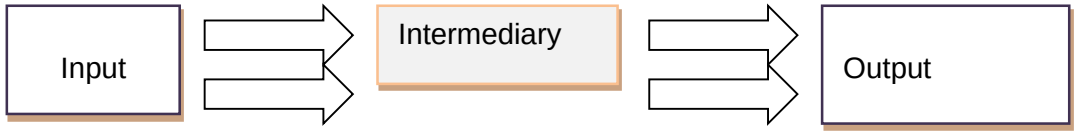
Resources such as:	Production:	Output:
○ Labour ○ Capital ○ Fixed assets	○ Transaction ○ Document processing	○ Number of transaction ○ Number of account (either loan or deposits

Lim & Randhawa (2005) argued that the production approach lacks the information availability to provide revenue versus cost (human cost, time, and effort for each transaction. They claimed that the monetary amount is generally accepted as substitute. As the transaction number is not a direct indications of profitability, Matthews & Thompson (2005) and Heffernan (2005) debated that this approach ignores different variables such as interest cost, size and profitability or revenue per transaction, which means that all the focus will be on the transaction output not on the outcome and revenue generated from these transactions. However, it might help in assessing the operational efficiency.

The Intermediation approach

The intermediation approach acknowledges that the core business of the bank or the financial institution is the facilitation, brokering or intermediation between deposits and loans. Banks are not the producer of the loan or the deposit service but they are service providers. (Mester (2008), Mostafa (2007), Heffernan, 2005 and Matthews & Thompson, 2005). The following diagram illustrates the intermediation approach:

Figure 2-3: Intermediation approach



Deposits & Labour	**Transforming money**	**Loans**
Amount of deposits	Service	Amount of loans
Cost of deposit		interest & risk of loans
Cost of labour		
Other fixed & variable cost		

The intermediation approach identifies the earning assets such as loans, securities and the core banking services as output and the other items which incur cost as input such as deposits, salaries or other expenses. In recent studies, when the off-balance sheet items such as non-interest income and fee based services, started to grow and began to have a noticeable effect on the bank's revenue, researchers begin to account for these items as output which has a positive effect on the efficiency. (Heffernan 2005 and Matthews & Thompson 2005).

Based on the literature review, most researchers in the banking and financial field used the intermediation approach. This is supported by Heffernan (2005) who claims that researchers prefer the intermediation approach because of the data availability issue, as the detail number and value of the input and the number of transactions will be difficult to get either because it is confidential or because they are unavailable. On the contrary, the intermediation approach uses mainly financial figures and numbers that are available in the financial statements.

Based on Matthews & Thompson (2005) and Heffernan (2005), another challenge is how to identify input and output, as mentioned above, using the production model would dictate set of input - output measures and by using the intermediation model different input- output measures will be used.

Another limitation issue was raised by Heffernan (2005) concerning the usefulness of the production and the intermediation approaches. He argued that both approaches ignore to

account for the quality of the loan and deposit portfolio in term of the risk associated with the loans and maturity dates of loans and deposits, in addition to external factors such as competition and economic cycles.

Some researchers used both approaches in their model; they called this mixed approach the two stages model. Among the researchers who used the two stage approaches are Lim & Randhawa (2005) and Hu & Zhu (2004). They assumed that to evaluate better the bank's performance and activities, inputs and outputs would be divided into two stages. The input will be looked at as production approach where its main duty is to collect deposits or funds with least cost possible such as labour and physical capital. This stage is looked at like the early stage of the supply chain to get raw materials, factors of production or sourcing for the factory. The second stage is the intermediary one where the main task is to provide the deposits into loans with the highest return possible while minimizing the risk. This stage is focusing on the market, demand for loans and assessment of each opportunity and deal. Hu & Zhu (2004) took this approach a bit further and started to identify the first stage as efficiency and the second as effectiveness. Hu & Zhu (2004) conducted their research on different banks especially in Hong Kong and Singapore and they found out that a bank with better efficiency does not always mean that it has better effectiveness. Finally, Hu & Zhu (2004) claimed that there is no apparent correlation between these two indicators.

In both approaches, the term of X – Efficiency rises. Based on Matthews & Thompson (2005) and Heffernan (2005) for banks to be called pure technically efficient they need to reach a level of efficiency at which they have to increase a unit of output or reduce a unit of input to be able to reduce input or to increase the output. There are two main X- efficiency framework, cost X- efficiency and profit X- efficiency. More attention was given to the cost X- efficiency because bank managers have more control on the cost structure.

To be able to assess bank performance, the researchers were using different mathematical and analysis models to be able to look and assess performance. From the mathematical significance test, there are two main approaches, Parametric and non-parametric. Based on Saunders et al (2009) and Sekaran (2005) the parametric test is used when the sample's data are large, normally distributed (either it includes all the population or it is an exact representation of the population of the sample) and the data are on interval or ratio scale. If the sample does not comply with the previous requirement, then the non-parametric test is used even with the nominal or ordinal scale. Based on Saunders et al (2009) and Sekaran (2005), parametric test are more powerful than the non-parametric because it's accuracy of the sample's representation, moreover, the results of the parametric are easier to interpret as the non-parametric results are mainly ranking among the sample itself.

Most of the used performance assessment methods are under the methodology of the efficient frontier approach that is used to test the X- efficiency of an organization compared to the rest of the sample. The approach is measuring different variables as input and output, and the units that scored the highest are considered the frontier of the benchmark, are given a 100% score, and are considered the most efficient. Other unites are considered less efficient with a score less than 100% according to the distance from the frontier. Among the concerns of this model is that the most efficient unit might not be efficient in another sample, moreover it might be difficult to assess with different sample as benchmark and variables might be different (Matthews and Thompson 2005).

The following models are the main models that are used in assessing banks performance and efficiency categorized under the parametric and nonparametric tests and following the methodology of efficient frontier approach. (Berger and Mester 1997, Reda 2008, Mester 2008, Paradi, Yang & Zhu 2011)

Nonparametric	Parametric
1. Data Envelopment Analysis (DEA)	**3. Stochastic Frontier Approach (SFA)**
2. Free Disposal Hull approach (FDH)	**4. Distribution-Free Approach (DFA)**
Drawback: assumption of no random error	**5. Thick Frontier Approach (TFA)**

1. Data Envelopment Analysis (DEA):

According to Paradi, Yang, & Zhu (2011) the DEA is the most common non-parametric analysis tool that is used to assess financial institutions and especially in the banking sector. According to Banker and Natarajan 2011 and Cooper, Seiford, & Zhu (2011) the DEA became a popular methods and analytical tools to assess and measure performance. Based on Berger & Humphrey 1991 & 1997, DEA is a linear programming technique that depends on a simple concept to assess the performance of the bank which is: to what extent the bank can produce more output with the same level of input. Alternatively, to what extent the bank can use less input to produce the same output level. This output – input is called the orientation of the model.

According to Cooper, Seiford, & Tone (2007) a DEA could be summarized in this basic ratio of:

$$Efficiency = \frac{\text{Output}}{\text{Input}}$$

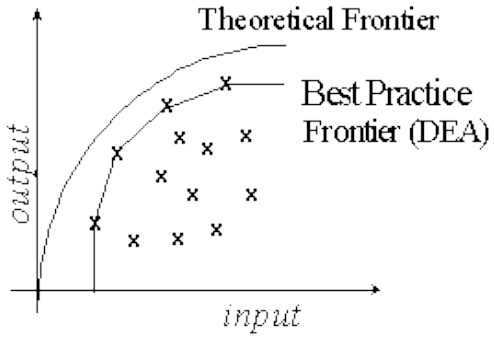
Therefore, it measures the rational decisions of management in utilizing the resources or getting the maximum outcome. So to increase efficiency, either increase output with the same input, or reduce input with same level of output, or increase output and decrease input at the

same time. The output and the input variables can include different components to produce efficiency score not just a simple ratio.

As mentioned before, the DEA assumes input – output as measurement variables to get the most efficient firm between the sample, the most efficient get the score of 100% and the other firms are compared to them. So the efficiency is compared among the sample under study. The DEA can help in identifying the weakness of each firm and based on which variable compared to the best in class of the selected sample. Banker, Charnes, & Cooper (1984). Cooper, Seiford & Zhu, (2011), Heffernan (2005), Casu & Girardone (2006) and Matthews and Thompson (2005).

The following diagram highlights the difference between a theoretical frontier, which is the best possible frontier that could be achieved and the DEA frontier, which is the highest frontier, based on the sample at hand.

Figure 2-4 : Theoretical frontier versus DEA frontier



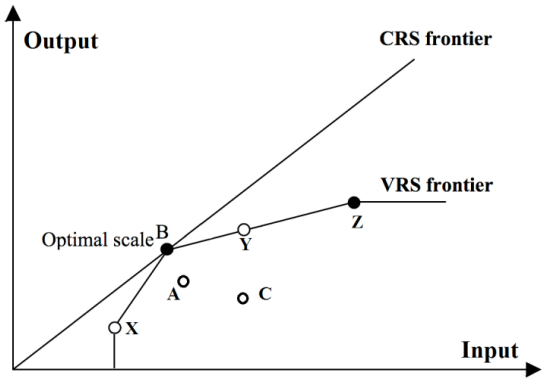
In addition to the input-output orientation, selection of return to scale makes a difference in measuring efficiency. According to Golany and Thore (1997) and Ramanathan (2006) and Cooper, Seiford and Tone (2007), there are different return to scale models such as the constant return to scale CRS (line), variable return to scale VRS (convex line), increasing, decreasing and generalized return to scale (a controlled convex line). The CRS occurs when an increase in inputs by 1% leads to increase in output by 1%. The VRS occurs when the CRS assumptions does not occur.

Golany and Thore (1997) and Ramanathan (2006) stated that based on the DEA tests the CRS efficiency scores are less than or equal to the VRS efficiency scores. Moreover, the CRS measures the technical efficiency and the efficiency loss when the variable is not operating in the efficiency scale size, while the VRS assesses only the technical efficiency.

The following graph illustrates the difference between the CRS and the VRS. In case of CRS, point B is considered the optimal scale and made the efficiency frontier and all other points

are scales to point B. While in VRS all points that scored high enough to form the VRS frontier are considered efficiency such as point X, B, Y & Z, all other points such as A & C are not efficient.

Figure 2-5: CRS versus VRS

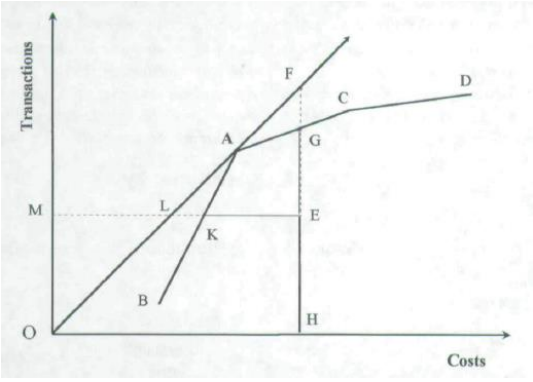


Based on Joe Zhu (2003), Cooper, Seiford and Tone (2007) and Cooper, Seiford and Zhu (2011) there are different models that were developed based on the DEA approach to address different situations.

The basic model is the Charnes – Cooper – Rhodes (CCR) model which was initially proposed in 1978.

Athanassopoulos and Giokas (2000) in their assessment of the efficiency of the Greek banking sector illustrated the DEA frontier in the following chart.

Figure 2-6: DEA of Greek Banks



Assuming A,B,C & D are bank branches, A is the most efficient branch, which made it the efficiency line, and other branches are compared to it.

The CCR model computes a single year and it is a constant return to scale model. Based on Banker, Charnes and Cooper (1984), the CCR takes into consideration the technical and scale inefficiency. The technical inefficiency occurred in the case of being unable to get the best output level or the required input level.

The most widely used method in banking sector is the Banker – Charnes – Cooper (BCC) model. The BCC model assumes a production frontier that is spanned by the convex hull of the variables of the model. The BCC model computes a single year. The BCC model is a variable return to scale model.

Among the limitation of the BCC and the CCR models that they are static models and analyse variables that are taken in a single period. If more than one year needs to be studied, another test should be conducted then both test results will be combined. To overcome this, the Window Analysis DEA model is considered the basic CCR model but looking at the variable over time and computing different years together.

Among the questions that were raised about the DEA approach by Casu & Girardone 2006, is the assumption that bank managers having control over inputs and outputs. For example, they can eliminate either the very efficient units or the very inefficient units, so they do not affect the results. Moreover selecting the benchmark to assess against is the managements' decision. This could be true in using qualitative and difficult to measure variables, and also when using the financial results as evaluation criteria, as management can manipulate the definitions to either include or hide items from being noticed.

Based on Paradi, Yang, & Zhu (2011) and Dinçer (2013) the DEA method was used in many countries in the banking sector. They stated that during the period of 1985 to 2011, the DEA was used in conducting 50 researches in USA banks, 28 research in Spain, 25 researches in Canada, 25 researches in UK, 23 in Sweden, 22 in India, 20 in Italy, 19 in Taiwan, 18 in Greece and 17 in Germany. In addition to other studies that cover cross-country studies. Among these studies, they found out that 36% of them used variable return to scale (VRS) in the model, 26% used constant return to scale (CRS) and 38% used both CRS and VRS assumptions. Results of these studies vary based on objective of the studies (branches assessment, foreign entry and privatization) the economic cycle, the variables used, industry structure and development of the sector.

2. The Free Disposal Hull approach (FDH):

The Free Disposal Hull approach (FDH) is a case of DEA, which produces larger estimates of average efficiency. (Berger & Humphrey 1997). The main difference between FDH and DEA is that FDH does not include in the frontier the points on lines connecting the DEA vertices. (Reda 2008). Moreover, among the drawbacks that it does not make any assumptions about the form of distribution across the observation.

3. Stochastic Frontier Approach (SFA) or the econometric frontier approach

The Stochastic Frontier Approach computes different variables such as profit, cost, or production as relation between input and output, the external environment and also it allows random errors. However, it does not separate the random errors from the inefficiency in the results. (Berger & Humphrey 1997, Matthews and Thompson, 2005 and Mester 2008). The Stochastic Frontier Approach identifies cost or profit function and the banks is considered cost inefficient if its cost exceed the others or considered profit inefficient if its profit is below the other banks assuming using same input – output resources. Based on Heffernan (2005), the stochastic cost model is as follow:

TC= TC(q,p,z,u,e)

Where

TC: variable total cost
q: output variable
p: input variable
z: quantities of fixed input or output that might affect output
u: error term of allocative inefficiencies
e: random error.

4. Distribution-Free Approach (DFA)

Based on Berger & Humphrey (1997), Matthews & Thompson (2005) and Mester (2008), the Distribution-Free Approach (DFA) is similar to Stochastic Frontier Approach (SFA) but it follows different separation of inefficiency and random errors, under the assumption that efficiency is constant and error is average to zero over time. Moreover, if there is a panel data the DFA is recommenced to be used.

The DFA follows the following equation:

Inefficiency = average residual of the individual firm – average residual of the frontier's firm

5. Thick Frontier Approach (TFA)

Berger & Humphrey 1997 and Matthews & Thompson, 2005 argued that Thick Frontier Approach (TFA) is a similar frontier approach to DFA and SFA but it offers a general level of efficiency that firms can move within. It does not provide individual rating or ranking but it highlight on the range that the industry lies within.

One can argue that due to the different variations and methods that could be used to assess performance and efficiency, it is rarely to find common ground for comparison of the outcome or to be able to reach a concrete methodology and approach to follow.

Berger & Humphrey (1997) were looking at this challenge and argued that there is no best approach as each of the approaches has some limitation and varies based on the context. They recommended that there should be more flexibility to the parametric approach and space for random error in the non-parametric one. They debated that there are some attempts to combine both methods by having a stochastic DEA. Based on Matthews & Thompson (2005) researchers such as Bauer et al (1998) used the mentioned above methods to assess the same sample, they found a consistency of results among the parametric methods and consistency of results among the non-parametric methods, however, when comparing the parametric and non-parametric results, they found that the results of the two were not consistent.

From the literature review conducted, most of the researches reviewed were using different DEA method, moreover some definition of input and output or the variables used were different in some of the studies. In addition to that, some of the researchers were using the production approach and other used the intermediation approach which affects the selection and definition of variables of input and output. Researchers who used DEA were Duncan & Elliott (2004), Ho & Wu (2006), Ho & Zhu (2004) Berger & Humphrey (1997), Berger & Mester (1997), Berger, Leusner & Mingo (1997), Barr, Killgo, Siems & Zimmel (2002), Ayadi, Adebayo & Omolehinwa (1998), Canhoto & Dermine (2003), Lim & Randhawa (2005), Mukherjee, Nath & Pal (2002) and Casu et al (2004).

Other researchers such as Avkiran (1997) use different performance measures and indicators to include in the banking industry. These indicators are mixture between qualitative and quantitative measure that could be used in the DEA models to assess the performance of the bank. Avkiran (1997) used four measures in his research, they are:

1. Service delivery and quality
2. Sales (growth of quantity of loans and deposits)
3. Expenses control (production efficiency)
4. Loss control (risk management)

Rhee & Mehra (2006) used the same approach and general definition of the performance criteria but developed the following performance indicators to assess banks performance:

1. The sales growth
2. The profit growth and
3. The profitability

Looking at these measures, one can claim that they are lagging measures and financial measures that not necessary indicates the success of the strategy in the future, as they focuses on the past financial performance driven from the financial statements.

For the lagging measures, Charbaji (2001) categorized banks based on three dimensions of bank performance:

- Profitability factor (interest margin, total spread, interest paid/interest received)
- Investment factor (ROE, Net return on average equity to hurdle rate)
- Liquidity factor (Total net liquid asset / total deposits, T bills/ total deposits)

Hess & Francis (2004) argued that financial ratios and benchmarking which are derived from the financial statements such as the ones mentioned previously by Avkiran (1997), Rhee & Mehra (2006) and Charbaji (2001) are not enough to evaluate the bank performance or the efficiency. Process measures for example are also key factors to provide insight of performance, effectiveness and efficiency and could give an indication about results in the future. This argument is supported by Quey-Jen Yeh (1996) as he claimed that financial ratios alone cannot provide the full picture, he added that using other assessment methods would provide better meaning and evaluation to the results. Process measures could include time, number of transitions, error rate, re-do rate, transaction cost, overhead, resources used to perform a task or problems in processing documents.

Ho and Wu (2006) also stated that using only financial ratios and indicators could form a very long list, which will make comparison difficult confusing and hard to relate. Therefore, they conducted a research to compare the outcome of the financial statement analysis (FSA) and other analysis tools that account for missing data for three banks. The aim or the purpose of the research was to test the similarity or difference when reducing the indicators from 59 financial ratios to 23 representative indicators. The results proved the same output.

Duncan & Elliott (2004) were using financial performance and related it to non-financial performance. As they argued that financial performance such as interest margin, expense/income, return on asset and capital adequacy are positively correlated with customer service's quality score. They also defined efficiency as relationship between output and input. In financial efficiency, it is a relative measure that reflects the deviation from maximum attainable output for a given level of input. In their analysis, they used two measurement techniques that were developed by Charnes, Cooper and Rhodes (CCR) using the Data Envelopment Analysis (DEA) to prove the positive correlation. The DEA seeks to minimize the input to produce the same output assuming constant return to scale. i.e. doubling input will double output. However, for the CCR efficiency score will be affected by score efficiency.

Although many researchers investigated different models to look at the banks performance and compared the relationship between bank size and efficiency, but there is no clear agreement on the effect of bank size on efficiency. Kaparakis, Miller and Noulas (1994) and Hermalin and Wallace (1994) found a considerable negative relationship; Berger, Hancock,

and Humphrey (1993) found a significant positive relationship; and many of the other researchers such as Isik and Hassan (2002), Ali, Grabowski, Pasurka, and Rangan (1990), Berger and Hannan (1998), Cebenoyan, Cooperman, Register and Hudgins (1993), Mester (1993 and 1996), and Pi and Timme (1993) found an insignificant relationship which means that there is no economy of scale could be benefitted from by growing the balance sheet and operation. Moreover, Berger and Hannan (1998) found limited evidence that banks in concentrated market are less efficient than banks in more competitive market with more players and no dominance by limited banks.

2.2.5. Research on Egypt's banking sector's efficiency.

The previous literature was mainly presenting the research conducted and the different perspective in looking at the banking and financial sector especially in the developed economy. This section will reflect on the research conducted in assessing the financial reform, bank performance and efficiency in Egypt. It will describe the research conducted, the method applied and the outcome, then comments and critique will be mentioned at the following section.

Compared to the research conducted at the developed countries and especially in US and UK, there are relatively few researchers who did assessment on the bank performance in Egypt. Bolbol, Fatheldin, and Omran 2005 did an assessment to test the relation between the banking sector and the economic performance and the effect of relative financial structure on total factor of production and GDP growth. They worked on an econometric model to compared bank change in performance the economic change in Egypt during the period of 1974 to 2002. Moreover, they did a correlation to test the extent to which the Egyptian economy is dependent on the banking sector by comparing bank-based indicators with market-based indicators. They find that the Egyptian economy and financial sector relies heavily on the banking sector and that the banking institutions are the main driver of the economy in Egypt because of the market share and dominance of public banks and the limited effect of the other financial institutions. This study was mainly looking at the effect of the open door policy on the economy and the banking sector and the early waves of reform that occurred from 1974 to 2002.

Mostafa (2007 & 2009) and Emrouznejad, and Anouze (2009) were among the researchers who assessed performance and efficiency on Arab banks to come up with a regional bank efficiency list. They were mainly using CCR and BCC DEA analysis with a variable return to scale to account for the bank size into the performance. Mostafa (2007& 2009) used cross sectional data for year 2005 to test the efficiency. He selected the top 100 Arab banks in year 2005 to be the sample. His input variables were asset and capital, and output variables were net profit, return on asset and return on equity. He selected output oriented test. According to his results, he made a list of the most efficient bank based on efficiency. His results presented Banque du Caire and Egyptian American bank to be the most efficient Egyptian banks on the 100 banks (score of 1), to Bank Misr, National bank of Egypt and Egyptian Arab Land Bank to be the least efficient in the sample (score of 0.07, 0.055 and 0.004).

Emrouznejad and Anouze (2009) were not convinced with Mostafa's (2007 and 2009) DEA results, and they did their research to verify the outcome. They followed the same approach that Mostafa (2007 & 2009) did including the methodology, sample, variables and theoretical framework. They claimed that after testing the methodology, framework and variables used they found out that they are adequate for the test. However, they came up with different and contradicting results. For Example, Mostafa (2007) argued that Banque du Caire is among the efficient banks, however, Emrouznejad and Anouze (2009) argue that the bank was not efficient and among the lowest performing banks. Emrouznejad and Anouze (2009) justified this difference due to human error in transferring the data to the model or due to different data handling. They also claimed that the use of CCR method is not adequate due to the difference in size of the banks. Finally, Mostafa (2007 and 2009) used ratios as output variables (return on asset and return on equity), Emrouznejad and Anouze (2009) claim that although it could be used but it is not recommended as it ignores the size factor and consider only the ratio.

The following table highlights on the results developed using the BCC for the Egyptian banks for year 2005.

Table 2-2: BCC score comparison

Bank	BCC score Mostafa's (2007 & 2009)	BCC score Emrouznejad & Anouze (2009)
Banque de Caire	100%	3.9%
Egyptian American Bank	100%	100%
Suez Canal Bank	100%	4.6%
Arab African Int'l Bank	42.8%	42.8%
HSBC Bank Egypt	22.5%	26.9%
Bank of Alexandria	13.2%	8.5%
Arab Int'l Bank	9.5%	8.4%
Banque Misr	7.3%	6.5%
National Bank of Egypt	5.5%	5.5%
Egyptian Arab Land Bank	0.4%	0.3%

The previous table shows that by changing some of the data the results can be changed dramatically especially for Banque de Caire and Suez Canal Bank.

The study conducted by Mostafa (2007 & 2009) and by Emrouznejad, and Anouze (2009) looked at the banks in the Arab region and did not consider that each country has a different economic structure and model. Moreover, they only looked at one year, which is 2005. By having a one year study, that includes different countries with different economic cycle, regulations, reform, GDP size and growth might not give the required in-depth analysis or tools to make the assessment. Worth to mention that these studies were among the few that used output oriented DEA model.

Ben Naceur, Ben-Khedhiri, and Casu (2009) used an input oriented BCC model to assess bank efficiency in the MENA region (Egypt, Jordon, Morocco, and Tunisia). Their study covered a period of 14 years from 1993 to 2006. They followed the intermediation approach in which input variables were total cost, which includes personnel expenses, administration expenses, interest paid, non-interest expenses. The output variables were total loans and other earning assets. They found out that Egyptian banks compared to the other countries were less efficient with average score of 61.56%, while Tunis and Morocco have average of 86.3%. Moreover, Egyptian banks in 1996 (73.3%) were more efficient than in 2004 to 2006 (50%). They also found out that countries, which have high concentration, were having lower cost efficiency, which is against the views that state that high concentration leads to bigger banks and higher efficiency which is complying with the findings of accordance with Berger (1995) and Athanasoglou et al (2008).
Although this model overcome the shortcoming of the previous study of having a single year analysis, but it also didn't take into consideration the different economy of each country which consists of banking structure, GDP size, GDP growth, government banking reform and the ownership of banks.

As it will be explained in detail in a later chapter, the banking sector experienced different reform waves. In 1991, central bank of Egypt put a new regulation for banks to increase the paid in capital. Ben Naceur, and Kandil (2009) also conducted another research to test the impact of increasing the capital requirement on cost and profitability. They used an empirical model that combine cross sectional and time series data. Their sample consisted of 28 banks observed over the period of 1989 to 2004. The variables used mainly depend on profitability ratios such as Return on Assets and Return on Equity, and for the capital measure is the capital to total assets. They also included other variable such as liquidity (net loans over deposits and short term borrowing), implicit cost (non-interest expenses to non-interest revenues, management efficiency (earning assets to total assets), bank size, cost efficiency (overhead to total assets), reserve and market power (market share of total assets). The results showed that with high capital adequacy ratio, the risk of shareholder increases, the bank increases the cost of intermediation that leads to higher profitability in term of return on equity and return on assets. They also claimed that other factors such as improvement of management efficiency and reduction of inflation improved the profitability of the banks.

Ben Naceur and Omran (2011) conducted a similar test like the previous one but on a larger sample of 10 countries in the Middle East and on 173 banks in the time span between 1988

and 2005 and used multivariate regression models. They measured bank performance by using cost of intermediation (measured by net interest margin), operating performance (total operating costs divided by the sum of total earning assets and total deposits) and profitability (Return on assets). They accommodated for other proxies such as bank size, equity and risk to normalize the model. Results were similar to the previous study of Ben Naceur, and Kandil (2009), the higher the capital and the better credit risk the higher the profitability, net interest margin and cost efficiency. They also found that economic indicators have no effect on bank performance apart from inflation. As mentioned before, comparing banks from different countries might give a false indicator and efficiency score.

The privatization waves that occurred in Egypt and the debate of the effectiveness of it on banks, the banking sector and the economy in general attracted the attention of many researchers to investigate and assess. The following paragraphs are the studies conducted to assess the effect of privatization on banks' performance.

To assess the bank performance after the initial wave of privatization took place in Egypt, Omran (2007) conducted another non-parametric test on 12 privatized banks for the period of 1996 to 1999. He segmented the privatized bank sample based on the ownership structure to be private banks, state owned banks, mixed ownership with private majority banks and mixed ownership with state owned majority banks. He defined a privatized bank based on transfer of ownership that made the state own less than 50%. He also compared the performance of the privatized banks with other banks to assess the trend and difference in performance. To make the test, Omran (2007) selected 6 performance measures: profitability (return on asset and return on equity), asset quality (net loans after provision to total loans), capital risk (total shareholder equity to total asset and total loan to total equity), operating efficiency (net interest margin, non-interest revenue production, and return on loans), liquidity risk (securities to total asset) and growth (asset growth rate). He selected the year of the privatization as year zero and calculated the performance pre and post year zero. He calculated the mean pre and post year zero, and the null hypothesis. He found out that some of the profitability and liquidity measures declined while other performance measures stayed the same for the privatized banks. He also found out that the privatized banks performed less in profitability than their state owned banks. This study is considered a conceptual extension of that study for a different period, as Omran (2007) was assessing performance before and after an event of this wave of privatization. Moreover, he segmented the sample to have better analysis. Among the limitations of the study is the short duration of the study, which is four years, as the acquiring bank may not be able to make the necessary changes and restructure that could be transferred in financial and operational results.

Another research conducted to test performance after the privatization was conducted by Mohieldin and Nasr (2003 & 2007) did a research on bank assessment to investigate the effect of privatization on Egyptian banks. They compared the performance of the state owned banks with the private banks for the period of 1995 to 2005. They made a comparison between the private banks and the public banks based on different variables and ratios. The variables selected were capital adequacy, asset quality (non-performing loan, foreign loans, sector concentration, and provisions), management indicators (expense ratio and earning per employee), liquidity and profitability (Return on asset and return on equity). They proved that private banks performed better than the public ones on the selected variables in the period of 1995 to 2005. This research overcomes the relative short period of the previous study. However, this research came with a different conclusion with the previous research, as this one claimed that privatized bank performed better, while Omran (2007) claims that privatized bank performed worse than the public ones.

El-Shazly (2009) conducted a research to assess the effect of privatization and liberally economic models on the banking sector during the period 1992 to 2006. He used a profit and cost functions and divided the sample into six groups based on ownership and specialization (public, real estate and industrial, agriculture, private, foreign and private investment bank). His results stated that private, investment and foreign banks have better cost efficiency and profit efficiency. However, he claimed that public bank performance could be justified by the political constraints and the quality of human capital. This research agrees with the outcome of Mohieldin and Nasr (2003 & 2007) that privatized banks performed better than the public banks.

Another research conducted by Mohieldin (2000) to assess how the change in bank structure affected the performance of the banking sector in Egypt. He tested the structure – conduct - performance model on 47 banks out of 59 commercial banks in Egypt during the period of 1980 and 1998. He used a profit equation for the return on assets as a dependent variable and selected the independent variables to be the market concentration, market share, capital asset ratio, total assets, loans to asset ratio, deposit, operating expenses, and market deposit growth. He found out that the sector concentration is not significant while the market share is significant in affecting the return on assets. He argued that this test cannot identify the effect of efficiency on the profit of the banks. This was one of the most comprehensive studies because of the duration and the number of banks in the sample. However, it is worth mentioning that during this time period, Egypt passed through many different stages, challenges and reforms that might affect the results.

Reda and Isik (2006) and Reda (2008) did a research to test the efficiency of the banking sector in Egypt during an economic growth period of 1995 to 2003. They used the intermediation theory on a BCC and CCR input oriented DEA model. In addition to the DEA tests, they did Malmquist index to evaluate the efficiency change over time. Their sample was 35 banks for the DEA and 24 for the Malmquist. They did two segmentations of the sample, one based on ownership and another was based on balance sheet size. The ownership segmentation was public banks, joint venture banks (with the government), private banks and foreign banks. They divided the sample based on bank size to micro, small, medium and large. Input variables were capital, number of employees and loanable funds. Output variables were loans, off balance sheet items and other earning assets. The results showed that there was technical inefficiency of 22%. The efficiency per segment was as follow: Medium banks 96% efficient, large banks were 85% efficiency, small banks were 77% efficient and micro banks were 61% efficient. There was no clear difference in performance based on ownership. This research tested the early wave of restructuring and followed the input oriented model.

Reda (2012 & 2013) conducted a similar research like the previous one but for different years and different research hypothesis, which is whether consolidation will increase efficiency, or not? She followed the same model in choosing intermediation approach, CCR and BCC DEA input oriented model, added Tobit regression analysis and ratio analysis to test the efficiency of banks pre and post merging and acquisition. She included in the study banks that were not involved in M&A to compare performance. Period of study were 2000 – 2003 as pre M&A activity versus 2007 – 2010 as post acquisition activity. Input variables were operating expenses and interest expenses, while output variables were non-interest income, net interest income and total loans & advances. She used the Tobit regression analysis to test the efficiency determent which are total assets, ownership (public vs. private, foreign vs. domestic), market power (loans/total assets, deposits/total assets), profitability (Return on Assets and operating income/ total assets), risk (provision/loans), financial capital (equity/assets) and total assets/number of employees. Finally, the ratios she selected were the profitability, liquidity and risk. Results showed increase in efficiency in post duration and that large banks were more efficient than the others were, so the consolidation improved efficiency. In the pre period, public banks were more efficient and in the post period, private banks reached the same level of efficiency and improving. The ratio tests showed mixed results, the profitability and liquidity had no significant results, risk improved. She found that among the most efficiency determinants are the assets. This study is considered similar to the current research in term of research hypothesis; model used (DEA) and the period of study. However, selection of variables was slightly different, and the model orientation was input oriented.

Abdel-Baki (2010 & 2011a) did researches to assess the banking reform in Egypt and its effectiveness and compared that to the Turkish banking sector. She looked at how the reform affects the efficiency of a selected 26 banks during a period of 6 years from 2004 to 2009. She used Stochastic Frontier Analysis tools. Her finding complies with other research that Egyptian banks were not efficient and more focus should be made to enhance efficiency. Moreover, she found that large banks are less efficient than the medium size banks. Abdel-Baki (2011b) did another research on the same sample to test the efficiency of the banking reform on the readiness on the Egyptian banks to absorb the financial crisis of 2008. She used the Fully Modified Ordinary Least Squares model. Her outcome was that the reform helped the banks to overcome the crisis by having more solid banks with solid financial statements, and less exposure to risk.

Poshakwale and Qian (2011) did their research to investigate the impact of the financial and banking reform on bank efficiency. They looked at 45 banks at the period of 1992 to 2007. They argue that the reforms have a positive and significant effect on efficiency and improving competition, however there were mixed results about the cost efficiency and profit efficiency among the public versus private and domestic versus foreign banks. They used Panzar Rosse model and its H-statistic indicator to test competition and used the BCC DEA, Stochastic frontier approach, and distribution free approach models to test efficiency. Input variables, they used interest expense, non-interest expense, fixed assets and loanable fund. For output they used total loans, total other earnings and non-interest income.

The period of 2002 to 2007 and the merging and acquisition activity that happened in the Egyptian sector made Badreldin and Kalhoefer (2009) to make their research to assess the performance of the merged banks before and after the merger on 10 banks that were divided based on domestic and foreign ownership. They used different performance measures such as interest margin, commission margin, trading margin, gross income margin, operating expenses, gross profit margin, provision, equity ratio, cost/income, deposit/total asset and loans/total assets. Their results showed that merging and acquisition did not result in improvement in ROE, showed some improvement in profitability, but positively affected the non-performing loans.

Finally, Farrag and Lang (2012) assessed the banking sector efficiency using a stochastic frontier cost function for the period of 2000 to 2006 on 34 banks. They argued that banks showed general efficiency of 88% and that banks suffer from internal x-inefficiency (management inefficiency). They found that economy of scale could be achieved for banks

that are smaller than £3 billion. Moreover, they also found bank's size, growth and merger have positive impact on efficiency.

By looking at the previous researches, there was 21 researches conducted that cover Egypt banking sector either fully or using Egypt in comparison with other countries. From these researches, eight used DEA application and only three of them used output orientation. Two researches used stochastic frontiers and the rest of the 11 researches used regression models. Two researches were conducted for years before 1999, while nine others were conducted for years after 2000; the other 10 were covering some years from the 1990 to 2010. Only three researches covered similar durations. From these, one argues that efficiency increased, while the others were comparing Egypt with Turkey.

It is worth noting that due to the limited number of studies, which use similar methods or cover the same period of study, it was difficult to compare most of these studies or to verify the outcome with the exception of one study. Moreover, even with the different models, the literature didn't have a general trend or conclusion about the general efficiency change due to foreign entry, privatization or reform.

2.3. The outcome and the gap from the literature review

The majority of research on bank efficiency focuses on the US and the European countries, see for example Berger and Humphrey (1997). These countries have a banking sector and economic structure that passed through many development stages and the growth. In developed economy, rules regulation, industry structure and main players are already set. The demand size and approach to provide the services are also clear for the developed economy. On the other side, developing countries lack the institutionalization, the clarity of the structure or the regulation. Limited researches that were mainly conducted in the past years were for developing countries that have different structure and level of involvement from the government on the banking sector.

The researches that focused on Egypt used various research methods and came with different and sometimes contradicting results. A gap could be identified concerning the studies conducted on the Egyptian banking sector for performance, competition, the industry structure or concentration during the period of 2004 to 2010. The literature does not agree on a definite answer concerning the effect of bank strategy that should be followed especially in emerging market or in an economy that witness consolidation fuelled by central bank decisions and large merging and acquisition. Therefore, the effect of bank consolidation and bank reform on the performance and profit is still debatable. Even the methodology used to assess the concentration, industry structure and performance is argued. Bank performance and efficiency are conducted using different evaluation methods; very few studies used different evaluation methods and compared the results to identify commonality or differential results. However, in addition to the normal econometric regression models, the most frequently used methods for efficiency are the DEA, HHI and the Panzar & Rosse, and Concentration index for market structure. These methods were used in similar research in different countries such as Turkey, Greece, GCC, Mexico, China, India and even in Egypt. Although these methods were applied using different variables but they will give the researcher benchmark to assess against.

The argument concerning the entry of the foreign bank in an economy is still controversial. Some researchers claimed that foreign entry in developed economy has no effect on the sector or performance; other researchers argued that in developing economies foreign bank entry improves the sector by knowledge transfer, technology, new services and increase in competition which lead to increase in performance. However, in India, the last claim is disproved. Few studies from the current literature discussed the effect of competition on

management decision and segment served and whether management decision to serve a specific segment is based on strategy or market dynamics.

The research conducted on the banking sector in Egypt was mainly driven by the economic reforms or merger and acquisition activities that were conducted either in the first reform phase of the 1990's or the second reform of the 2000's. The researchers who used the DEA were mainly using the BCC and the CCR model following the intermediation approach with input orientation. Some of them categorized the sample based on size, ownership or origin. Selection of variables of input and output varied a little from one research to another, but this is a common practice in the DEA tests. As far as the author knows, few researches that were conducted used an output orientation model for the selected duration in Egypt, which is considered a gap in the literature. To have a different view using another perspective, this thesis will use the output oriented model. Moreover, the models used are limited to very few ones, none of the researchers used different models on their samples to justify and compare the results.

3. Chapter 3- The Research Context: Egypt Economic, Financial and Banking Sector

3.1. Introduction

Any economy is depending on different aspects that are influenced by the resources available to it. Therefore, some economies or countries depend on different main sources of revenue such as tourism, agriculture, industry, production, services or financials. However, most countries have a mix of sectors that shapes the general economy. Egypt depends on different sources of revenue, which came from Oil & natural gas, Suez Canal, tourism, service, industrial and agriculture exports. All these sectors need a sound financial and banking sector to facilitate the transactions and capital exchange.

The banking sector contributes to the development and the growth of any given economy especially in a developing economy (Alaa El-Shazly 2001 and Ikram 2007). Having a competitive and efficient banking sector is a leading indicator for the performance of other sectors. Egypt passed through different periods and economical models based on the political framework. Till year 2000 the financial sector was dominated by the banking sector, other financial tools were minor compared to the banking sector this was clear when looking at the market capitalization of the stock market which accounted for 3% of the GDP in year 2000 compared to 100% of GDP of credit (Mohieldin and Nasr 2003 & Ikram 2007). During the previous economic growth cycle of 1995-1999, banks were lending most businesspersons without a rational evaluation of risk or forecast of the feasibility of the projects they were investing in (Mohieldin and Nasr 2003 & 2007). Lending was given to well-known businesspersons who were in good relation with the Mubarak regime or members of the parliament. Most businesspersons directed their attention to real estate business that witnessed very high growth and profit margins at the end of the 1990's. However, supply exceeded demand and most of the real estate projects were not able to sell their units. The situation was accelerated by the worldwide recession. Many businesspersons went into

default, unable to repay to the banks and escaped from Egypt. (Mohieldin and Nasr 2007). This following table highlights on number of bankruptcy that occurred during the period of 1997 to 2004, for either personal or corporate. (Badawy, Gouda, Shoeib, Aly & Roshdy 2005). The table shows a high number cases of bankruptcy during the late 90's versus a reduced number of cased on later years.

Table 3-1 Bankruptcy cases

Years	1997	1998	1999	2000	2001	2002	2003	2004
Initial court	22,691	22,623	33,781	12,325	6,788	4,966	3,127	2,755
Final court	1,663	1,570	2,612	2,408	2,321	1,616	1,238	858

With the appointment of the Nazif's government who came in power in July 2004, supported by the economic recovery and growth worldwide, the Egyptian economy witnessed a growth period with GDP growth of almost 7% for the second year. The Egyptian stock market ranked the best performing market for two consecutive years. This economic growth needed a financial and banking support to stimulate and at the same time to direct. (Nasr 2009)

Egypt's government decided to stimulate the banking and the financial sector and to enhance its structure. The Nazif's government and the central bank focused on its role as regulator and allowing more participation of the private banks to compete and expand. The government implemented new regulations and laws including the privatization of the state-owned banks, selling their share in private banks and encouraging the merging and acquisition in the banking sector, which resulted in reducing the number of banks from 64 in 2003 to 41 in 2007 with an intention to reach 37 by 2009 (still 41 in December 2010) (Central Bank of Egypt 2011). Many foreign banks acquired small local ones or distressed banks in order to get the licence to be able to operate in Egypt. Almost all of them pursue aggressive growth strategy in all financial and banking services. Banks are in a race to serve the best clients with minimum risk and to increase their client base. Looking at the banking penetration rate which is 10% (i.e. 7.2 million person deal with banks out of the Egyptian population of 72 million in 2008) (Fletcher 2010), this might seem an easy task. However, with no credit history, low banking culture and refusal of the majority to deal with banks because they are afraid to go to jail if they defaulted or because banks are against Islamic Shariah so they only deal with Islamic banks, banks faced high and fierce competition among them to acquire the best customers in Egypt.

The government regulations also covered other non-banking financial sectors that could support the financial reform of the Egyptian economy. These regulations covered brokerage firms, investment banks, asset and portfolio management firms, private equity firms, venture capital firms, leasing and factoring companies (El-Shazly 2001 and Nasr 2006).

This chapter will cover Egypt economics, financial development and the reform that were conducted. It will start with the history of the Egyptian banking industry, and the periods that shaped or resulted in the present and current structure. Then, the existing structure until December 2010 will be presented. The latest development and the activities conducted by the government and the central bank will be explored in addition to some indicators of the progress of the industry. Moreover, highlights on different institutions that form and shape the financial sector in Egypt will be presented.

3.2. Egyptian Economic & Banking History

➲ Egyptian Banking History

When Mohamed Ali ruled Egypt (1805-1848), he wanted to establish a strong kingdom similar to the ones in Europe. He controlled and collected all the land production and was selling it to Egyptian and European markets. He linked Egypt's economy with that of Europe through cotton exports to England. He began an era of large-scale development and economic activities in the areas of industry, agriculture and trade. These new economic activities created the need for finance. The government established the first commercial bank in Egypt in 1842 (Zahran, 1988). The history of banks in Egypt can be divided into five periods as follows:

- The First Period (1856-1919)

The banks were the first sign of modern economic development in Egypt. Foreign banks opened branches in Egypt to finance cotton exports, agriculture products and general trade (Mohieldin 2000). The first bank was the *Bank of Egypt*, which was established by a group of English investors who founded a company based in London in 1856. The Bank had two branches, in Cairo and in Alexandria. The bank operated until its bankruptcy in 1911. Similar foreign-owned banks opened branches in Egypt such as *The Ottoman Imperial Bank*, established in 1867, *La Banca de Roma*, established in 1880, and *The Discount and Saving Bank*, established in 1887 (Mokhtar 1988).

The first foreign loan given to Egypt was in 1862, since then loans started to accumulate, until they reached an amount that the government can't repay, and accordingly, foreign creditors were given the privilege to manage all revenues of Egypt to make sure of the repayment by establishing the *Casse de la dette public* in 1876. (Mohieldin 2000).

Special privileges were given to foreign investors which were the main reason behind foreign capital flow into Egypt. Banks during this period had Egyptian names but were actually foreign owned. *The National Bank of Egypt* was established in 1898 with paid-in capital of one million British pounds and was given the duty of a central bank. Its Founders were Sir Ernest Cassel (50% ownership), Ralph Isaac Suarez, his brothers Joseph and Felix and related parties (25%) and Constantine Salvagos of Alexandria (25%) (Mohieldin 2000 and Raafat 1998).

Other banks were established such as the Agriculture bank of Egypt that was established in 1902 to serve the peasants. One third of the bank was owned by National bank of Egypt. However, due to change in laws and regulation that made the bank unable to collect the loans from small farmers, the bank struggled until its liquidation in 1936. (Mohieldin 2000).

- The Second Period (1920-1956)

Based on Khalid Ikram, (2007) the period until 1956, the government was mainly focused on infrastructure and irrigation, however, all other services, industry, trade, banking and business was mainly controlled by the private sector either by Egyptian or by foreigners. The first Egyptian-owned bank, *Banque Misr*, was established by Talat Harb (the most influential and richest Egyptian entrepreneur of that period) in 1920 and was concerned with national development. This was due to 1919 revolution that asked for liberalization from foreign influence. (Mohieldin 2000). Several Egyptian banks were established later and specialized in agricultural and industrial lending. *The Agriculture Lending Bank*, which was half owned by the government, was established in 1931 followed by the *Industrial Bank* in 1949. *Banque du Caire* opened in 1952 and *Bank El Gomhoria* (Republic bank) in 1956. All these banks were founded with Egyptian capital.

The first law to organize the duties of banks in Egypt was Law No. 57 for the year 1951. This law gave the *National Bank of Egypt* full authorities of a central bank such as the right to issue currency. It did not however undertake all the duties of a central bank, such as helping local Egyptian banks (Saleh 2000).

- The Third Period (1957-1974)

As the government planned to build the high dam, money was needed to finance the project, the government started to have more control and involvement in the economy (Ikram (2007). At the beginning of 1957 twenty-two banks were operating in Egypt, the majority of them were branches of foreign banks with foreign management. In the same year, the government issued nationalization laws that rearranged the banking system. The law which was issued in 1951 was replaced by Law No. 163 for the year 1957, which was concerned with banks and credit, and Law 22/1957 which increased the requirement of capital to be LE 500 thousand marking the beginning of a new era in the history of the Egyptian banking sector (Mohieldin 2000 and Wazir 1988). By 1963, the twenty-two banks were consolidated into five state-owned banks, the National Bank of Egypt, Bank of Alexandria, Banque Misr and Banque du Caire and Port Said Bank and five specialized banks, an industrial bank, an agriculture bank, and three real estate banks. Moreover, by 1974, they were merged to form four commercial banks, and three specialized banks. When the National Bank of Egypt was nationalized, it was divided into two banks, one of which became *The Central Bank of Egypt*. (Mohieldin 2000 and Zahran 1988).

The new banking system aimed to finance the dominant public sector and the national projects, agriculture or industrial. In addition to the national project, the new rulers of Egypt, Nasser, wanted to be able to manage the resources of the Egyptian economy without the interference and the control of foreigners. Successive nationalization policies and merging of banks led to

several administrative problems due to differences in management and accounting techniques among the merged banks. Needless to say, the organization culture and code of each of these banks were different because instead of serving corporate and business the banks were serving the government direction. This was obvious when the banks' role was to collect deposits from the household and reinvesting it in the public projects or public companies (Ikram 2007).

In 1967, Israel attacked Egypt and occupied the Sinai Peninsula. The Egyptian government, being in a war from 1967 until 1973, focused all the country resources to serve for the war and liberalization of Sinai. This made all the financial institutions and banks work to serve the interest of the war and support for the rebuilding of the army (Ikram (2007).

The state during this era was the main driver of all activities in Egypt, from industrialization to services (Alissa 2007). The government was using public companies as a means to employee people, resulting in over staffed organization. Moreover, to ensure 'fairness', promotion was based on seniority and not performance. All that led to a culture and code of slow organization, which is bureaucratic, productivity per employee, is low and inert which continued until the moment.

- The Fourth Period (1974-1992)

Following the 1973 October War, Egypt needed more freedom and security in the money market. The Egyptian economy was suffering after the period of war and socialism, the GDP growth was 3% and prices started to increase and the government, because they were following a subsidized model started to suffer large losses (Ikram 2007). Therefore, the government encouraged the private sector to take part in the development process (Saleh 2000). This was supported by the open door policy *Infitah* that the government applied which allowed the private ownership and foreign ownership of companies and less trade constraints with foreign countries (Mohieldin 2000, Bolbol, Fatheldin, and Omran 2005, Alissa 2007 , Mohieldin and Nasr 2007 and Abu-Bader and Abu-Qarn 2008). During this year, external support and grants flowed to Egypt. However, the economic development especially in adjusting the subsidies structure, fixed interest rate and the large public working force, made Egypt suffer from very high debt that couldn't be solved until the debt rescheduling conducted by Paris club in 1987 (Ikram 2007).

The Open door policy launched during the 1970's expanded the banking sector dramatically in Egypt. Getting out of a communist period, where all sectors were managed by the government, the policy aimed to increase the dynamics with the international world, provided by an active role for the private sector to enhance economic performance. A new banking law

at that time (Law 120/1975) defined the mode of operations for Egyptian banks. It identified three types of banks:

Commercial banks	Business and investment banks	Specialized banks,
These banks usually accept deposits and provide finance for a wide variety of transactions.	These banks carry out medium- and long-term operations such as the promotion of new businesses and financing of fixed asset investments. They may also accept deposits and finance foreign-trade operations.	These banks carry out operations serving a specific type of economic activity They may accept demand deposits
Examples of these include public, private and joint-venture banks	Examples of these include joint-venture banks and branches of foreign banks	Examples of these include housing, agriculture or industrial.

The Open Door Policy and new investment laws marked a new era in Egypt's economic development (Zahran 1988 and Alissa 2007). This period was characterized by the establishment of large private companies in trades, exporting, importing, tourism and manufacturing, accordingly there was a niche for new financial services and banks (Farag 2009). This triggered the establishment of joint venture, business and investment banks, in addition to the opening of foreign banks in Egypt and thus increased the number of banks operating and increased the competition among them. (Bolbol et al 2005) This period, was characterized by an increase in workers' remittances and international liquidity, which was mainly due to the increase in oil process, resuming oil exploration in Egypt and new discoveries in oil in the gulf (Ikram 2007). All these factors had an effect on the nature and the operations of the banking system. Competition among banks triggered an increase in marketing activities and banks, especially the four public- banks, worked to develop sources of funds by modifying and increasing types of deposits. They also expanded investment activities and the use of funds to include financial, industrial, real estate, commercial, tourism and services sectors. Banks gave more attention to customer services such as safe renting, deposits in foreign currency, and new technological services like ATM were added although were very limited in term of number of machines and banks using them.

Business expanded and banks were able to do more business with the private sector. However, with decades of no competition, centralized economy and low human resources development, left the banking sector with inefficient staff, procedure and system, which affected the quality of work and rational lending decisions. As mentioned before, lending was

given without proper credit and risk assessment and was based on network lending, which affected the quality of loans and the default rate increased (Mohieldin 2000, Mohieldin and Nasr 2007).

However, short-term lending remained the dominant lending scheme in the banking sector during that period (Saleh 2000). Based on Bolbol et al 2005, some reform were conducted to have better transparency in financial statements, and banks started to follow international accounting standards, performance and risk ratios such as capital adequacy, asset classification and credit concentration to have better overview of the bank performance and risk management. Moreover, the trend of Islamic fundamentalists increased (which resulted in the assassination of President Anwar El Sadat in 1981). Along with it, the trend to follow Islamic rules and Shariah (law) increased, results in new form of financial services that comply with the Islamic Shariah (Law). In this model private companies or even individuals were accepting money from people not as deposits where there is a fixed interest, but as partners in the company or the business in return of a profit share. This model is asset-based financing versus the debt-based financing that banks normally follow. The capital will make the profit from the real economy not from lending the capital. (El-Gamal 2006; Taqi 2008, 2012, Asutay 2010, Warde 2010, Pohl 2010). During this period, interest rates at banks were 14-16% and these companies and individuals were giving return on investment of 24-30%. These forms of companies succeeded in collecting most of the savings of the Egyptians. Most of these companies were investing in trading and importing products and mainly the retail products (Ministry of Interior Egypt 2013). The banking industry was suffering from low deposits as funds were transferred to these companies. However, during the late 80's and early 90's the Egyptian government banned these companies from operating, put their owners in jail and acquired the assets and the business, hoping to return to the depositors their money. However, the whole Egyptians financial sector was hit with these acts as many people lost their savings. (Ministry of Interior Egypt 2013)

- The Fifth Period (1992 -2003)

Following the Gulf war and the liberalization of Kuwait, a considerable amount of the external debt of Egypt were cleared, as $13 billion out of $51 billion were cleared and rescheduled as compensation for Egypt's participation in the Gulf War (Mohieldin 2000, Ikram 2007 and Bolbol et al 2005). Foreign Direct Investment (FDI) and money flowed to Egypt. With the support of different international aid and donor, Egypt initiated a structural and economic reform program

in the early 90's (Alissa 2007, Mohieldin and Nasr 2007, Rizk, Dixon, and Woodhead 2008, Ben Naceur, Kandil 2009 and Herrera, Selim, Youssef and Zaki 2010). Financial sector reform was one of the most important goals of this economic reform program. The Islamic investment companies banned from operating in Egypt. Based on El-Shazly (2001) and ElMikawy, Handoussa, and Abou Shnief (2002), the 1990's showed an example of intensive attempts to reform the economy based on the support of the gulf and the FDI, but many of these attempts were not successful because the economy lacked the required institutions, investment regimes, trade mechanism and required regulations (Mishrif 2010). Among these reforms attempts is the reduction of fiscal deficit, the unification and freeing of exchange rates, interest rates and lending decisions from administrative control (Roe 1998 and Ikram 2007). The interest rates on loans and deposits in Egyptian Pounds were liberalized in 1991, as there was a ceiling on the interest rate. In addition to that, the liquidity ratio and the required reserved were reduced. The financial reform program aimed as well to reduce the role of government in the banking sector and included the plans for privatization of the public sector banks in addition to the privatization of the government stake's in all 24 joint- venture banks (JV). The privatization of the joint-venture banks was a step toward improving competitiveness in banking in addition to decreasing the commercial interdependence between different banks (Mohieldin 2000, Alissa 2007 and Ikram 2007).

Based on Isik and Hassan (2002), some of the developing countries that were passing through comparable situations and similar economic structure followed almost the same reform process like Egypt. Turkey followed similar reform initiatives in the 1980's and 1990's.

Having real economic development in Egypt the need for more financial services emerged. The market expanded for all banks. However, most banks were competing for the market centre, which were from 1992 until 1999 the big corporate customers. In this era, the supply side (the depositors) was the individual and the demand side was the big corporate customer – comparison between deposits and loans of the household vs. private business vs. the government will be presented later in this chapter. This led to intensifying in branch expansion and imitation of the product or engagement zone. Although majority of banks in Egypt were seen as generalist, they narrow their niche to the corporate client (from the demand side), so one can argue that they were essentially specialist banks. (Ikram 2007).

There used to be six main public banks, two of which were specialized ones, (Agriculture and Housing & real estate). Now, there are five public sector banks in Egypt (after the privatization of Bank of Alexandria) they are the largest operating banks in Egypt in terms of balance-sheet size, accounting for nearly 50% of total banking deposits and 38% of loans, in addition to 65% of system branches (EFG-Hermes 2007 and Ikram 2007). They have a significant market share in retail and corporate banking services through large branch networks and close

relationship with state-owned companies. The public banks serve to an extent, the government plans or financial needs. This relation with the state-owned companies, can be valued at 2.6 billion GBP of government debt to these banks, which makes any attempt to privatize any of them a big challenge to the government as it will either repay the amount or make the bank write-off them as loss, which will affect the value of the bank. (EFG-Hermes 2007).

The private banks used to play a less dominant role in the market for loan-able funds and focus on trade-related or real estate financial services to the private business sector. Arguably, private banks have showed a preference to finance working capital and trade activities whose transactions normally require short-term credit and result in quicker and more secure returns (Herrera et al 2013).

Most banks at this period were using a decentralized credit department, in which each branch can operate as a separate bank, and does not need head office approval unless the loan exceeds a specific large amount. Due to this structure, banks were lending many projects, companies and people if perceived as suitable from the perspective of the branch manager. The non-performing loans became very high (Ikram 2007). Banks were giving too many unsecured loans to businesspersons just because they were well known, or had good relations with the branch manager or related to the president or the ruling party or if they are Members of Parliament. This issue was made public in the scandal involving 14 members of parliament accused of receiving around GBP 150 million and then they were sentenced to 14 years in prison in 1997.

During the period between 1997 and 2003, Egypt faced economic changes that put many banks into a high risk and 33,781 cases went bankrupted in 1999 (Badawy et al 2005). The challenges faced by Egypt at that time were as follow (Economist Intelligence Unit 2005 and EFG Hermes 2006):

- Recession in Egypt and World recession
- Floatation of the currency against the dollar from 3.4 to 7.0, which forced banks to be reluctant to lend exporting & importing projects.
- Due to the devaluation of the currency, goods and services imported became expensive, and the purchasing power of the Egyptian became weak.
- Scandal of unsecured loans together with the rush of all businesspersons to invest in real estate, with the recession and the devaluation of the currency, they were not able to sell the developed areas or the flats. This was also magnified because those real estate projects were focusing on high-end housing by developing compounds that include 200-400 villas, so they could not repay either the principle or the interest of the loan. Consequently, banks stopped lending real estate and construction projects
- Terrorist attacks that put the tourism industry into the minimum, touristic project were considered unstable so banks stopped lending them.

These changes put pressure on the economy as the economic development almost stopped, the FX risk was high so financing importing business minimized. Banks were not allowed either by the central bank or by choice to finance tourism – as it is unstable because the threat of terrorist acts, importing, exporting – because currency fluctuation, real estate- as supply is more than demand, and some manufacturing business – because of market and collection issue, unless it is 100% secured. Perhaps unsurprisingly, banks were not financing start-ups, media or software and information technology companies because they were not having assets or credit history. The stock market decreased by around 50%, many equity investors were either stuck with their investments, went bankrupt in case of borrowing to finance their investment, or get out of the stock market with heavy losses. Based on these circumstances, investment level was low, as most investors were not confident in the economic situation and were not certain of the future, accordingly people preferred to save their money instead of investing it. (EFG-Hermes 2007 and Ikram 2007).

In order to survive, private banks pursued ways to further diversify their loan portfolio and to utilize their assets and deposits by shifting to personal banking or retail banking. Almost all banks shift their interest to the retail business or the individual service such as credit card, personal loan (car, house, appliances, etc.…) ATM cards, salary payment, mortgages, insurance products, and retirement plans. Backed up by the entry of some foreign banks, sales and marketing activities conducted by banks intensified (Reda 2012). As for the first time in Egypt, private banks start to have outdoor sales force, as it used to be all in bank sales where the customer goes to the bank asking about the services. The banking sales forces approached customer in multinationals, large local companies and private universities to sell them some financial facilities such as credit card, payroll, foreign exchange, and personal loans. All the retail services were supposed to be with lower risk lending compared to corporate lending. Before that, only large banks were making some advertisement, these advertisements were mainly either to promote their deposit certificates or just make ads about the bank name. When banks changed their focus to retail, they started to promote specific product to a specific segment such as wedding loans, education loan, car loans, credit cards offers and even (Haj and Omra) pilgrims' loans (EBI 2004).

3.3. The Egyptian Financial & Economic Reform 2003 - 2010

The Egyptian government worked during the period from 2000 until 2010 to make economic and financial reforms (Nasr 2006 and Alissa 2007). This reform with the support of many international organization references succeeded in changing and enhancing the structure of the Egyptian economical setup. Based on Saunders & Sommariva (1993) most banking reform that occurred in countries that transform from government controlled economy to a free market economy faced many challenges and problems. Moreover, many international organizations supported this reform and worked on the eco system to reach a free market economy. The Egyptian government, the central bank of Egypt and the international organizations, worked on multiple directions and pillars to enhance the effectiveness, efficiency and competitiveness of the Egyptian financial sector. This is illustrated by the different activities conducted, organization created or merged and laws issued.

To be able to understand the activities conducted, it is crucial to have an overview of the structure of the financial sector and the forces that influence on it. This is illustrated in the following diagram, which shows the different stakeholder, influencers and enablers that affected the financial sector.

The following diagram illustrates the financial sector reform pillars overview.

Figure 3-1 : Financial Sector Reform Pillars

Source: Researcher own output.

The following table highlights on some of the economic indicators from 2001 to 2010 based on EIU 2005 & 2010 EFG-Hermes 2008 and Ministry of Finance 2005, 2008, 2010).

Table 3-2 : Economic structure: Annual indicators

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
GDP at market prices (E£ bn)	358.7	378.9	417.5	485.3	536.6	618	745	896	1039	1223
GDP (US$ bn)	90.4	84.2	71.5	78.3	92.9	108	132.2	164.8	187.3	217.4
Real GDP growth (%)	3.5	3.0	3.1	4.2	4.9	6.8	7.1	7.2	4.7	5.1
Consumer price inflation (av; %)	2.3	2.7	4.5	11.3	4.9	10	9.6	9	10.5	11.7
Population (m)	66	67.2	68.6	69.9	71.3	72.6	73.6	75.2	76.8	79
Unemployment	9.2	9	10.5	11.1	9.5	10.6	8.9	8.7	9.4	9.6
Current-account balance (US$ m)	249	849	3,723	3,237	2,207	1,752	2269	888	-4,424	-4,318
Foreign-exchange reserves excl gold (US$ m)	12,926	13,242	13,589	14,273	20,609	25,581	31,374	33,933	36,464	33,790
Total external debt (US$ bn)	26.08	28.1	29.1	29.7	28.8	29.5	29.9	33.9	31.5	33.7
Exchange rate (av) E£:US$	3.97	4.60	5.84	6.20	5.78	5.73	5.63	5.43	5.55	5.63

The previous table shows that the Egyptian economy has developed and increased in value in almost all sectors throughout the period understudy. As the GDP increased by 3.4 times from year 2001 to 2010 using market prices and increased by 2.4 in dollar base (from $90 billion to $217 billion). The highest real GDP growth was in years 2006, 2007 and 2008, reaching 6.8%, 7.1% and 7.2% respectively. The variation of the inflation rate over the years is due to the change in the methodology used in calculating the inflation from the consumer price inflation in urban to average consumer price inflation and the producer price inflation. The years that had the highest real GDP growth are the ones that are accompanied with high inflation. The current account balance widen largely in years 2003 to 2007 because the effect of the devaluation of the Egyptian pound, however, due to the FDI and improvement in exporting, the current account was improved in 2009 and 2010 in favour for the Egyptian economy and the exchange rate against the dollar was relatively stabilized. The main development that strengthens the economy is the change that occurred to the foreign exchange reserve. The central bank almost kept a steady increase of the reserves from $12.9 billion to $33.7 billion, which represent an average of 15-25% of the GDP. (EIU 2005 & 2010 EFG-Hermes 2008).

3.3.1. The Current Egyptian Banking System: Structure and Competition

From 2003, with the improvement of the global economy and with the appointment of new government in Egypt led by Prime Minister Ahmed Nazif, a new plan was put in place to improve the economic situation of Egypt. These plans covered the telecom and IT sector, the manufacturing sector (cement, textile, agriculture, fertilizers, petrochemicals, and building materials), tourism, and of course the banking and the financial industry. As stated by Lown, Peristiani, and Robinson (2000) and Diamond & Rajan (2000), most regulators and governments are mainly concerned with banks and especially capital adequacy rate, which is considered, a safety measure against bank default or against liquidity issues. The Egyptian government and the central bank followed the same route by an attempt for consolidating the banking industry, creating stronger financial institutions by having bigger balance sheets and transforming the nonperforming companies to the private sector. The Egyptian parliament passed many modified and new laws, among these new laws is the unified banking law in 2003.

Following the unified banking law, and based on the presidential approval of the reform plan, The Central Bank of Egypt (CBE) was working on the following four pillars to reform the banking industry (Central Bank of Egypt Annual Report 2005 – 2011; Nasr 2006)

1) Privatization and consolidation of the banking sector,
2) Financial and managerial restructuring of the State-owned banks,
3) Solution of the problem of non-performing loans,
4) Upgrading of the Supervision Sector at the CBE.

The Central Bank of Egypt (CBE) to execute the previous pillars, adopted a strict regulation concerning:

1) Increasing the paid-in capital of banks to £ 50 million from £10 million (either by injection, merging or acquisition)
2) Setting higher risk weighted capital adequacy ratio at 10% instead of 8%
3) Stopping the issuance of new banking license
4) Privatization of public banks (Bank of Alexandria so far)
5) Divestment of public bank shares in other banks or joint venture banks
6) Restructuring and turning around current public banks.
7) Redefining the non-performing loans NPL based on strict category, which depends on defaulting list, which implies a percentage of provisions that could reach 100% of the loan.
8) Acquiring small banks or struggling banks by the large public banks

9) Merging small banks to form a larger bank.

These regulations are referred to as “the bank reform program” that was conducted by the Egyptian government.

The regulations made by the CBE opened the door for financially strong foreign banks to enter the Egyptian market and/or to grow in it especially that the new regulation of not issuing banking licence will create a high barrier to enter the banking industry.

Many banks were having high non-performing loans (NPL), during 2007 banks focused on increasing their paid in capital, or merging with or acquiring other banks. Banks who failed to do so were acquired by the others.

The new bank regulation made the CBE reluctant to license new domestic banks as it regards that the number of existing operating banks large enough for establishing a competitive market. Nevertheless, All banks were given a deadline as of the end of July 2005 (extended to 2007) to raise their paid-in capital to a minimum of £ 50 million and to comply with the capital adequacy ratio of 10%. Banks that cannot meet these requirements had to merge with larger banks with the aim of reducing the number of operating banks in Egypt to a target of 30 banks. Several banks have not been able to meet these requirements and became a target for acquisition or merger into one of the large state-owned banks, private banks or international ones. These regulations also aimed at preparing Egyptian banks for the more stringent requirements of Basel II (Mohieldin & Nasr 2007). The public sector banks are mandated to divest their shares in the joint-venture banks with a maximum ownership of 20%. Another privatization program, which was concluded in 2007, was the selling of Bank of Alexandria the smallest among the four main public owned banks to the Italian SanPaolo bank. The following section will explore the merging and activities that were occurred in the Egyptian banking sector.

3.3.1.1. Merger & Acquisition activities in the Banking sector In Egypt

As mentioned in the previous section, based on the banking reform activities conducted by the Egyptian government, the constraints that were put on the banks were high, especially the increase of the paid in capital requirement from £10 million to £50 million, the increase of the risk weighted capital adequacy ratio at 10% and not issuing new banking licence. These regulations forced many banks to be involved with merging and acquisition activities to be able to comply with the law. This was reflected in the change in merging and acquisition activities that were conducted during this period.

The following banks failed to make the £ 50 million capital adequacy requirement and many of them were acquired or merged with other banks: (Oteify 2006)

1. Port Said National Development Bank
2. Nile Bank
3. United Bank of Egypt
4. Cairo Far East Bank
5. Workers Bank
6. International Islamic Bank for Investment and Development
7. National Bank for Commerce and Development
8. El-Mohandes Bank
9. Alexandria Commercial and Maritime Bank
10. Arab Investment Bank
11. Housing and Development Bank

The following Table illustrates the latest development and activity conducted by some of the Egyptian and foreign banks in acquiring, merging or increasing their stake during the period of study of 2003 to 2009. Apart from the merging and acquisition from the previous list, the next table represents the stake that was owned by the government represented in public banks ownership that was sold to the private sector or foreign bank either by acquisition or by increasing stake.

Table 3-3 : M&A in Egyptian Banks from 2004 to 2009

No	Target Bank	Acquiring Bank	Activity	Value	Date	Ownership Percentage
1	Misr Exterior Bank	Bank Misr	Banque Misr acquire the remaining stake in Target bank	£ 180 million	2004	100.00%
2	Al Mohandes Bank	National Bank of Egypt	Acquisition	-	2005	100.00%
3	American Express Bank	Egyptian American Bank	Acquisition	-	2005	100.00%
4	Bank of Commerce & Development (Togareyoun Bank)	National Bank of Egypt	Acquisition. The Target bank was almost bankrupted		2005	100.00%
5	Barclays Egypt	Barclays (UK)	Banque du Caire sold its stake in Barclays bank to the Acquiring bank	-	2005	-
6	ECB Egyptian Commercial Bank	Piraeus Bank (Greece)	Bank of Alexandria sold its stake in Target bank to the Acquiring bank	£ 17 million	2005	88.00%
7	Misr America International Bank MAIB	Arab African International Bank AAIB	Banque du Caire and the Industrial Development Bank sold their stake in Target bank to the Acquiring bank	£ 24 million	2005	100.00%
8	Misr Romanian Bank	Bank of Lebanon and El Mahgar (Blom) (Lebanon).	Banque Misr sold its stake in Target bank to the Acquiring bank	£ 20 million	2005	90.70%
9	National Societe Generale Bank	Societe Generale (France)	National Bank of Egypt sold its stake in Target bank to the Acquiring bank	£ 71 million	2005	24.00%
10	NSGB- Egypt National Societe Generale Bank	SG -France	Raising stake	-	2005	78.40%
11	Suez Canal Bank	Arab International Bank	National Bank of Egypt sold its stake in Target bank to the Acquiring bank	£4.80	2005	16.80%
12	Alexandria Commercial and Maritime Bank	Union National Bank of Emirates	Banque du Caire and the National Investment Bank sold its stake in Target bank to the Acquiring bank	£25 million	2006	94.80%
13	Bank of Alexandria	Intesa San Paolo Bank Italy	80% Stake	£ 921 Million	2006	80.00%
14	Cairo Far East Bank	Bank Audi (Lebanon)	Banque du Caire sold its stake in Target bank to the Acquiring bank	£ 9.5 million	2006	99.70%
15	Commercial International Bank CIB	Ripplewood-led consortium (US)	National Bank of Egypt sold its stake in Target bank to the Acquiring bank	£ 133 million	2006	18.70%
16	Commercial International Bank CIB	International Financial Corporation IFC	Stake	£ 13.4 million	2006	1.90%
17	Delta International Bank	current shareholders , United Ahli Bank (Bahrain) Kuwait & middle East bank, El Ahly Bank of Qatar, Wafra for International investment - Kuwait, Astrategia Investment co- Kuwait	Bank of Alexandria sold its stake in Target bank to the Acquiring bank	£ 160 million	2006	89.30%

18	Islamic International Bank for Investment and Development, the Nile Bank & the United Bank of Egypt	United Bank	Merge to form new bank	-	2006	99.9% by Central Bank of Egypt
19	Misr International Bank MiBank – Egypt	Societe Generale Bank	Banque Misr sold its stake in Target bank to the Acquiring bank	£ 220 million	2006	90.70%
20	Misr Iran Bank	National Investment Bank	Acquisition	$ 19 million	2006	29.90%
21	Egyptian American Bank	Credit Agricole Group (Calyon) (France).	Merge	$ 591 million	2006	-
22	Egyptian American Bank	Crédit Agricole SA & El Mansour & El Magharby Investment and Development Co.	Bank of Alexandria sold its stake in Target bank to the Acquiring bank	£ 165 million	2006	56.20%
23	Arab Egyptian Land Bank	Housing & Development Bank	Acquisition	-	2007	100.00%
24	Banque du Caire	Banque Misr	It was announced and approved that Banque du Caire to be merged with Banque Misr, but it didn't executed	-	2007	-
25	Egyptian Workers Bank	Industrial Development Bank	Merge	-	2007	100.00%
26	National Bank of Development	Abu Dhabi Islamic Bank (UAE)	Hostile Acquisition of 49% then acquisition of the rest	£ 15.2 million	2007	49.00%
27	National Bank of Development	Emirate international for Investment	Support in the Hostile Takeover	£ 0.71 million	2007	2.30%
28	Watany Bank of Egypt	National Bank of Kuwait	Acquisition first offer 93.8% then 2.1%	£ 554 million	2007	95.90%
29	Credit Agricole	Credit Lyonneis	Merge to form new bank Calyon		2008	-
30	Port Said National Bank	SAIB Société Arabe Internationale de Banque	Acquisition	£ 10 million	2008	100.00%
31	Bank of Alexandria	International Financial Corporation IFC	Stake	£ 110 million	2009	9.75%
	Total known value			£ 3263.6 million		

Source: Author's own compilation for the period of 2004-2011 from Egyptian Government website, American Chamber newsflash , Shalakany Law Office credentials 2013, Central Bank of Egypt Annual Report 2005-2011, Ministry of Finance reports 2004 – 2011 & Thomson one Bankers.

The previous table highlights the deals that were conducted in the banking sector only from 2004 to 2009. The majority of the merging and acquisition activities were conducted from year 2005 to 2007. Year 2007 was set by the government as the deadline to comply with the new banking law. It is worth noting that until year 2011 there was almost no new activity in Egyptian banks. Total value of the known deals is £ 3263.6 million. The table also confirmed the government intentions to privatize its share in banks. National Bank of Egypt- NBE sold its share in CIB, NSGB, Suez Canal Bank. NBE also acquired two bankrupted banks, Al Mohandes Bank and Bank of commerce and development. Banque du Cairo also sold its share in Alexandria Commercial and Maritime bank, Barclays, Cairo Far East and Misr America

bank. Bank Misr acquired Misr Exterior and sold its stake in Mibank and Misr Romania. As for Bank of Alexandria, it sold its share in EAB and ECB, and then was sold to San Paolo. This shows that the banking sector was controlled by public banks, either directly or through stakes in other banks. Although by this intensive sales activities, the government still has ownership in 17 banks of the large operating banks in Egypt from as low as 5.5% to 100% ownership that will be presented later in the public bank categorization.

Moreover, looking at the merging and acquisition activities conducted by the public banks, one can say that the government sold the operating banks which varies in size from small to large, but were not distressed. However, the public banks acquired the distressed and the bankrupt banks and added them to their balance sheet. One can claim that these merging and acquisition activities in addition to the banks that increased their paid in capital, succeeded in achieving some of the central bank objectives which are reducing the number of operating banks and having large banks with big balance sheet.

From the literature review on competition, it is difficult to identify the type of the banking sector in Egypt. Before the new unified banking law, number of operating banks was around 60, after the law it is 41 in 2007 and 39 in 2010. Before the new law, there was no restriction to issuing a banking licence. Services were limited and almost identical in all banks. Price was mainly directed by the central bank, so banks had minimum control over it. So the banking sector although it was not following the full criteria but it was between perfect competition and monopolistic competition from the structure perspective. However, from the ownership perspective, before the law, the government was having almost a full control over the industry using the clear public banks or by owning stakes in the other commercial banks.

The argument of state bank privatization in Egypt was supported by different researchers such as Barth, Caprio, and Levine (2000), Goldstein and Turner (1996), Laporta, Lopez de Silanes, and Shleifer (2002) and Roa (1998) to increase competition by having larger financial institutions able to serve customer better, with more services and geographical coverage. This is in addition of having a financially solid institution with big balance sheet and paid in capital and low capital adequacy ratio to be able to stand against economic cycles or economic shocks. Yildirim and Philippatos (2006) argued that the consolidation of the banking system will intensify competition amongst the international banks, and may impose pressures on margins so credit customers will be able to get cheaper funds. However, by reducing the number of banks, restricting and blocking the issuance of banking licences along with the privatization, merging and acquisitions, and having a distance control over prices through the monetary and fiscal tools, the government is shaping the sector to be an oligopoly. In this industry structure, a few numbers of banks will lead them to control the sector and might have a cartel to set service levels and prices.

3.3.2. Description of the Banking Sector development

Many of the changes that occurred in the banking sector affected the size of operation, size of deposits, size of loans, and number of branches. The researcher conducted a descriptive presentation to better review the changes that occurred in the banking sector.

The following section presents the factors that shaped the operational size of the banking sector. These data were gathered from the Central Bank, Egyptian ministry of Finance, Egyptian Government Portal, Information, and Decision Support Center (IDSC) from year 1995 to 2011. It is worth noting that the fiscal / or financial year in the Egyptian government is from 1 July until 30 June of the following year.

The data covers the following items:

1. Number of operating banks
2. Number of branches
3. Domestic Credit given to private business, household and public entities
4. Domestic deposits made by to private business, household and public entities

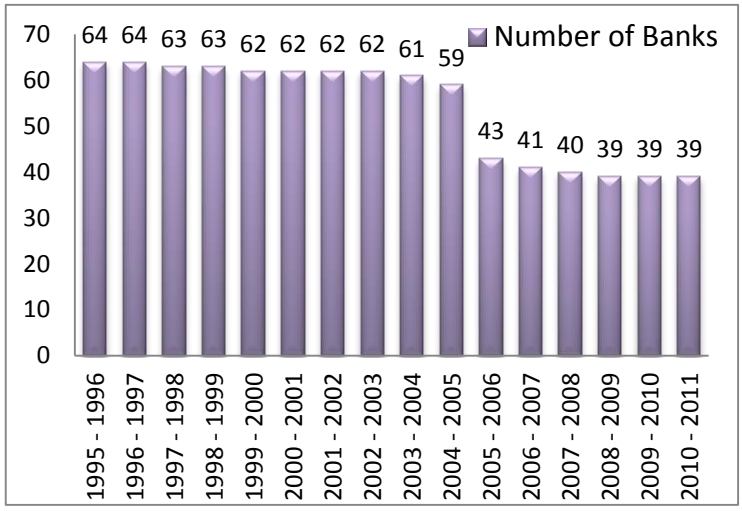
The following analysis highlights the developments and changes that occurred in the banking industry in the past 15 years in number and value from 1995 to 2011. Although this research focuses on the period from 2004 until 2011 but looking and analysing the years before the study period will give insights and clear overview about the changes that occurred in the financial and banking sector.

3.3.2.1. Number of Operating banks in Egypt

The banks in Egypt are classified as either operating bank or correspondent bank. The correspondent banks are representative banks, which cannot accept deposits to give loans, they only facilitate the transfer and transactions with international banks in other countries. In this study only the operating banks are the ones analysed.

The following table represents the total number of operating banks in Egypt from year 1995 until year 2011.

Table 3-4: Number of Banks



(Source: the Egyptian government Portal IDSC and Central Bank of Egypt report from 2004 till 2011)

The previous graph shows that the number of operating banks (public and private) was 64 banks in mid-1990's before the introduction of the new unified banking law in year 2003 they reached 61 banks, which was mainly due to that some of the banks went bankrupt, and were acquired by other banks. The bank reform, which began mid-2004, gave the banks duration to comply with the new banking law. After the new law, because banks were forced to increase their paid in capital or to merge, the number of banks was reduced to 39 banks in 2008. This means that the government succeeded in achieving one of their objectives of reducing the number of banks. They were claiming that by reducing the number and increasing the financial capability of each banks competition will increase.

3.3.2.2. Number of Operating Branches in Egypt

Based on the previous table, the consolidation in the banking industry increased which resulted in diminishing the number of banks. However, banks were getting bigger in term of more assets under management, larger client base, higher competition to acquire and reach clients is growing. Among the first sign of intensity of competition is the reach of the bank, which represents by the number of branches it has and the coverage area, and cities they exist in. Data regarding the number of branches was mainly gathered form the Data published by the Central Bank of Egypt. The following table highlights the number of bank branches in Egypt and the results of changes.

Table 3-5: Number of Branches and percentage of change

Date	Number of Branches	% change per year	Average change per period
1995 - 1996	2285	0	2.1%
1996 - 1997	2325	2%	
1997 - 1998	2391	3%	
1998 - 1999	2434	2%	
1999 - 2000	2481	2%	2.7%
2000 - 2001	2536	2%	
2001 - 2002	2561	1%	
2002 - 2003	2582	1%	
2003 - 2004	2783	8%	
2004 - 2005	2847	2%	
2005 - 2006	2944	3%	4.1%
2006 - 2007	3056	4%	
2007 - 2008	3297	8%	
2008 - 2009	3443	4%	
2009 - 2010	3502	2%	
2010 - 2011	3610	3%	
		58.0%	

(Source: Author own research and outcome based on data gathered and analysed from the Egyptian government Portal IDSC and Central Bank of Egypt report from 2004 till 2011)

From the table above, it is clear that the number of branches increased by almost 58% in 15 years, with an average of 3% yearly to reach 3610 branches in mid-year 2011.

The population in 2010 - 2011 was almost 82 million; branch density per 1000 person for 2011 was 22.7, which means that each branch is serving 22,700 people. If we compare 2011 numbers with year 2000 and 2005, one can find that the density rate per 1000 was 26.7 in year 2000 when the population was 67 million, and 25.2 in year 2005 when the population was 74 million. However, as mentioned before the penetration rate of the banking sector is around

10% (Fletcher 2010), and this number is increasing because of the spread of personal loans and salary payment through banks. (The World Bank 2012). This means that branches almost serves one tenth of the branch density.

The changes in the number of branches before the new banking law in 2004-2005 and after the law implies that average increase from 1996 till 1999 was 2.1%, while from 1999 till 2005 was 2.7% and after 2005 it was 4.1%.

3.3.2.3. Total Domestic Credit and Deposit in Egypt

Along with the growth in the reach and number of bank branches, there is the total domestic credit and total domestic deposits. The next table highlights Total domestic credit from 1996 until 2011.

Table 3-6: Domestic Credit, Deposit and percentage of Change

Date	Domestic Credit in bn LE	% change per year	Average change per year	Domestic Deposit in bn LE	% change per year	Average change per year
1995 - 1996	156	0	18.2%	175		10.8%
1996 - 1997	184	18%		201	15%	
1997 - 1998	212	15%		216	8%	
1998 - 1999	257	21%		237	10%	
1999 - 2000	287	12%	10.5%	260	10%	14%
2000 - 2001	322	12%		291	12%	
2001 - 2002	360	12%		341	17%	
2002 - 2003	387	8%		403	18%	
2003 - 2004	422	9%		462	15%	
2004 - 2005	467	11%		520	13%	
2005 - 2006	510	9%	11.6%	569	9%	10.8%
2006 - 2007	531	4%		650	14%	
2007 - 2008	571	7%		747	15%	
2008 - 2009	695	22%		810	8%	
2009 - 2010	775	11%		892	10%	
2010 - 2011	893	15%		957	7%	
		473%			**447%**	

(Source: Author own research and outcome based on data gathered and analysed from the Egyptian government Portal, IDSC and Central Bank of Egypt report from 2004 till 2011)

Domestic credit increased by 473% since 1996 until 2011 with an average annual increase of 12%. We can divide the periods into three phases, before 2000, from 2000 to 2005 and after 2005. As mentioned before in the literature review in chapter three, years 1996 to 1999 were the years when banks were lending without guarantees especially to Members of Parliament and businesspersons related to the government, ruling party and president administration. The

average yearly increase was 18.2%, after the credit problem (year 2000), average yearly increase was 10.5%, and after the new banking regulation the increase was 11.6% yearly.

On the other side, deposits increased by 447% for the full period, where most of the increase happened in the second period from 1999 to 2005. It was interesting to see that since 1999 and until 2002, domestic credit was more than domestic deposits, which means that the international deposits were covering the gap.

To be able to analyse the domestic credit and deposit in a more robust manner, breakdown of the amounts and the beneficiary will be needed. The domestic credit and deposit will be divided into three segments:

1. Private Business: these are the privately owned business either Sole ownership, limited liability companies or joint stock companies. They are classified by sector as agriculture, trade, industry, services and unclassified sectors.
2. Household: these are the individuals taking personal loans and facility on their own capacity.
3. Public: it includes government entities and public companies that are owned by the country. This is the net claims on the government & public sector which is calculated by the following formula:

   Net Claim on government & public = Securities + credit facility + claims on public sector – deposits.

The next part will present the results of the segmented analysis.

3.3.2.4. Private Business Credit and Deposit

The next table shows, the amounts of credit and deposit related to the private business sector.

Table 3-7: Private Business credit, deposit and percentage of Change

Date	Private Business Credit in bn LE	% change per year	Average change per year	Private Business Deposit in bn LE	% change per year	Average change per year
1995 - 1996	68	0	27.6%	22.6		24%
1996 - 1997	88	29%		31.7	40%	
1997 - 1998	113	28%		35.9	13%	
1998 - 1999	142	26%		42.5	19%	
1999 - 2000	162	14%	8.3%	44.7	5%	9%
2000 - 2001	179	10%		46.6	4%	
2001 - 2002	200	12%		51.0	9%	
2002 - 2003	214	7%		55.3	8%	
2003 - 2004	223	4%		64.8	17%	
2004 - 2005	228	2%		71.0	10%	
2005 - 2006	239	5%	6.1%	80.7	14%	17.2%
2006 - 2007	269	12%		126.6	57%	
2007 - 2008	292	9%		176.9	40%	
2008 - 2009	304	4%		162.6	-8%	
2009 - 2010	326	7%		169.3	4%	
2010 - 2011	323	-1%		164.2	-3%	
		372%			626%	

(Source: Author own research and outcome based on data gathered and analysed from the Egyptian government Portal, IDSC and Central Bank of Egypt report from 2004 till 2011).

The private business credit facility increased from year 1996 to 2011 by 372%, while deposits increased by 626%. However, the starting amount of the credit was LE 68 billion, while the deposits were LE 22 billion. The previous table emphases on the situation Egypt faced in the late 1990's when credit was given to businessperson with low collaterals, in this period credit increased by 27.6% yearly, a percentage which was never achieved not seen in Egypt in the preceding 15 years. From year 2000 until 2005, average yearly increase was 8.3%. During this period, banks were reluctant to give credit to businesspersons or projects. They were only giving credit and facility to secured business with guarantees and collaterals of more than 40% of the loan or the facility itself. It is worth noting that during 2001-2002 there was devaluation of the currency by almost 100% ($1 was LE 3.5 and after devaluation $1 was LE 6.9), which affected on the trade business and the importing cost. After 2005, the average yearly increase was 6.1%. In the last year of the table the credit given to private business sector was -1%, one can claim that this was due to the revolution occurred in Egypt in January 2011.

3.3.2.5. Household credit and Deposit in Egypt

The household sector is a key driver in the banking system especially in deposits. The household sector, based on the central bank classification, was always having a low contribution in the credit taking but a major contribution in the deposit accumulation. This is clear from the following table.

Table 3-8: Household credit, Deposit and percentage of Change

Date	Household Credit in bn LE	% change per year	Average change per period	Household Deposit in bn LE	% change per year	Average change per year
1995 - 1996	16	0	18.1%	105.5		11%
1996 - 1997	20	23%		117.6	12%	
1997 - 1998	23	15%		129.1	10%	
1998 - 1999	26	16%		144.5	12%	
1999 - 2000	29	10%	7.7%	161.2	12%	15%
2000 - 2001	31	6%		185.8	15%	
2001 - 2002	33	8%		220.4	19%	
2002 - 2003	35	4%		264.7	20%	
2003 - 2004	37	7%		296.3	12%	
2004 - 2005	41	11%		339.7	15%	
2005 - 2006	53	29%	16.1%	380.1	12%	11%
2006 - 2007	60	13%		420.1	11%	
2007 - 2008	78	31%		447.8	7%	
2008 - 2009	85	8%		513.8	15%	
2009 - 2010	93	10%		574.7	12%	
2010 - 2011	99	7%		641.3	12%	
		518%			508%	

(Source: Author own research and outcome based on data gathered and analysed from the Egyptian government Portal, IDSC and Central Bank of Egypt report from 2004 until 2011).

The household deposits and the personal loans have different development, though credit increased by 518%; it still represents only 11% of total credit. The deposits of the household are considered the main pillar that the banking sector and the credit business are depending upon. The deposits increased by 508% with a starting amount of LE 105 billion versus LE 16 billion of credit in year 1995. During the first period in which banks were giving loans easily, the household sector also benefited from these actions. Before year 2000, the average yearly increase was 18.1%. From year 2000 to 2005, the percentage was 7.7%. In the last period, the increase was 16.1%.

It is argued that the increase in number was due to the expansion of branches, marketing activities, credit cards and personal loans especially in cars. Moreover, banks because of the business risk prefer to give loan to individual because interest rate is higher, and it has less complicated procedures compared to business loans.

3.3.2.6. Public and Government Credit and Deposit in Egypt

The next table shows, the credit granted to the Public sector that include the government and the public companies. As mentioned before it is based on the following formula:

> Net Claim on government & public = Securities + credit facility + claims on public sector – deposits.

Table 3-9: Public credit, Deposit and percentage of Change

Date	Public Credit in bn LE	% change per year	Average change per period	Public Deposit in bn LE	% change per year	Average change per year
1995 - 1996	71	0	7.5%	44.4		2.8%
1996 - 1997	76	6%		48.7	10%	
1997 - 1998	76	1%		49.1	1%	
1998 - 1999	88	15%		48.0	-2%	
1999 - 2000	95	8%	14.5%	53.4	11%	14.2%
2000 - 2001	113	18%		57.4	7%	
2001 - 2002	127	12%		68.0	19%	
2002 - 2003	139	9%		81.9	20%	
2003 - 2004	162	17%		99.2	21%	
2004 - 2005	197	22%		105.8	7%	
2005 - 2006	217	10%	17.2%	104.8	-1%	5.7%
2006 - 2007	203	-7%		97.7	-7%	
2007 - 2008	201	-1%		116.6	19%	
2008 - 2009	306	52%		128.6	10%	
2009 - 2010	356	16%		143.3	11%	
2010 - 2011	470	32%		145.0	1%	
		560%			**226%**	

(Source: Author own research and outcome based on data gathered and analysed from the Egyptian government Portal, IDSC and Central Bank of Egypt report from 2004 till 2011)

Public credit increased by 560% in 15 years and deposits increased by 226%. The first period before year 2000, the average increase was 7.5%, during that time, most of the focus was on the private business and the household sectors. After year 2000, the average increase was 14.5%. After the banking law in 2005, the average increase was 17.2%. During years of 2006-2008, government deposits and credit reduced, one can argue that this is due to the better financial positions of the public budget caused by increase in revenue and cash inflow from the FDI.

The biggest jump was in year 2008-2009 until 2010-2011 in which the public credit jumped by 134%. It is argued that because of the worldwide financial crisis and that the private credit and the household credit increased by a very low percentage of 4% and 7% respectively, the public spending increased to overcome the tight that could happen in the economy. Moreover, the gap between the deposits and credit increased widely in the third period, partially because of the government spending to stimulate the economy and partially to overcome the budget deficit

that is widening because of different shortfalls in the public budget such as subsidies and interest incurred.

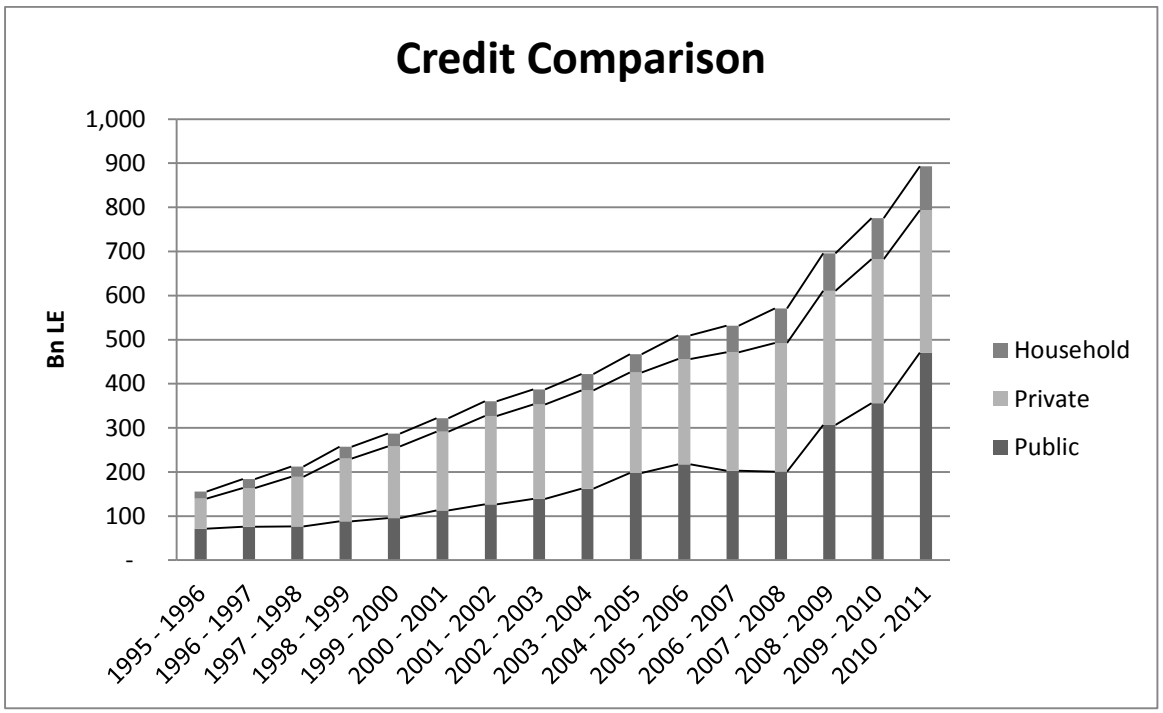
The following table illustrate the comparison among the three sectors.

Table 3-10: Credit comparison

Credit Comparison							Bn LE
Date	**Public**	**% of total**	**Private Business**	**% of total**	**Household**	**% of total**	**Total**
1995 – 1996	71	46%	68	44%	16	10%	156
1996 – 1997	76	41%	88	48%	20	11%	184
1997 – 1998	76	36%	113	53%	23	11%	212
1998 – 1999	88	34%	142	55%	26	10%	257
1999 – 2000	95	33%	162	57%	29	10%	287
2000 – 2001	113	35%	179	55%	31	10%	322
2001 – 2002	127	35%	200	56%	33	9%	360
2002 – 2003	139	36%	214	55%	35	9%	387
2003 – 2004	162	38%	223	53%	37	9%	422
2004 – 2005	197	42%	228	49%	41	9%	467
2005 – 2006	217	43%	239	47%	53	10%	510
2006 – 2007	203	38%	269	51%	60	11%	531
2007 – 2008	201	35%	292	51%	78	14%	571
2008 – 2009	306	44%	304	44%	85	12%	695
2009 – 2010	356	46%	326	42%	93	12%	775
2010 – 2011	470	53%	323	36%	99	11%	893
	560%	Average **39.7%**	**372%**	Average **49.7%**	**518%**	Average **10.5%**	**473%**

(Source: Author own research and outcome based on data gathered and analysed from the Egyptian government Portal, IDSC and Central Bank of Egypt report from 2004 till 2011)

Figure 3-2: Credit comparison



Although the total credit has increased by 473% in 15 years, but the main driver for this increase (in term of percentage increase and weight) was the public & government sectors. The public sectors increased by 560% while the business increased by 372% and the household increased by 473%.

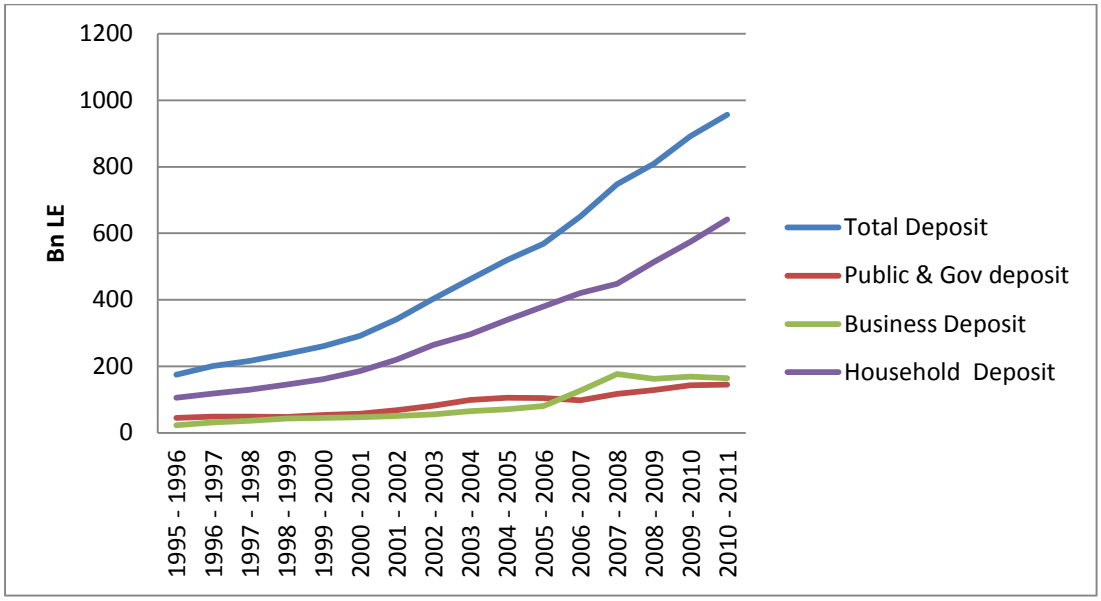
The following table highlights the comparison among deposits and domestic credit for public & government, Private sector and the household sector.

Table 3-11: Credit - Deposit Comprehensive comparison by beneficiary

	Total			Public & Government			Private Business			Household		
Date	Total Credit	Total Deposit	Total Credit to deposit	Public & Gov. credit	Public & Gov. deposit	Public & Gov. credit to deposit	Private Business Credit	Private Business Deposit	Private Business Credit to deposits	Household Credit	Household Deposit	Household Credit to deposits
1995 - 1996	156	175	0.89	71.3	44.4	1.60	68	22.6	3.03	16.1	105.5	0.2
1996 - 1997	184	201	0.91	75.8	48.7	1.55	88	31.7	2.78	19.8	117.6	0.2
1997 - 1998	212	216	0.98	76.4	49.1	1.56	113	35.9	3.14	22.8	129.1	0.2
1998 - 1999	257	237	1.08	88.1	48.0	1.83	142	42.5	3.35	26.4	144.5	0.2
1999 - 2000	287	260	1.10	95.4	53.4	1.79	162	44.7	3.63	29.0	161.2	0.2
2000 - 2001	322	291	1.11	112.5	57.4	1.96	179	46.6	3.83	30.8	185.8	0.2
2001 - 2002	360	341	1.06	126.6	68.0	1.86	200	51.0	3.92	33.3	220.4	0.2
2002 - 2003	387	403	0.96	138.5	81.9	1.69	214	55.3	3.88	34.6	264.7	0.1
2003 - 2004	422	462	0.91	161.9	99.2	1.63	223	64.8	3.44	37.0	296.3	0.1
2004 - 2005	467	520	0.90	197.3	105.8	1.86	228	71.0	3.21	41.3	339.7	0.1
2005 - 2006	510	569	0.90	217.0	104.8	2.07	239	80.7	2.97	53.2	380.1	0.1
2006 - 2007	531	650	0.82	202.8	97.7	2.07	269	126.6	2.12	59.9	420.1	0.1
2007 - 2008	571	747	0.76	200.9	116.6	1.72	292	176.9	1.65	78.3	447.8	0.2
2008 - 2009	695	810	0.86	306.3	128.6	2.38	304	162.6	1.87	84.6	513.8	0.2
2009 - 2010	775	892	0.87	356.1	143.3	2.48	326	169.3	1.93	92.8	574.7	0.2
2010 - 2011	893	957	0.93	470.3	145.0	3.24	323	164.2	1.97	99.2	641.3	0.2
Total	473%	447%	0.94	560%	226%	1.96	372%	626 %	2.92	518%	508%	0.2

(Source: Author own research and outcome based on data gathered and analysed from the Egyptian government Portal, IDSC and Central Bank of Egypt report from 2004 till 2011)

Figure 3-3: Deposit comparison



From the previous table, the amount of credit is increasing with a lower rate than the amount of deposits that increased with an accelerated rate especially from year 2000 to 2011. During the recession of 1999 until late 2002, total credit was higher than the deposits; banks were sometimes borrowing from the central bank to lend money. Business credit as a percentage of total deposits was high during 1999-2002, now a day, the business credit to total deposits is 41% and reducing. The household is the main source of deposits while it only account of around 10% of the credit. The public and the government sector are competing with the private business for the credit. Most banks will prefer to deal with the public and government sector because of the risk associated with them, which is less than the private business.

3.3.2.7. The Central Bank of Egypt

The central bank of Egypt CBE is an independent regulatory entity. The Law no 88 for 2003 and the presidential decree no 65 for 2004, gave the CBE it autonomous, authority and power to purse the duties of a central bank. Based on the CBE website the main objective of the CBE is to:

- Ensure price stability and the reliability of the banking system
- Plan and manage the monetary, credit & banking policies
- Issue banknotes
- Supervising the banking sector and the national payment system.
- Managing the currency reserves.
- Manage and regulate the foreign exchange market.
- Recording and following up on the external debt

According to Lyer (2010) before 2003 and the appointment of Dr Farouk El Okda to be the governor of the Central Bank, the CBE has limited effective control on the banking sector, and the human calibre working there were lacking the latest techniques and training to perform the reform required. Al Okda made great improvement on the structure of the CBE, the staff, the system and the policy applied. The CBE helped in improving the position of the non-performing loans, complying with the international standards, support the consolidation in the banking sector hoping to improve competition.

The Central Bank plan to improve the sector implies the establishment of a specialized training and development institute. The CBE established The Egyptian Banking Institute (EBI) as the training arm of CBE to provide banking, financial, risk and monetary training.

The EBI was initially established under the Egyptian Law No. 78 in 1991 to be governed by a Board of Trustees, including the Governor of the CBE and the Institute's Executive Director. In 2003, the Institute was transferred as a separate entity with an independent budget and governed by a Board of Directors, headed by the Governor of the Central Bank of Egypt and followed the Egyptian Law No. 88.

Since 2003, the Institute has passed through momentous growth and development in terms of reach, co-operation with international partners, training facilities, training services and products. They currently serve not only the banking sector, but also the financial and investment sector as well. The Institute served 23,000 participants on more than 1000 course with total training hours of 28,000 in 2011.

Source: Egyptian Banking Institute website www.ebi.gov.eg accessed 9-11- 2013 and EBI 2013.

3.3.3. Public Institutional Enablers

3.3.3.1. The Egyptian Financial Supervisory Authority (EFSA)

In order to make the economic and financial reform, the government decided to establish one authority to overview the whole non-banking sector. The Egyptian Financial Supervisory Authority EFSA is a public Authority that has a legal status based on the Egyptian Presidential Decree No. 192 of 2009 Promulgating the Statute of (EFSA) and it is reporting to the minister of investment . EFSA was established in accordance to law 10 of the year 2009. With the establishment of EFSA, different independent authorities were dissolved, and their duties and their regulating power came under the supervision of EFSA. These authorities and correspondent laws were: Egyptian Insurance Supervisory Authority (law no. 10 of 1981), the Capital Market Authority (law no. 95 of 1992), and the Mortgage Finance Authority, Depository and Central registry law no. 93 of 2000, Financial Leasing law no. 95 of 1995 and the Mortgage Finance law no. 148 of 2001.

EFSA supervises and regulates all non-banking financial markets and instruments, including the following sectors:

1. The Capital Market,
2. The Egyptian Stock Exchange,
3. Insurance Services,
4. Mortgage Finance,
5. Financial Leasing,
6. Factoring
7. Securitization.

EFSA's main aim is to:

1. Regulate and stabilize the non-banking financial market by issuing and inspecting financial institutions licenses
2. Ensure transparency and competitiveness to attract investments
3. Solving problems, manage risk and standardizing non-banking financial rules.
4. Protecting investors' rights and monitor the dissemination of information
5. Confirming financial discipline and limiting market manipulation and fraud
6. Development of the non-banking sector by providing training and co-operation with similar entities abroad to increase investment awareness and culture

To ensure that the EFSA will be independent, it stated in its establishment law to create a board of directors, which has the authority without referring to any higher authority to manage the EFSA. The board is formed by the Chairman of EFSA, his two deputies, Central Bank of Egypt deputy, five members to be nominated by minister of Investment.

Source: Author outcome based on The Egyptian Financial Supervisory Authority website accessed on 20-11-2013 and the Presidential Decree No. 192 of year 2009 and Law 10 of year 2009.

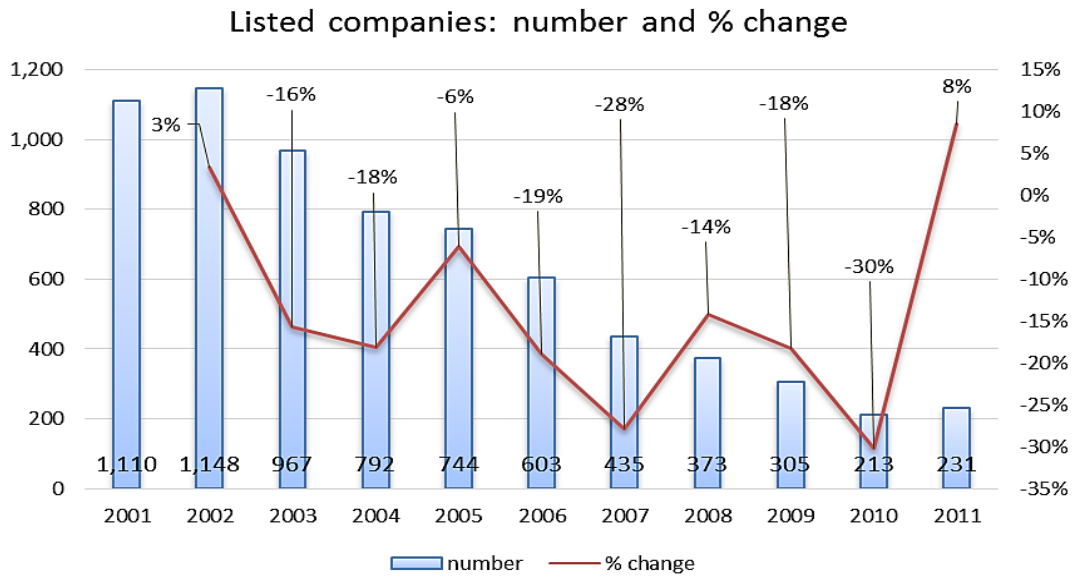
3.3.3.2. The Capital and Stock Market

The Egyptian stock market is considered one of the oldest in the world. It was the fifth most active stock exchange worldwide in the 1940's, preceding the Egyptian revolution of 1952 (Rizk et al 2008). The nationalization policies resulted in a significant drop in the market activities and became dormant till the 1980's. The new development and the growth in the economy, the privatization program and the initial public offering occurred, supported the recovery of the stock market made in the early 1990's, and has ever since been considered among the attractive capital markets in the MENA region and the emerging markets.

In the 90's there were many benefits of being listed in the stock market, however the new rules started to eliminate these benefits, which affected the number of the listed companies in the market. Based on Bolbol, et al (2005) the Egyptian financial sector is a bank based one, and this is valid for the stock market as well. They found out that the development of the stock market was highly correlated with the development of the banking sector.

The following graphs illustrate the changes that occurred in the stock market during the period understudy.

Figure 3-4: Listed Companies

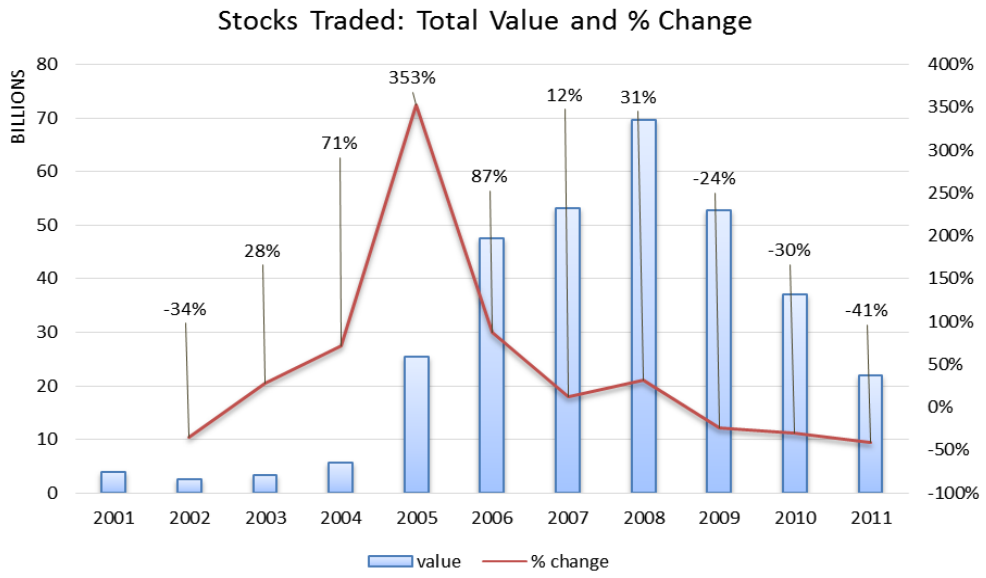


Source: Fred's data - Trading economics data 9-11-2013

One of the interesting readings concerning the reform is the effect it had on the number of the listed companies in the stock market as shows in the previous figure. Starting with 2003 and with Nazif's government, changes were made to the listing regulation and the incentive law of the listed stock market. Previously, listed companies were able to have a tax incentive equal to 10% of their paid in capital. Moreover, many of these companies were closed companies

with a limited free float and a limited number of shareholders. With the reform, the tax incentives were removed, companies have to have at least 100 investors, and 10% as a free float. According to these new regulations, many companies did not comply with them, asked to be de-listed from the stock market, and became a closed company. This had an effect on the number of listed companies that reduced from as high as 1148 to as low as 213 companies in 2010.

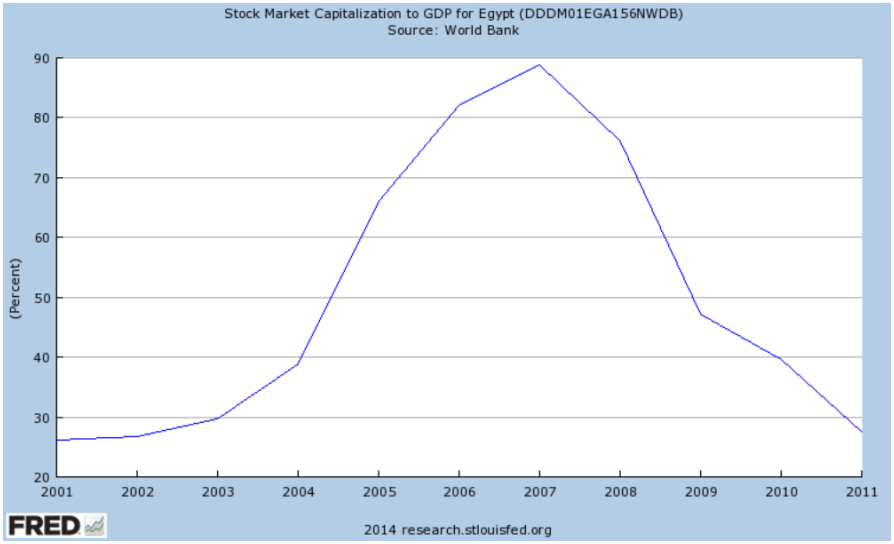
Figure 3-5: Stocks traded; total value (current US Dollar) and change year on year



Source: Fred's data - economic data accessed 9-11-2013

The previous graph shows that although the number of listed companies reduced dramatically, but the value traded increased by high percentage especially during the second half of the 2000's which had witnessed a high FDI and GDP growth rate above 5%.

Figure 3-6: Stock Market capitalization against GDP



Source: Fred's data- economic data accessed 9-11-2013

The floatation of the Egyptian pound was a factor that affected the value of the stock market. Comparing the market capital to the Egyptian GDP, shows that the market capital increased from less than 30% in 2001 to almost 90% in 2007, and with the effect of the worldwide recession in 2008 and the reduction of the listed companies, the market capital started to decline again (Feyen 2010). As mentioned before, the effect of the FDI and the economic growth represented in the GDP growth fuelled the feeling of prosperity and increased the stock market capitalization.

Among the development that the EGX conducted is to have a specialized market for small and medium size companies. The EGX introduced the Nilex to be the first Small and Mid-cap market in the region. The Nilex, which was, founded in 2008 follows many of the EGX requirement but with a relaxed and more flexible conditions and listing rules. It has less minimum capital, listing cost, number of shareholders, number of shares to be offered to the public as well as the company's financial track record and financial statements. (EJB 2010 and Nilex 2013).

3.3.3.3. I-Score

Among the main challenges that banks were facing in investigation to give credit, is the lack of reliable and comprehensive credit history. In order to overcome this issue, and with the boom of the personal loans and credit card demand, the decision to establish an entity to be responsible for providing the credit score firstly of individuals then later for companies. The I-Score (the trade name) was established in 2005 under the name of Egyptian Credit Bureau 'Estealam'. There are twenty-five banks participated in establishing the company in addition to the social fund for development. The other banks were just using the service of the i-score.

I-Score gathers information about individuals and SMEs and maintains an official database of credit history, situation and credit quality. These data are then sold to I-Score members to assess the risk of dealing with these clients either individual or SME. It also provides financial advice and solutions on how to improve the credit score and settle all the issue that might affect the rating.

The I-Score claims that they have 92% of credit data of individuals and SMEs who dealt with commercial banks until 2010.

Source: Egyptian Credit Bureau I-Score accessed 10 October 2013.

3.3.3.4. SME Development and Access to Finance

SMEs have been one of the pillars of the Egyptian private sector. SMEs in all sectors of Egypt's economy have been the major private sector employers since the 1980's. There are differences among these enterprises according to their size, location, ownership, status of formality and economic activity, but together, as major job providers, they produce a relative share of total value added, and provide a large segment of the poor and middle-income populations with affordable goods and services. Furthermore, given an enabling framework that rewards rather than penalizes risk, SMEs are able to foster the innovation and experimentation that are essential for structural change through the emergence of a group of dynamic, efficient and ambitious entrepreneurs.

Small and Medium Enterprises (SMEs) in Egypt represent almost 90% of the enterprises and provide the main bulk of private sector employment, but their share in value-added is disproportional, as the share of manufacturing SMEs in net private manufacturing value-added is only about 7.5%.

The development of SMEs in Egypt is considered a necessity, as they constitute a large portion of the country's economy as well as acting as a major employment provider and enhance development of new affordable products. Among the several challenges that these enterprises were facing is access to finance. SMEs access to finance is a responsibility shared by various stakeholders; regulators, financial institutions, investors as well the SMEs themselves.

In Egypt, SMEs face many challenges, these challenges and key issues exist because the SMEs do not have the resources, expertise, time, focus or cannot afford them. Some of these key issues are:

1. Registration and legal challenge
2. Planning challenges
3. Organization and Execution Challenges
4. Human Capital challenges
5. Financial challenges

By addressing these challenges and by providing a practical solution and advice to the SME they will be able to get access to finance, grow, export, hire more people, expand their capacity and develop into a corporation.

Traditionally, Egyptian banks had focused on serving corporate clients, who are typically well-established businesses with a strong track record & collateral base, which makes them good

clients for banks to serve, or “bankable” companies. However, over the past few years the banking sub-sector has undergone significant change in the types of products offered and the strategic focus of banks. This change is partially a result of a well-implemented reform agenda. As a result, nowadays we see banks expanding their operations into areas other than corporate banking, such as retail banking (focusing on the individual consumer) & SME banking, focusing on small and medium enterprises.

Opportunities

SMEs are clearly able to play a more positive role in generating income, employment and exports and in aiding the development of new products. The Egypt Human Development Report 2005 estimates an increase in the contribution of SMEs to total value added (and thus GDP) from 25% to more than 40% over a ten year period. There are many reasons for this optimism such as the growing institutional support to the sector; the increasing role of NGOs in supporting SMEs with business extension services and credit facility. Moreover, the rising levels of education of entrepreneurs; the growing size of new enterprises, both in terms of workers and the value of capital; and the gradual pressure of competition and the emergence of better equipped small and medium-sized economic units helped the segment. At best, the Egypt Human Development Report 2005 projects a 1.97% annual growth rate, with around 2.7 workers per enterprise, and an expected number of employed workers of almost 12 million.

To serve the SME sector, GAFI has established "Bedaya Center for Entrepreneurship and SME Development" to develop the SME sector and increase their investment. Bedaya centre. The centre acts as an advising agent and incubator for entrepreneurs and SMEs. The centre helps the SMEs to get different service of financial and non-financial services, which are crucial for the development of each project or company.

Generally speaking, Bedaya Centre provides the following services:

- Business development by providing non-financial and consulting services
- Entrepreneurship program
- Access to finance by having the Bedaya Fund which supposed to be a £100 million but ended to be £13 million as venture capital and private equity fund for SME
- Business linkage with large co-operation.

Source: Bedaya Center for Entrepreneurship and SME Development accessed 2013.

3.3.3.5. The Export Credit Guarantee Company

The Export Credit Guarantee Company was establish in early 1990's with an authorized and paid in capital of 250 million Egyptian Pounds (£25 million at 2011 foreign exchange rate), with the objective to support Egyptian company to be able to export their products. Among its services is the factoring for exporting and importing products.

The shareholder structure is as follow:

Name	Percentage of ownership
Export Development Bank of Egypt	70.55%
National Investment Bank	21%
Misr Insurance Company	4%
Misr Life Insurance	2%
National Bank of Egypt	1.2%
Others	1.25%

Source: The Export Credit Guarantee Company website accessed 2013.

The ECGC increased their portfolio as it is shown in the following table:

	2008	2009	2010
Revenue	£ 1.2 million	£ 3.1 million	£ 4.3 million
Net Income	£ 0.65 million	£ 1.43 million	£ 2.6 million
Exports covered	£ 37.7 million	£ 54.2 million	£ 93.1 million

Source: The Export Credit Guarantee Company website accessed 2013.

3.3.3.6. The Credit Guarantee Company

Among the barriers that the SMEs are facing in getting finance is the lack of collaterals and guarantees. According to Saadani, Zsofia, and Rocha (2010) many developing countries developed a credit guarantee scheme to help SME find their way in securing finance.

The Credit Guarantee Company (CGC) was established in 1991 to encourage the financial institutions to deal with the small and medium size enterprises that does not fulfil banks requirement in term of full collateral and guarantees. CGC shareholders are mainly banks as they represent 90% of shareholders.

The CGC provides different guarantee programs such as: Program of health care providers, Program to support small and emerging projects, Program to improves energy efficiency,

Program to reduce poverty and create jobs. However, CGC main program is the SMEs program (in cooperation with the Ministry of International Cooperation and the U.S. Agency for International Development), which can provide guarantee from £4,000 to £5 million. However based on Saadani et al (2010) research, the maximum provided by CGC is £250,000 with maximum duration of 7 years, with 50%- 70% coverage ratios and annual fees of 2%.

The research also highlights that in year 2009, CGC issues 3,595 guarantee contracts, which is around 45 person per million, with average value of guarantee of £24,000. Their outstanding portfolio amounted to £104 million, which is around 0.07% of GDP. If we compare 2009 results with 2004 results that were provided in the Ministry of Finance report (2004), one can identify an increase in outstanding loan and loan size but reduction in number of clients. In 2004, the results were £57 million outstanding loan, 8643 clients, and average size of £6500. Although the numbers are improving but the CGC contribution compared to the size of the market is very limited.

Source: The Credit Guarantee Company website accessed 2013.

3.3.3.7. Egyptian Institute of Directors

The Egyptian Institute of Directors (EIoD) was founded in 2003 and it was the first institute focusing on Corporate Governance in the Arab Region aiming to spread awareness, knowledge, and best practices of corporate governance in Egypt, the Middle East, and North Africa (MENA) region. The EIoD plan is to address directors, executives and shareholders in different entities such as listed/ non-listed companies in the stock market, family-owned and state-owned enterprises (SOEs).

The EIoD was initially affiliated with the Ministry of Trade and industry, and then by the Presidential decree no. 231/2004 - the EIoD followed the Ministry of Investment until year 2011. It is worth noting that in November 2011, the Supreme Counsel of the Armed Forced issued a Presidential decree no. 251/2011 to transfer the affiliation of the EIoD to the Egyptian Financial Supervisory Authority.

The EIoD developed and delivered many training and professional certificate about Corporate Governance, Board Member effectiveness and Internal Auditing.

The EIoD helped in developing many directors who work in the public sector in addition to the private sector. The corporate governance was another issue that the EIoD covered to spread the awareness of the subject and to increase transparency.

Source: The Egyptian Institute of Directors (EIoD) accessed 20-10- 2013.

3.3.4. Non-bank financial Institutions

3.3.4.1. Leasing

Leasing is a funding facility in the form of an agreement by contract between a lessor and a lessee, where the Lessor provides assets for use by Lessee for a definite period, in return for regular payments to the Lessor over a predetermined fixed period. At the end of the leasing period, the Lessee has the right to buy the equipment, and another benefit for the Lessee would be that he is allowed to deduct the cost of lease rentals from taxable income. (EJB Guide 2010)

Highlights on the Financial Leasing Law in Egypt: Law 95 for the year 1995, amended by Law 16 for the year 2001, was introduced to regulate the work with this new financing instrument supervised by the General Authority for Investment (GAFI), which is affiliated to the Ministry of Investment.

The following parties can register as lessors after taking the required license: any Egyptian or non-Egyptian normal person or legal entity, with leasing as one of its activities, general partnership, limited liability, joint stock companies and banks. The last amendment (Law 10 for the year 2009) states that the Egyptian Financial Supervisory Authority (EFSA) would oversee non-banking Financial Markets and Instruments including Financial Leasing. The leasing companies can leverage their paid in capital by eight times.
At first wave of leasing, government offered leasing companies tax exemptions and customs incentives, this encouraged many companies established them to benefit from this offer. The government waved these exemptions on later stages.

Recently, the Egyptian Financial Supervisory Authority (EFSA) has been considering setting new rules for licensing and controlling leasing in the Egyptian market aiming to force companies, working in different fields including leasing, to have their leasing accounts separate from accounts of their other activities or establishing specialized subsidiaries for it.

Furthermore, on April 20 2009, the Legislature Department of the State Council has prepared the final draft for the amendments. These amendments include exempting the long-term loan contracts for financial leasing firms established under the Law 8 of 1997 from the relative stamp tax, documentation, and registration duties for 5 years as of the date of registration in the trade register without sticking to the activity's financial standards.

Market of Financial Leasing in Egypt

Economic development, growth and employment generation are some of the main concerns of governments across the world, particularly in developing countries and transitional economies. Thus, in the year 1995, the Egyptian government realized the increasing importance of new financing tools like financial leasing that play an effective role in the economies of many developing countries as it provides funds for different companies and SMEs in these countries.

Financial leasing in Egypt has been making great leaps and bounds since 2004 with a growth rate of 82.1% (EFSA reports) in its early years of introduction and continuing to increase in the following years, as leasing is one of those means that has proven to be greatly successful as a better alternative to financing assets for SMEs in Egypt. Egypt now has 212 Leasing Company, with around 20 in real operation while the others are having very limited transactions.

The leasing market is divided into three major sectors:

1. **Captive / equipment dealer**: those are the companies, which operate for the benefit of their own holding companies. These include companies like GB Leasing and Powertrac.
2. **Bank affiliate companies:** the remaining leasing companies that offer a wide range in their contracts between small, medium and large capital companies. They are mainly backed up by banks. The main companies are Incolease, ATLease, Ahly Lease, ORIX, Corplease, Upper Egypt, and Sogelease.
3. **Independent Companies:** These leasing companies are not affiliated with banks, and operate on their own. Such Tamweel company, this sector is still small in number but is expected that more companies will be established and operate.

The companies that are not operating or low operating ones are the single-contract lease companies, so the company is established to make a specific contract not to work as a financial leasing company. As mentioned before, as there was a tax exemption, many factories established leasing companies to benefit from the exemptions and customs incentives.

The financial leasing in Egypt compare to the other financial services could be considered in the growth phase. The main problem is that the majority of leasing company relay on banks to finance themselves, and this caused their prices to be high compared to bank loans. Only few were able to finance themselves through securitization.

3.3.4.2. Factoring

Factoring firms mainly perform a financial transaction whereby a business sells its accounts receivable (i.e. invoices) to a third party (called a factor) at a discount in exchange for money which can be immediately injected in the business. Factoring companies also provide different services to traders by having an open account without the need to issue bank credit documents. Factoring services can provide immediate cash up to 90% of the creditors' value and it can facilitate trade with suppliers. (EJB Guide 2010)

The EFSA regulated the factoring companies and requires that a financial institution to be among the shareholder, to have £1 million as a minimum paid in capital. Factoring companies can leverage up to 10 times its shareholder equity to be able to finance their operation.

Until year 2011, there were two factoring companies in Egypt. Only one of them is operating. This company only deal with companies that have yearly sales over £4 million. Moreover, it is located in one of the free zone areas.

Source: EJB Guide 2010 and EFSA reports.

3.3.4.3. Mortgage

Mortgage is one of the key financial instruments to facilitate real estate ownership and channelling saving into the financial sector. Mortgage development is considered as one of the major task that the 2004-2010 government were working on especially Ministry of Investment (Nasr 2006).

Mortgage finance Law No. 148 was issued in August 2001. According to the law, mortgage finance is considered the method for financing the purchase, construction, restoration and/or development of any buildings including houses, administrative units, service foundations and trade.

The EFSA is assigned to supervise mortgage finance activities in Egypt. To better develop the sector, EFSA supervises the following stakeholders:

- Mortgage finance companies.
- The Egyptian Mortgage Refinance Company (EMRC).
- Securitization authorities.
- Mortgage finance intermediaries.
- Mortgage finance appraisers.
- Mortgage finance agents
- Auditors
- The credit bureaus and insurance companies, which act as parties complementing the mortgage finance process.

EFSA is responsible for setting the policy, regulate, issuing licence, review, setting standards and inspect on the mortgage finance companies.

Many activities were taken to ensure the development of the sector. The following are some of the actions conducted:

- Supporting the Low-income families Mortgage Finance. Based on the Presidential decree number 4 for year 2003, a fund was established to provide finance to low-income families to finance up to £9,500 per unit. The definition of the low income families is any family whose monthly income does not exceed £250.
- The establishment of the Egyptian Mortgage Refinance Company (EMRC) with capital of £21.2 million in year 2006 to provide long term finance for mortgage finance companies. Their main focus is to issue bonds against collaterals of the real estate being mortgaged. This is supposed to help mortgage companies in financing their business and to promote for the bond market in the stock exchange.
- Development of the Legislative Framework Regulating Mortgage Finance including sharing credit information.
- Development of the institutional framework and regulatory control to protect dealers' rights
- Development of the registration system to encourage the registration of assets. This was done by setting a maximum amount of £200 for registration based on ministry of Justice decree number 5424 for year 2006. Moreover exempting the mortgage finance contract from the stamp tax to reduce transaction cost.
- Collaborating with the provide sector to develop residential units for low-income families in different governorate
- Other enhancement were conducted such as reducing time to register the asset and time for contract acceptance and registration, establishment of credit rating institutions, creating awareness sessions of mortgage finance and developing insurance for the contract to ensure ability to pay in different cases.

The following table highlights the key figures and the development of the mortgage finance sector in Egypt.

Table 3-12 : Mortgage sector in Egypt

Item	2005	2006	2007	2008	2009	2010	2011
Mortgage finance value	£ 9 million	£ 27 million	£ 49 million	£ 111 million	£ 166 million	£ 242 million	£ 310 million
Percentage of mortgage finance to total lending	0.03%	0.08%	0.13%	0.26%	0.39%	0.55%	0.59%
Number of clients	333	1305	2327	7065	14007	21490	29631
Number of companies	2	4	6	8	12	13	13
Real estate surveyors and evaluator	67	87	109	125	137	142	154
Mortgage finance & real estate agents	200	240	258	273	325	371	394

Source: The Egyptian Financial Supervisory Authority (2009, 2010 & 2011)

From the EFSA report on mortgage finance, the majority of the clients (99%) were mainly for residential houses, with average mortgage value of £12,000 on 16 years period. Eighty percent of the clients have monthly income less than £500 and they account of 27.5% of the total value of the mortgage and have flat area of lower than 120 sqm (72% are less than 66 sqm). Eleven percent has monthly income more than £2000 account for 62% of the total value of mortgage.

3.3.4.4. Insurance Sector

The insurance industry is one of the key drivers for any economy. As it plays a major role in collecting and using national savings and protecting individuals and companies against risk, Bairnard (2008). Arena (2008) is adding on this idea by highlighting that Insurance companies play the role of intermediation, risk transfer and management, and mobilizing national savings.

The Egyptian insurance market is subject to supervision and regulation per Law No. 10 of 1981 and its amendments, the last of which was Law No. 118 of 2008. Effective July 1st, 2009, the EFSA has, in accordance with law No. 10 of 2009, replaced the Egyptian Insurance Supervisory Authority (EISA) in terms of enforcement of provisions of the law on supervision and regulation of insurance promulgated by Law No. 10 of 1981.

The insurance industry was introduced in Egypt in the early 19th century with the existing of British and French trading companies. In 1900 the first Egyptian insurance company was established, it was called National Insurance Company. Al-Sharq Insurance Company and Misr for General Insurance were established in year 1933 and 1934 respectively. During the 1930th and 1940th many foreign insurance companies began to establish branches and agencies, at that time there was 130 agency and branch.

During Nasser era and the centralized economy the insurance companies were nationalized due to the law no 23 of year 1957, which regulates the nationalization movement. The number was 14 Egyptian insurance and re-insurance companies. Based on merge decree of 1964, the insurance companies were limited to three nationalized entities namely Al Sharq, Misr and Al Ahliya Insurance Companies and one re-insurance company. These companies have dominated the insurance sector for many years especially with the co-operation with the public sector companies and the government.

Following Sadat open door policy, Law no. 43 of year 1975, this allows for private insurance companies to be established in Egypt and for foreign ownership company to be established in the free zone. However, the real participation of private sector insurance companies began in

the 1980'. Three semi-public companies were established, they are The Suez Canal Company for Insurance in 1979, Al-Mohandes in 1980, and Delta for Insurance in 1981. In the 1990's, during the economic reform, Law No. 10 of 1981 was amended to allow 49% of foreign ownership, due to this, the number of insurance companies increased to twelve: 4 public sector, 6 private and two free zone. (Nasr 2006)

In the 1990's the first wave of reform reached the insurance sector. The Insurance Law was amended again by Law No. 156 of 1998 to allow 100% foreign ownership. Number of insurance companies became seventeen, which consist of 4 public sector companies and 13 foreign capital companies. On the second wave of economic reform, the public insurance conglomerate was established in 2006 when former president Hosni Mubarak announced a merger of major public insurance providers under the Ministry of Investment's state asset management plan. The holding combines the three main providers in the country, MISR Insurance Company, Al-Chark Insurance Company and National Insurance Company. The move was a part of a bid to strengthen the growth of the insurance industry in the public sector and an attempt to bridge the earning gap between Egypt's public sector insurance providers and the country's private and foreign competitors (Nasr 2006).

The government then issued Law No.118 for year 2008, which target companies that have both life and non-life insurance service, to make a separation between life and non-life insurance line of business. The Law gave the company that follow under these criteria a 2 years to comply. In 2010, Total number became 31 companies, two public – one life and another non-life, and 29 private, foreign and mixed companies. Among the 29 private companies, there are eight takaful insurance (sharia compliance insurance)

Generally, there are four main types of insurance in Egypt:

- Vehicle Insurance
- Personnel
- Public Liability
- Building and content insurance

Reflecting on the development of the insurance sector, the insurance firms formed the Insurance Federation of Egypt (IFE), which is a consortium of insurance companies, reinsurance, and insurance associations licensed to operate in Egypt. IFE aims to develop the insurance industry and insurance professional. Federation membership mandatory for all insurance companies, reinsurance and insurance associations under the Law of the supervision and control of insurance.

Key players in insurance industry in Egypt

- Al Chark Insurance Company
- Allianz Egypt

- Arab Insurance Group (ARIG)
- Arab Misr Insurance Group
- AROPE Egypt
- BUPA Egypt
- Chartis Egypt
- Commercial International Life Insurance (CIL)
- Delta Insurance Company
- Egyptian American Insurance Company
- Insurance Holding Company (IHC)
- Pharaonic American Life Insurance Company (Metlife ALICO)

The following table highlights the development of the insurance sector in Egypt

Table 3-13: The Insurance sector performance

Insurance & Reinsurance Companies
Consolidated Balance Sheet

L.E.000

	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
Assets :					
Investments	21257610	28994035	28910613	31711117	35347783
Cash at Banks	624069	727842	426130	478104	504859
Debtors & Sundry Debtors	2975495	3357135	3385936	3252679	3817145
Other Assets	83594	305694	326570	399017	412811
Total	24940768	33384706	33049249	35840917	40082598
Liabilities :					
Shareholders Rights	4575223	8535306	6404513	6519562	6831318
Policyholders Rights :					
_ Life	9683865	12665850	14196312	16350734	18370903
_ Non Life	6807080	8035047	8223646	8690974	9522934
Commercial Reserves	546519	603916	541423	447459	414786
Creditors	3328081	3544587	3683355	3832188	4942657
Total	24940768	33384706	33049249	35840917	40082598

Source: EFSA Insurance annual report 2011.

From the table, the insurance sector increased in volume and importance in the Egyptian economy, however, during the 2008 and 2009 as the international financial crises affected the economy, the insurance sector almost stayed the same. After the direct effect of the recession, the market increased again to reach 40 billion Egyptian pounds. From the numbers, and based on the separation between life and non-life insurance, the policyholder of life insurance increased by almost the double although the non-life increased by around 40%.

3.3.5. NGO and Private Enablers.

Among the issues that hinder the institutionalization of the financial sector is the weak participation of the stakeholder though official representation. During the decade of 2000 to 2011, many organizations were established to represent the view and opinion of the private sector and professional in the sector. This section highlights on the main non-governmental organization that were established and their role in developing the sector.

The Royal Society of Egyptian Accountants and Auditors was established by the Royal decree issued on April 24, 1946. It was based on its counter-part association in England (Farrag 2009). After 1952 revolution, the name has been changed to be "The Egyptian Society of Accountants and Auditors" to comply with the presidential decision No. 311/1953. The role of the ESSA increased mainly in the 1960's to support the centralized and social economic system (Farrag 2009 and KPMG 2010). During that time, many accountants left their jobs either to work for the government or public companies or to work for the Central Auditing Organization, which is the auditing organization for the public sector.
In order for a potential member to join the ESSA he / she have to work at member firm for three years then apply for exam (KPMG 2010).
The main aim of the ESSA is:

- Maintain standards of accounting and auditing profession
- Develop the profession through training, seminars and knowledge transfer
- Cooperate with counter parts internationally.

The ESSA succeeded to have an effect on the accounting practice by issuing licence and applying the accounting standards.
Source: The Egyptian Society of Accountants and Auditors accessed 2013.

ECRA (Egyptian credit and risk association) was an idea to form in 2010 and get their official approval in January 2011. ECRA was formed based on the development that happen in the financial sector to gather credit & risk professionals in Egypt into one organization. It is considered the first and only Credit & Risk Association in Egypt. It is working with the regulators such as central bank of Egypt and Egyptian Financial Services Authority by suggesting their recommendations to enhance the financial sector in Egypt for the benefit of both lenders & borrowers. ECRA focus is on debt instrument, such as bank loans, leasing, factoring, mortgage and even the commercial papers.

ECRA is working on promoting and educating the market about different debt instrument that could be used such as Commercial Papers and securitization. Moreover, they also promote for new e-payment mechanism to facilitate payment and reduce time. In addition to the advanced training programs they provide to the banking professionals.
Source: ECRA website accessed 2013.

ECRA is still a new association with around 70 members. This is considered a very small number compared with the total number of professional in the banking & financial sector.

The increase of foreign direct investors- FDI to Egypt during the period of 2005 until 2010 fostered the development of Private Equity (PE) and the Venture Capital (VC) sector. Moreover, the improvement that the Egyptian government did in the economic reform based on the report Doing Business in Egypt 2008, many international and Gulf companies placed their focus on Egyptian companies. Due to this, a need to have an association to support this new industry evolved. The Egyptian Private Equity Association (EPEA): was an idea in 2009 and was born in late 2010 to be the industry body and public policy advocate and the hub for the MENA region.
EPEA's aim is to help in developing the PE and VC sector by working on the following directions:

- Regulation: negotiating on behave of the industry with the government and the regulator to help flourishing the industry by solving some of the issues including fund structure, taxes and approvals.
- Profession: developing the industry experts, profession, and capability through training and professional certificate programs, and maintain the required ethical standards.
- Industry: to be the hub for opportunities for companies seeking investors. Moreover, to encourage intuitional investors to participate in private equity and venture capital funds.

Again, EPEA is a new association with almost 80 members. They face a problem of attracting members as the private equity sector in Egypt is still in the early stage and the number of companies is limited.
Source: The Egyptian Private Equity Association.

3.3.6. Development of other institutions

There are different activities and reform that affected other institutions, either by change in regulations, requirements or incentives.

Among these institutions are the one that are related to the stock market such as

- Brokerage for equities
- Brokerage for Bonds
- Investment banks
- Portfolio management
- Asset management
- Financial advisors
- Rating companies for banks and financial institutions
- Holding companies
- Companies involved in capital raising and issuance of securities
- Securitization
- Market makers
- Clearing houses
- Book keeping for securities
- Stock valuation
- Management services for asset management
- Venture capital and Private equity
- Dissemination of financial information

More requirements were imposed on the brokerage company to limit the issuing of new licence unless the new company has the capability and plan to establish 10 branches in different cities to promote for the stock market outside the capital and the main cities.

New regulation for the financial advisory firms and more duties were given to them to provide more services in either the stock market, Nilex or valuation.

Other regulations affect different and new lines of companies were issued but participation on them was very limited. Among these services are Dissemination of financial information, Management services for asset management, Venture capital and Private equity. For Venture capital and Private Equity investors prefer to establish them offshore or in the gulf where regulation and contract are much flexible and tax-free.

3.4. Conclusion

The financial sector passed through different stages that helped in forming the current shape. Although the Egyptian financial sector was the oldest in the region, but due to the nationalization and the government led economy, the development in the sector were affected negatively. During the open door policy, the sector was lacking the required institutions, calibre, policy and system to follow, that are why the open door policy had a minimum effect on the sustainability and the development of the economy. In the 1980's and 90's different reform initiatives were applied, many of them with limited success, but it supported the following phase of reform. During the second half of the 1990's and the 2000's the consecutive cabinets became in control and applied a more comprehensive reform approach. This approach depends more on developing the required institutions and regulations to achieve the required results. However, many of these institutions, organizations and associations still in their early stage and didn't have their full effect on the sector, they many of them still lack clear objective, financial resources and authority to influence on the sector. The economic and financial reform that occurred in Egypt in the 2000's helped in setting the legal and institutional infrastructure for the next phase.

Organization such as the credit guarantee and export guarantee, have a business volume that is still small compared to the credit given or the export business size. The associations with the exception of the accounting one, has no power over the sector, members, the practitioners or the regulations. The Nilex and the Bedaya fund are still in their early stages and face many issues concerning their effectiveness.

Leasing, mortgage and factoring are also in their early stages but with potential to grow. The banking and the insurance sector are the one that dominate the financial sector. Even all the other credit financial institutions are still depending on banks as their main source of finance after equity as issuing bonds and securitization are still very rarely to occur. This has led to domination of the banks on the financial sector either in lending or in setting the interest rate.

By looking at this section, it is clear the Egyptian financial sector depends mainly on banks followed by the insurance sector. Banks and insurance companies were mainly controlled by the public sector directly or indirectly, which affect the growth, expansion and efficiency. Part of this research will compare between the efficiency of private vs. public banks, as it will be presented in later chapters.

4. Chapter 4 - Research Methodology

4.1. Research Methodology

4.1.1. Introduction

This study investigates the effect of banking reform on bank's efficiency and concentration in Egypt, the efficiency will be assessed using the DEA model based on selected variables of input and outputs. The concentration will be assessed using the K Bank concentration index. The previous chapters covered the literature review in the banking industry, methods used to assess competition and performance, the framework of the economic reform in Egypt and the theoretical framework which forms the perspective to look at the research. This part of the chapter identifies the research methodology and the procedures to conduct the empirical study. The research methodology is the guiding principle and the constraints that the researcher is putting into his study based on his understanding of the research question and based on the available constraints. It also presents the process by which data will be gathered and how they will be processed, analysed and concluded (Saunders et al 2009, Sekaran, 2005 and Ghauri & Grønhaug 2005). This part will cover the research Philosophy, research design and the research instrument used. Followed by variable development and data handling process.

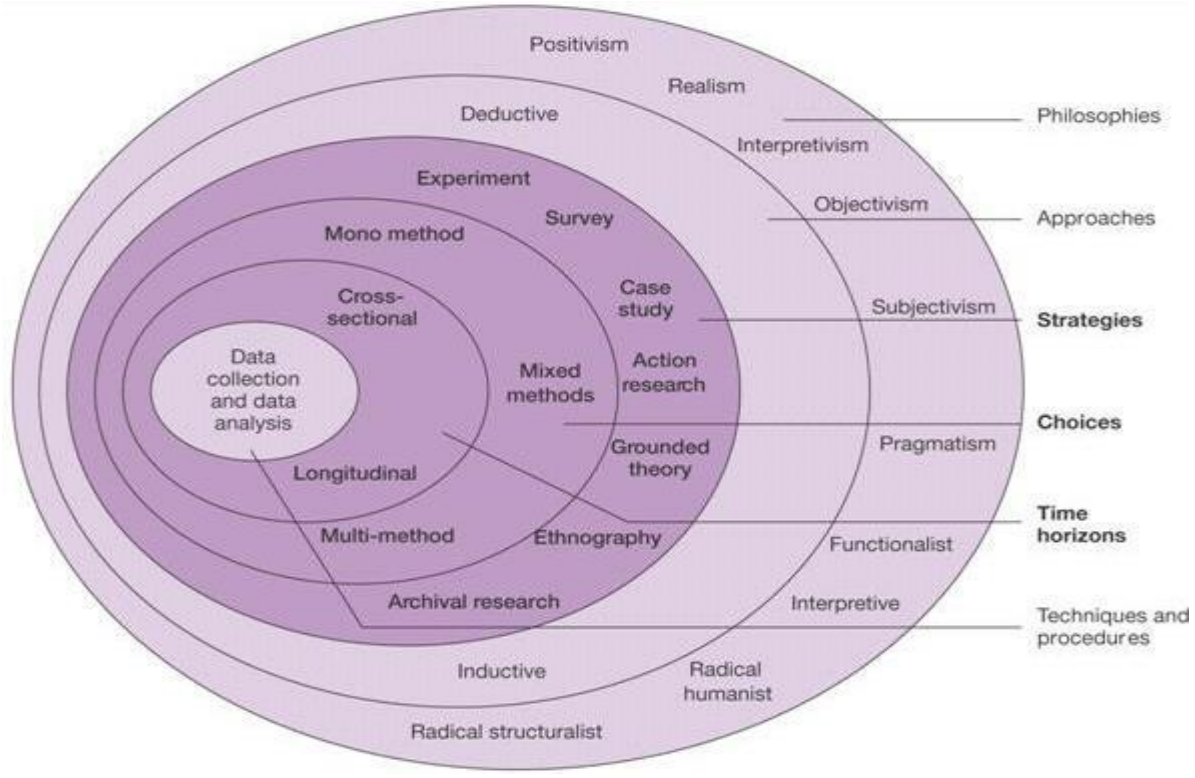
4.1.2. The Research framework

Any research should follow guidelines and procedures to be able to get the required outcome. The following section will highlight on the structured framework that this research followed.

Among the first step in the research process, is the research philosophy, which indicates the development of knowledge and the component and nature of that knowledge (Saunders et al 2009). It also highlights about the researcher's perspective about the study including the variable, relation, influencing factor and the desired outcome.

This is best described by Saunders et al (2009) research method illustrated in the following diagram.

Figure 4-1 :Saunders et al research method



Based on the research method by Saunders et al (2009), which could be considered as funnel techniques, which consider the general then goes into the specific detail of the research, the starting point will be the research philosophy.

The research philosophy is the first layer of the research method of Saunders. The research philosophy covers the whole research and includes different and important assumptions concerning the study. It answers the questions of the researcher point of view about the nature of reality, what is acceptable knowledge, and values in the research. It also highlights on the

research strategy, and the methods that the researcher is likely to use. The use of research philosophy will help in assessing and giving more understanding about the outcome of the study at hand. Saunders et al (2009) claimed that there is no research philosophy better than the other is; the most important is to select the most convenient philosophy or philosophies that will help in the chosen research questions. In other word, they recommend to use the pragmatism in selecting the philosophy.

The main decision that should be taken in the first layer is the selection of the way of thinking about the research philosophy, which could be, identify by *ontology* and *epistemology*. Based on Bryman 2012, Saunders et al 2009, Bryman and Bell 2011, Ghauri & Grønhaug 2005, Sekaran 2005.

A: Ontology: is the way we look at the world and how it works. It is mainly questioning whether the social entity could be separate from the social actor and be considered an entity in itself or it is attached to the social actor? Ontology is divided into two main aspects: Objectivism and Subjectivism. The Objectivism implies that the social entities are independent from the social actors. This could be because organizations have their own structure, hierarchy, rules, regulations, systems, procedures and even people are hired based on detailed job descriptions. All these factors put a pressure and force individuals to comply with them so the organization represents a social order in itself. On the other hand, The Subjectivism – sometime called constructivism- looks at the organization as a reflection of the social actors' actions and constructed the way it is because of the dynamics among them. It also implies that there are always evolvements in the organization because of the interactions of the social actors.

B: Epistemology: is more focused toward the acceptable knowledge in a particular discipline. In this manner, concrete gathered data and numbers are considered more important in looking at the subject or phenomena at hand. Positivism is applying the natural sciences methods in research, and by having such a general definition, it includes many and various methods and application. Value free is one of the key components of positivism, in other words the research has no relation, cannot change data or facts, and must be objective. Another epistemological position is Realism. Realism is more into scientific methods, which focuses more on certainty and what could be observed and felt by the senses. The last component is interpretivism. Researchers who support interpretivism are concerned to understand the difference between human and social actors. They claim that in depth analysis will be ignored if the complex world will be just generalization of some laws. The interpretivists think that dealing with natural science is different from social science, which includes human, behaviour and feelings. (Bryman 2012, Saunders et al 2009, Bryman and Bell 2011, Ghauri & Grønhaug 2005, Sekaran 2005).

The second layer is the Research Approach. This distinguishes the objective of the research, either to test theory (deductive approach) or building theory (Inductive approach).

In the deductive approach, the researcher will be testing an existing theory based on the case at hand and will develop a conclusion based on logic (Ghauri & Grønhaug 2005). Generally in deductive approach the following stages are conducted, making an observation, information gathering, theory formulation, deducing a hypothesis, presenting it in terms of variables, running the test, examining the outcome in light of the theory and finally making the conclusion. Researchers using deductive methods prefer to use large sample of data and to use quantitative research (Bryman 2012, Saunders et al 2009 and Bryman and Bell 2011).

Based on Saunders et al (2009) and Bryman and Bell (2011), in the inductive approach, the researcher is building a theory or understanding of the case at hand based on findings from a primary research based on human behaviour or first-hand observation (Ghauri & Grønhaug 2005). The inductive method is more concerned with the context of the case, so inductive researchers prefer closer observation or behaviour and feelings of a small sample rather than gathering large data from large sample. That is why the inductive research mainly uses qualitative data and different data gathering methods to get a clear view of the phenomena (Bryman 2012 and Sekaran 2005).

Then the research method is followed by three layers, research strategy, research choices and time horizon. These three layers are called the research design. Based on Robson (2002 as cited in Saunders et al (2009) the research design is where the research question will be tuned into research project.

The research design will be the project plan for executing the research to answer the needed questions. As any project plan, it should include objectives, actions, activities, source of data, constraints and time frame. This part will give better understanding of what the researcher is planning to do and how he is going to do it. It starts with the research strategy – the third layer- which consists mainly from the following list – the researcher selects the strategy that are mostly used in business and finance domain (Saunders et al 2009),

- Experiment – mainly to test a link between variables and if a change in one independent variable will lead to change in the dependent variable. This Might be compared with a control group in which no changes is conducted
- Survey – is a collection of a large data from large sample to answer different questions. They form an easy way to compare results and to derive a trend from them. Surveys are mainly used in deductive approach.
- Case study – in case study an in depth analysis and empirical investigation of the context and its boundaries are conducted. Case study is different from experiment

in the way of dealing with variables, in experiment you get involved in changing them, but in the case study, this variable management is not conducted.

- Grounded theory – is considered a good example of inductive research in which it starts without a theory in mind, the main objective is to gather enough data to understand the behaviour or the phenomena in a better way. Theory is developed based on the outcome.
- Archival research - it is mainly using secondary data or published data as main source for data gathering. This strategy helps in understanding development over time.

Multiple methods choices is the fourth layer of the research onion – the choice of using a mixture or a combination of the data collection or for analysis could be used to have better analysis and understanding of the research questions. Here the answer of qualitative and quantitative techniques will be highlighted. Using a single data gathering technique is known as mono method, and using more than one is known as multiple methods (Bryman 2012).

The fifth layer is the time horizon of the study. The time horizon answers an important question of will the study be a snapshot or it will cover different points in time. The snapshot is called the cross-sectional study and the continuous time study is called longitudinal. The cross sectional focuses more on the current situation while the longitudinal focuses more on change over time (Saunders et al 2009 and Sekaran 2005).

The last and sixth layer is the techniques and procedures used to collect and analyse data to have credible results. This includes the reliability of the data or analysis to provide the same results if conducted again, validity of the findings with the research questions, and generalization of the finding to be used in different researches. Therefore, it is testing that the research population was rightly selected, that data collections were relevant and accurate, the data interpretation was conducted with any deviation or pre assumptions and that the development of the conclusion is solid and relevant (Saunders et al 2009 and Sekaran 2005).

The previous section arranged the foundation for the research methodology by highlighting on how it should be conducted in term of process and the area that should be covered. The following section describes the selected research philosophy, approach, design and instrument used in the research.

4.1.3. Research Philosophy, Approach and Design

Based on the research at hand and from the previous descriptions of widely used philosophies and definitions, this research is using an epistemologically positivist research philosophy, in which the researcher is using the secondary data of the banks given to make the empirical analysis without the researcher interference.

This research will follow the deductive approach, which depends on selecting the theory, developing the hypothesis, data collection, analysis, reflection on theory. The selected theories are the financial intermediation and the competition theories, the hypothesis are H1: *The greater the capital resource of operating banks in Egypt, the higher the efficiency.* H2: *The lower the number of operating banks in Egypt, the lower the concentration*. The data is form the financial statements, the analysis will be made using the DEA tests and concentration index tools, and finally a reflection of the outcome will be made in the context of the theories.

The researcher will use a multi-method panel data as triangulation of data to seek convergence of results and complementary of results. It will be a simultaneous triangulation in which the input or the results of one technique do not depend on the other one. The methods will include the DEA test with four main applications (BCC, CCR, Window-CRS and Window-VRS), Correlation of the input and output variables, descriptive analysis of the development of the banking industry on the macro level, and Concentration indices.

The research will be a study of single country study of Egypt, using panel data for 27 banks over 7 years from 2004 until 2010 in which most of the economic and banking reform conducted which affected the merger and acquisition activities. The unit of study will be the financial figures derived from the financial statements of the selected banks. The researcher will use a multi method approach to tests and to identify the causality and direction of the selected variables. The testing tools are the analysis using financial statements and industry structure to be analysed using analytical, statistical tools and different application of the DEA methods and using different application of the concentration index.

As this study will follow the secondary data analysis, it will use the financial statements and the reports generated from the central bank as the main sources of secondary data. Based on Sekaran 2003 and Saunders et al 2009, secondary data are easy to get and cheap, especially if they are considered public information of listed companies. However, the data will need modification, and might not be directly relevant to the research question; the accuracy of data collection might be questioned.

Sample size

The operating banks in Egypt are 39 banks and around 20 corresponded banks (corresponded banks are banks with single office, which are not entitled to lend or to receive money; they handle and facilitate operation among Egyptian banks and banks in other countries). A random sample of the operating banks was selected for this study, correspondent banks were excluded, and banks that did not have their financial statement published for every year of the study were also excluded. The following are the full list of the selection criteria for the sample.

1. Bank should be a fully operating bank and not correspondent.
2. The bank should have its financial statements published for Egypt and not for the multinational group
3. The bank should be operating and have financial statements for every year of the study period as the window analysis do not compute for missing data.
4. Selected Sample Banks to represent the following:
    a. Representation of banks size
    b. Representation of ownership structure (public, private or mixed)
    c. Representation of international, local and mixed banks
    d. Banks that were involved in merging and acquisition

Based on the above-mentioned selection criteria, there were 27 banks that complied with them. Therefore, the study will cover 27 banks out of the 39. It turned out that the selected banks are most influencing bank due to their balance sheet size, deposits, loans and branches. These 27 banks represent 90% of the total banking sector deposits and 88% of total banking sector loans based on the results of the concentration index.

Item	Description
Number of selected banks	27 /39
Representation	4/5 Government owned banks 17 private banks 6 public and private ownership banks
Year of reviews	2004-2010
Analysis criteria	Income statement (operating profit and net profit) Balance Sheet (Deposits, bank loans, equity, loans, and securities) Total number of operating banks
Outcome	1. Efficiency score per bank per year based on their performance against the efficiency frontier according to different DEA models. 2. Different DEA results based upon the segmentation 3. Correlation among the input and output variables. 4. Descriptive analysis of the development of the banking sector in term of size, loans and deposits based on different segments 5. Concentration index based on 3, 4, 5 & 7 largest banks.

The following section will present the Banks that were selected based on the previous criteria and provides a brief about each of them:

Table 4-1: List of selected banks

1. Ahly United Bank	Established on August 8, 1978. On May 29, 2007, Delta International Bank SAE changed its name to Ahli United Bank (Egypt) SAE when it was acquired by Ahly United Bank of Bahrain 85%
2. Al Baraka Bank	The Egyptian Saudi Finance bank was established in March 1980. it became an Islamic bank backed by Saudi group Al Baraka which hold 73.4% of the bank and Misr Insurance 5.5%
3. Al Watany Bank of Egypt	Local bank that was established in June 1980 by a group of Egyptian investors. AWB was acquired by National Bank of Kuwait in 2008
4. Bank of Alexandria	Publicly owned bank which was established in 1957 The bank was partly bought (80%) by the Italian bank San-Paolo in December 2006
5. Arab African International Bank AAIB	Local bank owned by other banks and institutions Established in February 1964. In May 2005, Arab African International Bank absorbed Misr America International Bank. The bank is owned by the Central Bank of Egypt 49.4% and the Kuwait Investment Authority 49.4%
6. Arab Banking Corporation ABC	Established on August 21, 1982. In March 2000, Egypt Arab African Bank changed its name to Arab Banking Corporation - Egypt. The ABC Bahrain owns 99% of the Egyptian bank
7. Arab International Bank	Local bank established in 1974. The shareholders are the Central Bank of Egypt 39%, Libyian Foreign Bank, 39%, Abu Dhabi Investment Authority 12.5%, Qatar Holding Company 5%, The Sultanate Of Oman, 2.5%, and other investors.
8. Bank Audi	Lebanese bank that acquired 100% of Cairo Far East Bank in September 2006 and changed its name to Bank Audi SAE. Cairo Far East Bank was established by Banque du Caire (19%) and Korean banks 49%
9. Banque du Caire	Publicly owned bank Established on May 5, 1952 by individual investors. Was nationalized in 1961.
10. Banque Misr	Publicly owned bank Established on May 7, 1920. It was the cornerstone on a business empire founded by Talaat Harb. In September 2004, Banque Misr SAE acquired Misr Exterior Bank SAE.
11. Barclays Bank Egypt	British Bank Established in 1975 as Cairo Barclays International Bank SAE a joint venture between Banque du Caire & Barclays bank. In 1983, its name changed to Banque du Caire Barclays International SAE. On March 31, 2004, the bank changed its name to Barclays Bank - Egypt SAE when the British group acquired 100% of the bank.
12. Blom Bank Egypt	Lebanese bank Misr Romanian Bank was Established in May 1977. In February 2006, Blom Bank bought 100% of Misr Romanian Bank
13. Commercial International Bank CIB	Largest local bank that was originally established by Chase Manhattan 49% and National Bank of Egypt (NBE) 51%, established in 1975. Chase divested their investment in 1987 and sold 48.9% to NBE. NBE share was decreased due to capital increase to 18.7% and in 2006 NBE sold their stake to Ripplewood.
14. Credit Agricole	French bank that was Established on Feb 10, 1977 as Credit International d'Egypte. On August 19, 2001, Credit International d'Egypte changed its name to Credit Agricole Indosuez (Egypt) SAE. In March 2005, absorbed Crédit Lyonnais Egypt

	Branch and changed its name to Calyon Bank Egypt SAE. On September 1, 2006, absorbed Egyptian American Bank and changed its name to Credit Agricole Egypt. Credit Agricole Group has 60.4%, 13.07% for Mansour & Maghraby Investment and Development Company,
15. Egyptian Gulf Bank	Egyptian Bank established in 1981. The current shareholders are sons of Mohamed Mahmoud-Egypt 19.5%, Misr Insurance Company 19.4%, in addition to Saudi and Kuwaiti investors.
16. Export Development Bank EDBE	The bank was established in 1985. It is Publicly owned bank listed in the stock market with around 25% of free float. The bank is owned by National Investment Bank (40%) Bank Misr (23%) and National Bank of Egypt 11%
17. Faisal Islamic Bank	The bank was the first fully Islamic bank established in 1979. The bank is owned by Egyptian Awkaf Authority 15.3%, Bahraini institutions 10% and Saudi investors (mainly Faisal Family and related entities) 33%.
18. Housing & Development Bank	Publicly owned bank that was established in 1979. The shareholders are Egyptian Ministry of Housing and related housing fund 37%, Egyptian Awkaf 11.4%, Misr Insurance 15%, and Saudi Investors 15%.
19. HSBC	British Bank The Egyptian British Bank S A E was Established in 1982. On January 1, 2001, EBB changed its name to HSBC Bank Egypt SAE after the HSBC Group increased their share from 40% to 90%.
20. Misr Iran Development Bank	Established in May 1975. Shareholders are National Investment Bank of Egypt 30%, Misr Insurance 30% and Iran Foreign Investment Company 40%
21. National Bank for Development (ADIB)	The Bank was established in June 1980. The bank was bought -49.6%- by Abu Dhabi Islamic Bank the rest is 12.4% for National Investment Bank, Emirates International Investment Company 9.5% and other public entities 2%
22. National Bank of Egypt NBE	Publicly owned bank and the largest bank in Egypt in term of assets and branches Established on June 25, 1898. It used to act as the Central bank before the establishment of the central bank. In October 2005, National Bank of Egypt absorbed Mohandes Bank. In January 2006, it absorbed Bank of Commerce & Development 'Al Tegaryoon'.
23. National Societe Generale Bank NSGB	Owned by Societe Generale 78.4% and National Bank of Egypt The NSGB acquired 91% of Mibank in 2005
24. Piraeus Bank	Greek Bank 98.3% that bought Egyptian Commercial Bank that was established in 1978 as Alexandria Kuwait International Bank. On July 1, 1997, its name changed to Egyptian Commercial Bank. In January 2006, changed its name to Piraeus Bank Egypt SAE.
25. Societe Arab International du Banque SAIB	Egyptian Bank Established on March 21, 1976. On January 8, 2008, Société Arabe Internationale de Banque absorbed Societe de Banque Port Said. The shareholders are Arab International Bank 46% Arab Contractor 17% and Misr Insurance 20%
26. Suez Canal Bank	Egyptian Bank with Libyan and Arab shareholder that was established in March 1978. The Shareholder structure is 42% owned by Arab International Bank, Libyan Foreign Bank 27%, Suez Canal Authority (Pension Fund) 11% and others.
27. Union National Bank	Egyptian Bank Established on August 20, 1981. In December 2007, Alexandria Commercial and Maritime Bank SAE changed its name to Union National Bank - Egypt SAE. The Union National Bank of UAE bought 95%.

Source of Data:

In order to collect the data required for the research, many source of data and publications were explored to get the financial statements and the annual reports of the banks and the sector results. These sources are the selected banks' website, annual reports, articles, Central Bank of Egypt reports, The Capital Market Authority reports, The Egyptian Stock Exchange publications and Information and Decision Support Center Data Center. Some missing data were gathered from the research conducted by stockbrokers and investment banks such as the Banking sector and Economy publication from EFG-Hermes, Beltone, HSBC and CiCapital, The rating company MERIS and the web portal Zawya were also used.

The data collected included the annual report, income statement, balance sheet, cash flow statement and change in ownership statement. The data were in the form of annual reports, annual financial statement, financial research report and central bank reports about the macro results of the banking sector. Some of the selected banks are not listed in the stock market, and are not publicly traded; their financial statements were received from the central bank of Egypt and the rating agencies.

Among the difficulties in preparing the financial statement of the banks, was the difficulty in statement structure. As many of the financial statement were different in structure, definition and items, and some of the years were incomplete or missing. Multiple sources of data were used to cover the missing years. Standardizing and normalizing the statements by making a one unified financial statements with same definition and calculation per item for all the banks for the study period to be able to conduct the analysis were conducted. This will be explained more in detail in the following section.

4.2. Development of Hypotheses and Variables

4.2.1. Introduction

The research at hand is concerned with bank performance and efficiency resulted from the economic and financial reform conducted in Egypt during 2004 and 2010. Hypotheses were developed to be able to assess the performance and efficiency of banks during the selected period to test the effect of the reform on the performance and efficiency.

As mentioned before, the efficiency is defined as a measurement system that has a set of indicators derived in a consistent manner according to a forward set of rules or guidelines to be able to judge and assess results as mentioned by Welch and Mann (2001) in Anderson and McAdam (2004).

Efficiency in this research is how each bank used their input to produce their output. Selected inputs and outputs were chosen based on the literature in this domain and the DEA application. The bank/s with the highest results is/are used as benchmark(s) to make the efficiency frontier.

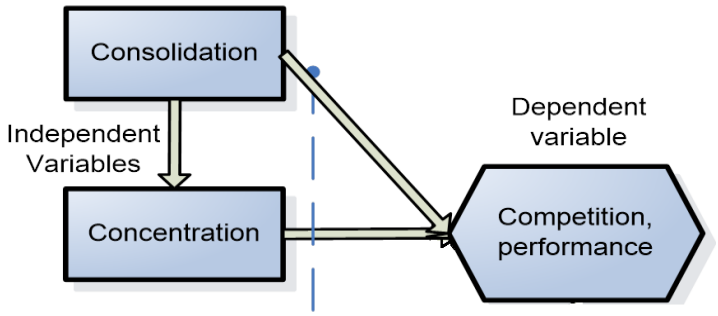
The research questions could be looked at as consecutive variables that depend on each other. Starting by the government decisions, the new unified law and restricting banking licence, encouraged foreign banks to participate in merging and acquisition activities that reduced the number of operating banks in Egypt. The consolidation resulted in larger banks with higher number of branches, huge deposits and loan portfolio. These enormous portfolios put pressure on the bank to utilize them. By having a low banking penetration rate in Egypt, which is 10% as indicated by Fletcher (2010), forced different banks to compete for the same customer and to be located in the main governorates. Having a limited customer base for the time being intensifying the competition among banks especially that most banks are commercial ones that target the same segment. Egypt was getting out from a recession, in which banks were reluctant to lend money especially with the devaluation of the Egyptian currency, and the high Non-Performing Loans (NPL) in the balance sheet of most banks. Bank managers decided to target and exploit the underserved market at that time in Egypt, which are the retail customers by offering them retail products such as (personal loan, car loan, credit card, white goods loan, mortgage, pilgrim loan, education loan and wedding loan). Large Corporations were forced to seek non-banking source of finance such as new investors as shareholder and the stock market for either stocks or bonds. These decisions affected the perceptions of the value received by different customers. As the retail market is highly

competitive and fragmented, and the large corporation market is limited, bank managers will seek another underserved segment to finance.

So, did all these reform activities help the banking sector and improve the performance, efficiency, competition and reduced the current bank dominance, or not? This is the general question of this study.

These could be considered the variables that can affect the banking sector. These variables and their interrelation and dependability are expressed in the next diagram that represents the conceptual framework that guided this research. Many of these variables were selected and used in similar studies.

Figure 4-2: Variable



In this model, the consolidation affected the competition and the performance, which will affect the efficiency. Moreover, the consolidation will affect the market structure represented by the concentration that will affect competition and performance.

4.2.2. Research Hypotheses and Variables

The following are the research hypotheses.

Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.

Independent variable:	○ The capital resources of operating bank in Egypt as the deposit and loan portfolio (consolidation)
Dependent variable:	○ The degree of competition-fierce competition will be measured in term of portfolio utilization, by looking at the source of funds such as deposits, loans and equity and utilization of funds such as loans and securities. ○ The profitability of the banks is also measured by looking at the operating profit and net profit. ○ The degree of competition and profitability will be presented as the efficiency score that will be developed from the DEA tests
Data gathering and Execution:	○ The capital resource is published by each bank on its financial statements. The Central bank publishes the cumulative deposits and loans in the economy. ○ For the dependent variable data, it was gathered from the financial statement as almost all large banks are listed in the stock market. ○ Data will be analysed using a statistical model of DEA as will be mentioned later
Difficulties:	○ Some banks are not listed and access to financial results might be difficult ○ The different structure of the financial statements.

Hypothesis 2: the lower the number of operating banks in Egypt, the lower the concentration.

Independent variable:	○ The total number of operating banks in Egypt
Dependent variable:	○ The degree of competition-fierce competition will be measured in term of concentration ratio for deposits and loans.
Data gathering and Execution:	○ Number of banks is published by the central bank ○ For the dependent variable data was gathered from the financial statement as almost all large banks are listed in the stock market. As most of the sample of the study will be from listed banks, detailed analysis reports will be issued by investment banks and research companies. ○ The total market size for the deposits and loans is gathered from the publications of the central bank. ○ Data will be analysed using a statistical model as will be mentioned later
Difficulties:	○ Some banks are new in the market with no financial history. ○ Some banks are not listed and access to financial results might be difficult ○ Banks that experienced merging and acquisition might have an increase in the loan or deposit portfolio.

4.2.3. Research instrument

According to Julie Pallant (2013), the research instrument is a crucial part in the research process. The instrument should be reliable, valid and reflect on the question under study and the variables that will be used to make the test.

The following instruments are used to gather the required data to measure the variables and test the hypothesis, the following research design framework will be applied.

	Quantitative
Purpose of the study	○ Hypothesis testing
Type of investigation	○ Correlation & Causal
Extent of researcher interference with the study	○ Minimal interference
Study Setting	○ Field Study
Unit of analysis	○ Banks
Sample size	○ 27 banks out of 39 banks in Egypt representing an average of 90% of the market
Time Horizon	○ Panel data for 7 years from 2004 to 2010, just before 2011 revolution to exclude revolution effect on the performance. ○ Year 2007 will be considered the break year, and comparison will be made between the first period (2004, 2005 & 2006) and the second period (2008,2009 & 2010)
Data collection methods	○ Secondary data from reports and company research ○ Financial statement

The literature review on Egypt was the starting point, Banking and performance assessment methodology along with the secondary data from the financial statement, reports and analysis to have more insights about the research question and to identify trends, gaps or discrepancies.

The data gathered were analysed using DEA approach to identify performance efficiency. As mentioned before, the most commonly used DEA approach in banks is the BCC (Banker – Charnes – Cooper) model. Due to some of the limitation of the BCC model, such as the high efficiency score it provides based on its definition, and to be able to have an in-depth and comprehensive analysis by comparing the results of different models, other DEA approach such as the CCR (Charnes – Cooper – Rhodes) model and the Window Analysis will be used. Even for the window analysis the two returns to scale adjustment – constant and variable will be used.

The DEA is used by identifying variables to be considered as inputs and other variables to be considered as outputs. The selected variables were:

Table 4-2: Input & output variables

Input	Output
• Funds (customers' deposits + due to banks + short-term loans + long term loans + non-interest bearing funds) • Owner's equity (paid in capital + retained earning + profit of the year)	• Net Loans (gross loans – provisions) • Securities (held to maturity security + short term security + available for sales security + other investment) • Operating profit (earnings before interest, tax, provision and other income) • Net profit (profit after interest, tax and other income)

The research will test the ability of the banks to use the input variables to produce the output variables. The bank that will produce more output with the same level of inputs or with less input will be considered more efficient than the other banks.

The selection of inputs and outputs are mainly derived to answer the first hypothesis question.

Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.

Therefore, by having more capital and funds and due to economy of scale, the bank will be able to have better outputs of loans, investment and profit, which will result in higher efficiency.

The researcher used the polarity of the model to be output oriented. This means that the DEA model is comparing the banks by measuring how to maximize the output by having the same input.

From the literature review, the BCC method is the most commonly used method from the DEA. The researcher used the BCC in the initial run of the DEA model; however, this method produces high efficiency rate among banks. This was mainly due to the definition of the BCC method itself that develops the efficiency frontier not based on the absolute best performing, but based on the relative best performing in each variable. Moreover, the BCC is used to assess efficiency of one year only, so the model was conducted for each year of the seven years from 2004 to 2010 to be able to compare the differences and changes all over the years. Comparison was conducted during the time of the study to identify the change in efficiency over time.

To have different view of the efficiency, the basic DEA method to assess the efficiency – CCR was selected. The main difference in the CCR definition is that the CCR considers the frontier is the best possible line for all the variables. The efficient banks in all years were reduced. However, the model is also looking at each year individually.

Then the window approach of the DEA was used. The Window model runs the test once for the whole 7 years and compares all the results together. The number of the efficient banks was reduced again. The author conducted two runs based on the constant return to scale and variable return to scale models. Moreover, correlation tests were conducted among the input and output variables.

To be able to have a better analysis, the researcher divided the banks into the following categories:

1. Full sample
2. Public vs. private ownership banks
3. International backed banks vs. regional (Egyptian and Middle Eastern) backed banks

For each of the categories two approaches were used; the Constant Return to Scale approach and the Variable Return to Scale approach. Therefore, a total of 12 tests were conducted. 1 for BCC, 1 for CCR, 2 Window Analysis (WA) full sample, 2 WA public, 2 WA Private, 2 WA International sample, 2 WA Egyptian & regional.

After the DEA tests for hypothesis 1, another descriptive analysis of the changes that occurred in the deposits, loans and number of branches will be made. This descriptive analysis will

cover a longer time span, and will segment the beneficiary of the loans or the deposits based on government, business sector and household. To test hypothesis 2 ***the lower the number of operating banks in Egypt, the lower the concentration,*** different K bank concentration indices are used based on the outcome of the descriptive analysis and the financial results of the sample at hand. The K Bank Concentration indices selected are the CR3, CR4, CR5 and CR7.

4.2.3.1. Selected Software

Many software packages can perform the DEA test. Different trials with different DEA software packages were conducted to select the most suitable for the research at hand. The trials were looking at the application of the BCC, CCR and Window analysis.

The following software packages were tested:

- The DEA-Solver provided by Cooper, Seiford and Tone
- The DEA Excel Solver by Joe Zhu
- DEAP version 2.1 by Tim Coelli
- Frontier Version 4.1 by Tim Coelli
- MaxDEA version 6.3 by Cheng Gang and Qian Zhenhua
- LPSolver by Free Software Foundation
- Win4Deap by Michel Deslierres

The trials applied the following process:

1. Generic DEA example with 1 input and two outputs for a single period for 3 banks
2. Generic DEA Example with 2 inputs and 2 outputs for a single period for 5 banks
3. Sample of the actual data of the banks for 4 banks with 2 inputs and 4 outputs for a single period.
4. Sample of the actual data of the banks for 4 banks with 2 inputs and 4 outputs for five periods.

The following selection criteria were made to choose the software for this research:

1. Range of tests it can make such as BCC, CCR and Window analysis
2. Range of adjustments it can include such as output and input orientation, Constant and Variable return to scale
3. Other tests that could be made such as correlation tests.
4. Data handling and ease of use of data by having easy data entry and integration with other format such as excel.
5. Outcome of the test such as the report, graphs and analysis.

Based on the trials, and the previous selection criteria, this thesis will use the DEA-Solver provided by Cooper, Seiford and Tone.

For the Concentration index tests for hypothesis 2, the Microsoft excel will be used.

4.3. Data Handling and DEA Tests

4.3.1. Introduction

This part describes the data handling and the selected DEA tests conducted by the researcher to test the hypotheses and the process followed to reach the conclusion.

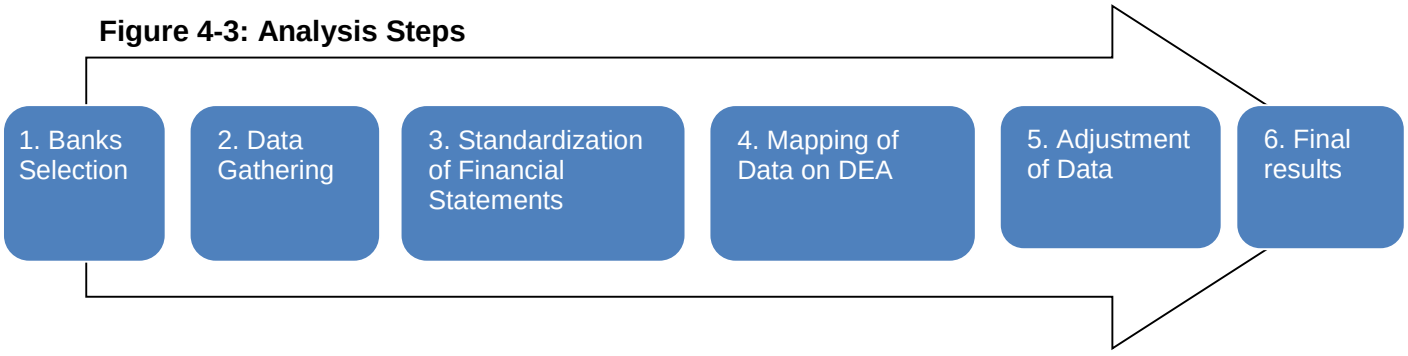
In order to analyse banks performance from 2004 until 2010 after government's decision to increase the paid-in capital of the bank from £5 million to £50 million, the researcher conducted an analysis that will help to measure the Egyptian banking performance and efficiency, which depends on their financial status (deposits, capital, debt, securities & investment, gross revenue and net profit).

4.3.2. Process

The analysis was conducted using the DEA method in order to understand the banks' performance based on their financial statements.

The following steps were applied in conducting the analysis:

Figure 4-3: Analysis Steps



4.3.2.1. Banks Selection:

As mentioned in chapter four, selection criterions were made to choose the sample list. The final list of banks is as follow:

1. Ahly United Bank
2. Al Baraka Bank
3. Al Watany Bank of Egypt
4. Bank of Alexandria
5. Arab African International Bank AAIB
6. Arab Banking Corporation ABC
7. Arab International Bank
8. Bank Audi
9. Banque du Caire
10. Banque Misr
11. Barclays Bank Egypt
12. Blom Bank Egypt
13. Commercial International Bank CIB
14. Credit Agricole
15. Egyptian Gulf Bank
16. Export Development Bank EDBE
17. Faisal Islamic Bank
18. Housing & Development Bank
19. HSBC
20. Misr Iran Development Bank
21. National Bank for Development (ADIB)
22. National Bank of Egypt NBE
23. National Societe Generale Bank NSGB
24. Piraeus Bank
25. Societe Arab International du Banque SAIB
26. Suez Canal Bank
27. Union National Bank

4.3.2.2. Data Gathering:

The three financial statements were gathered: the Balance Sheet, the Income Statement, and the Cash Flow Statement for the period of the study, of each bank from their websites, the stock market data, the central bank, and from other financial reports or financial institutions' analysis. Some statements were available from 2005 and some from a later year until first or second quarter 2010, and the researcher had to search for other source of data to complete the statements. It is worth mentioning that bank BNP-Paribas and United Bank of Egypt's data were missing for the period of 2004, 2005 and 2006, this is due to the fact that these banks were not existing and that they bought licence of nearly bankrupted banks. Moreover, the financial statement of Industrial Development & Workers bank of year 2010 is still not approved by the government and not yet published. These banks will not be added to the list of banks to be analysed.

4.3.2.3. Standardization of Financial Statements:

Many discrepancies were found in the statements, from one bank to another and from one year to another. In order to standardize the financial statements, the researcher followed these steps:

1. The financial statements were reviewed and discrepancies in structure and in definition of each item were identified. This was clearly detected with Islamic banks as they have different terminology and accounting standards. The standardization was conducted with the help of the footnote of each financial statements and annual report.
2. The statements of NSGB was selected as reference or standard model since they are the most comprehensive, structured and having a clear classification of the different items of the financial statements.
3. The financial statements were converted into an Excel sheet to identify the common and the different items.
4. Some items were added together to comply with the standard statement.
5. Converting the amounts in USD into EGP based on the central bank average exchange rate of the year and normalizing all the amounts to be presented in EGP pounds instead of thousands and millions.
6. Public banks have their financial year ends the 30th of June, while private banks have their year ends the 31st of December, the researcher standardized the full year so public banks which ends on 30-6 of a specific year and private banks which ends on 31-12 of the same year are recorded in the same period.

7. With the processing step, the researcher also wrote down some notes about the processing details like the items listed in few banks only and not included in the standard statement, the name of the item in case it's different than the name on the standard statement, etc.
8. Special attention was made for the selected variables of the model that represent the input and output.
9. Although the researcher focused and collected 16 variables, for simplicity he decided to combine them into six variables, two for inputs and four for outputs.

Input	Output
• Funds (customers' deposits + Due to banks + short-term loans + long term loans + non-interest bearing funds) • Owner's equity (paid in capital + retained earning + profit of the year)	• Net Loans (gross loans – provisions) • Securities (held to maturity security + short term security + available for sales security + other investment) • Operating profit (earnings before interest, tax, provision and other income) • Net profit (profit after interest, tax and other income)

4.3.2.4. Data entry:

After getting the standard financial statements with the items agreed upon, the researcher started the following:

- Structure the data and label the items on the excel sheet based on the requirement of the DEA-Solver program for each of the DEA tests.
- Adjust the program to accommodate the three statements into one sheet.
- Make data entry from the financial results in the statements on software while doing some processing work on them by adding, splitting and merging some items to fit in with the items listed.
- Make sheets for each year
- Make different sheet for the different window analysis tests that were conducted (Full sample, Public vs. private banks and International backed banks vs. regional (Egyptian and Middle Eastern) backed banks

4.3.2.5. Data Testing and Final Results

As mentioned before four main tests were conducted on the sample then the results of the Window Analysis were divided based on the different segments into 8 sub tests to make a total of 12 tests as listed below:

1. **BCC model for each year than combined**
2. **CCR model for each year than combined**
3. **Window Analysis for Full sample using constant approach**
4. **Window Analysis for Full sample using Variable approach**
5. Window Analysis for public banks using Constant approach
6. Window Analysis for public banks using Variable approach
7. Window Analysis for Private banks using Constant approach
8. Window Analysis for Private banks using Variable approach
9. Window Analysis for International banks using Constant approach
10. Window Analysis for International banks using Variable approach
11. Window Analysis for Egyptian and Regional banks using Constant approach
12. Window Analysis for Egyptian and Regional banks using Variable approach

For each of these tests a correlation test between the results and the total number of banks will be conducted.

A descriptive analysis was made for the banking sector including the development and changes of number of banks, number of branches, deposits, credit and segmentation were made for the public sector, private sector and household sector.

Moreover, Concentration indices were made for

1. The largest three banks
2. The largest four banks
3. The largest five banks
4. The largest seven banks

The outcome and the finding of the tests are described in detail in the following chapter.

5. Chapter 5 The Findings and Analysis

This chapter describes the results and the finding from the DEA tests conducted and the concentration index, followed by comments on the results.

5.1. The DEA Findings

5.1.1. BCC model

The first run was the BCC approach. The software package utilized can run BCC for a single year. Therefore, the run was conducted for each year then combined for comparison. BCC is a variable return to scale model.

The following table is the outcome from the BCC run.

Table 5-1: BCC outcome

BCC							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	27	27	27	27	27	27	27
Standard Deviation (SD)	0.135552	0.09328	0.15172	0.167858	0.064272	0.113326	0.081769
Maximum	1	1	1	1	1	1	1
Minimum	0.498242	0.626884	0.273204	0.326406	0.786371	0.536605	0.704517
No. of inefficient Banks in the sample	12	9	11	15	5	9	6
% of inefficient Banks in the sample	44.4%	33.3%	40.7%	55.6%	18.5%	33.3%	22.2%
Number of efficient banks	15	18	16	12	22	18	21
% of efficient banks	56%	67%	59%	44%	81%	67%	78%
Average of 3 years (# of banks)		60%		24.49%		75%	
Average per year	0.9182	0.9484	0.9298	0.8990	0.9752	0.9435	0.9691
Year Change		3.3%	-2.0%	-3.3%	8.5%	-3.2%	2.7%
Average of 3 years (score)		0.932		3.27%		0.963	
Change of 2010 vs. 2004	0.9182			5.55%			0.9691

From the previous table, there are some observations and findings:

a) First, there is a dramatic drop in efficiency in year 2007, which could be because 2007 is the deadline provided by the central bank to comply with the regulation. In this year, many of the acquisitions took place. This year as well had the highest standard deviation of 0.167. The researcher was previously considering year 2007 as the mid-year to assess efficiency before and after.

b) It is crucial to highlight that efficiency is relative and dynamic based on the score of each bank. Therefore, a bank might have the same performance over two years, but relative to the others, the efficiency score might differ.

c) Number of efficient banks (banks that had a score of 1) before 2007 were 49 banks which are 60% of the total sample. This number was less than the number of efficient banks after 2007, which were 61 or 75% of the sample on that period. However, the number of efficient banks increased by 25.5%. The lowest score was 0.27 which performed by Bank Audi in 2006.

d) The test has a relative low standard deviation for first and second period of 0.126 and 0.086 respectively. The variation of the results of the second period from the average score is narrow. Which means that the efficiency of the banks after the consolidation and the reduction of bank number, are close to each other and there is a tendency of similarity in performance.

e) The three years average score after 2007 is 0.963, which is better than the average score before 2007 of 0.932. This implies a score increase of 3.27%. however, by comparing the average efficiency of year 2010 versus year 2004, the improvement in efficiency was 5.55%

f) Seven banks were on the efficiency frontier and scored the 100%. These banks are Banque du Caire, Banque Misr, CIB, Faissal Islamic Bank, HSBC, NBE and Misr Iran. If we exclude year 2007, Ahly United Bank and Barclays will be added to the list. This makes an interesting reading, as five out of these nine banks are public banks. This is contradicting with the general assumption that public banks are not efficient. However, this could be justified as public banks have less cost structure (if we considered the expansion of new branches that the private banks are following) and the public sector is utilizing their funds.

g) One of the interesting readings is that some banks were performing low efficiency in one year than became fully efficient on the following year. This could be clear in Credit Agricole and SAIB in year 2004. On the contrary, Audi bank was scoring 100% then dropped to 27%, which was the lowest in the test. However, for Audi bank year 2006 was the year in which the acquisition occurred, which could justify the low efficiency score.

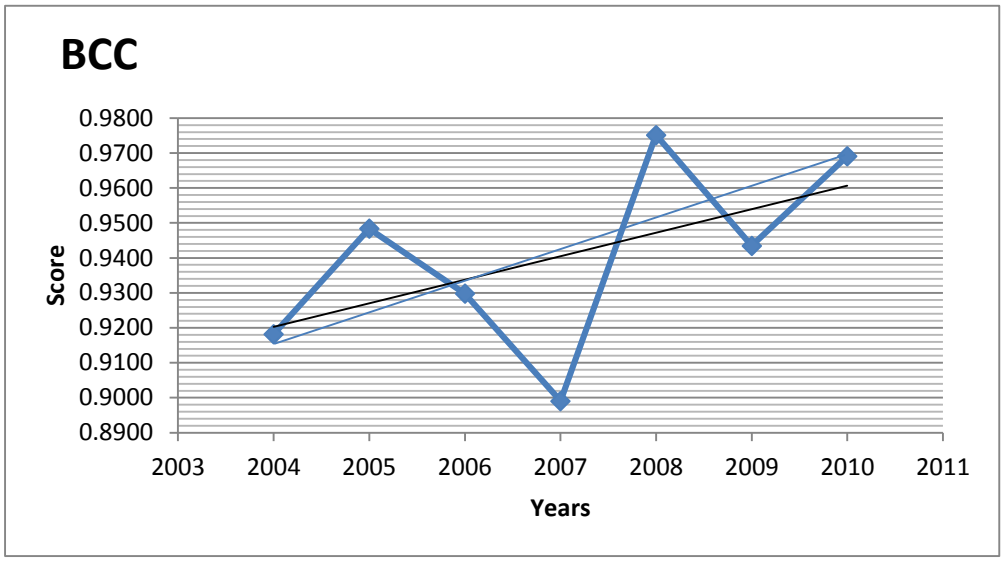
h) Year 2008 witnessed the highest rate of efficiency either efficient bank (22 banks) or average score (97.5%). However, year 2007 was the worst over the years with only 12 banks efficient and 89% average score.

i) Although the average score increased by a small percentage 3.27%, and the 5.55% for the first and last year, but banks that became on the efficiency frontier line increased by 24.5%. It is worth mentioning that the average score of 0.93 or 0.96 is considered a high efficiency rate.

j) Almost all banks relatively improved in efficiency with the exception of Suez Canal Bank and Arab International Bank.

To have a visual presentation, the following graph illustrates the average score per year and the line describes the average over the years.

Figure 5-1: BCC Average Efficiency



The graph clearly presents that the average score increased over the years. Year 4 (2007) is as mentioned before a drop year in efficiency.

To have better view of the results, a breakdown of the scores for the seven year period was made. There are 189 reading in the results over period, divided by 6 categories based on the score as illustrated in the following table.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	e<.7	Unavailable
# of results	122	25	23	8	11	0
%	64.6%	13.2%	12.2%	4.2%	5.8%	0.0%

From the table, using a BCC method, 89.9% of the outcome will be above efficiency rate of 0.8. There is a high concentration on categories above 0.8, which means that most banks in the period under study are either efficient or near the efficient frontier.

Based on the previous results of using the BCC Method, although the improvement was 3.27% and 5.5% but hypothesis one, ***the greater the capital resources of operating bank in Egypt, the higher the efficiency***, could be proven.

5.1.2. CCR model for each year then combined

As mentioned before, the BCC method, which is the commonly used in bank assessment, provides by definition higher number of efficient readings. This is due to the formula of the BCC method that considers the efficiency frontier as envelopment line formed with the highest score and not a straight line. Therefore, a 2nd run using the CCR method was conducted. The CCR has its efficiency frontier as a straight line formed by the highest score in the sample because it has a constant return to scale model.

The following table is the outcome from the CCR run.

Table 5-2: CCR outcome

CCR							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	27	27	27	27	27	27	27
Standard Deviation (SD)	0.168279	0.125637	0.168974	0.182919	0.100566	0.145602	0.110941
Maximum	1	1	1	1	1	1	1
Minimum	0.491665	0.530792	0.273004	0.318176	0.685509	0.498803	0.68244
No. of inefficient Banks in the sample	18	11	16	19	13	14	9
% of inefficient Banks in the sample	66.7%	40.7%	59.3%	70.4%	48.1%	51.9%	33.3%
Number of efficient banks	9	16	11	8	14	13	18
% of efficient banks	33%	59%	41%	30%	52%	48%	67%
Average of 3 years (# of banks)		44%		25.00%		56%	
Average per year	0.857	0.917	0.870	0.836	0.931	0.888	0.940
Year Change		7.0%	-5.1%	-3.9%	11.2%	-4.5%	5.8%
Average of 3 years (score)		0.881		4.33%		0.920	
Change of 2010 vs. 2004	0.857			9.62%			0.940

From the previous table, there are some observations and findings:

a) As mentioned in the introduction of this test, the because of the CCR definition which considers a straight efficient line, the number of efficient banks and the average score were less than the BCC results.

b) Number of efficient banks (score 1) before 2007 was 36 banks (44% of the banks for the 1st period) was less than the number after 2007 which was 45 banks (56%). The efficient banks number increased by 25%. The lowest score was 0.273 and performed by Bank Audi as well like the previous test, and this could be justified by the acquisition that happened this year.

c) The three years average score after 2007 (0.920) is better than the average score before 2007 (0.881). The score is increased by 4.33%. The change in efficiency

between year 2010 and 2004 is 9.62%. Although the average score increased by 4.33% and 9.62% but banks that became on the efficiency frontier line increased by 25%.

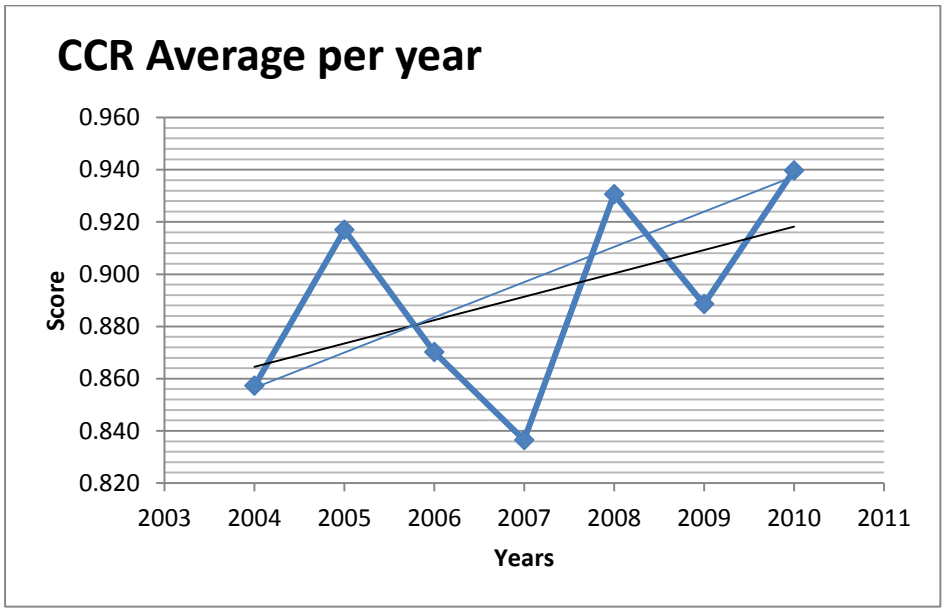
d) The previous BCC test witnessed the highest score in 2008, however, the CCR test had year 2010 to be the best performing year with 18 efficient banks and average score of 0.94.

e) The test has also an average low standard deviation for first and second period of 0.154 and 0.119 respectively. The test shows that the efficiency of the different banks for the 2nd period became closer to each other's.

f) There are three banks that were on the efficiency frontier and scored the 100% for the whole period, they are Faissal Islamic Bank, HSBC and Misr Iran. If we exclude year 2007, Barclays will be added to the list. However, other banks such as Banque du Caire, Bank Misr, CIB, Export Development Bank and Housing and development were second runners. Public banks were also the efficient ones, as the government owns 60% of Misr Iran and 15% of Faisal bank.

The following graph presents the average score of the CCR test and shows that the average score increased over the years by 4.33% and by 9.62% for the first and last year.

Figure 5-2: CCR: Average efficiency per year



Using the same category of efficiency score, as the previous BCC test, the CCR provided better distribution of the banks over the 7 years period.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	e<.7	Unavailable
# of results	89	28	27	23	22	0
%	47.1%	14.8%	14.3%	12.2%	11.6%	0.0%

From the table, 76.2% of the scores are above 0.8, still there is a concentration near the efficiency frontier but the results are less than the run using the BCC method which were 89.9% of the scores were above the 0.8 efficiency score.

To investigate the relation between the variables, a correlation test among the DEA variables was conducted. A test was conducted for the BCC and the CCR methods. However, they both came with the same correlation results, so the results were combined in the following analysis.

Table 5-3: CCR Correlation

CCR Correlation						
Average	Funds	Equity	Net Loans	Securities	Operating income	Net Profit
Funds	1	0.893519	0.97079	0.972549	0.859821	0.386104
Equity		1	0.908014	0.864816	0.856020	0.593830
Net Loans			1	0.910822	0.825043	0.455507
Securities				1	0.879791	0.331247
Operating income					1	0.503514
Net Profit						1

From the average correlation table, there is a positive and high correlation among Funds, Equity, Net Loans, Securities and Operating income. The variables that have high correlation are the ones that are directly related to the core banking operation of deposit taking, utilization of funds and the gross profit generated from them. The average score for these variables is 0.891. However, there is a positive medium correlation with net profit with an average correlation of 0.454. This medium correlation could be justified by the high amount of provision for the non-performing loans that most banks were suffering from. These high provisions are related to the new definition of the non-performing loan that the required percentage of coverage.

Based on the previous results of increase of 4.33% and 9.62% by using the CCR Method, hypothesis one was proven. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency***.

5.1.3. Window Analysis for Full sample using constant approach

The BCC and the CCR are static models. The window analysis provides better overview of the sample, as it looks at the full period and compares all results against each other's under a time-dependent use of DEA. As mentioned in the literature review, there are different assumptions for the return to scale; the main two are the constant and the variable return to scale. Both of them are employed to analyse the efficiency using the window analysis. The constant return to scale will always provide less number of efficient bank and less average efficiency score.

The following table is the outcome summary from the Window Analysis using Constant return to scale run.

Table 5-4: Window Analysis Constant

Window Constant Full							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	27	27	27	27	27	27	27
Standard Deviation	0.16794	0.127391	0.172459	0.162633	0.132907	0.151976	0.133521
Maximum	1	1	1	1	1	1	1
Minimum	0.416371	0.522023	0.261172	0.473604	0.567805	0.433133	0.562495
No. of inefficient Banks in the sample	25	24	21	24	24	25	25
% of inefficient Banks in the sample	92.59%	88.89%	77.78%	88.89%	88.89%	92.59%	92.59%
Number of efficient banks	2	3	6	3	3	2	2
% of efficient banks	7.41%	11.11%	22.22%	11.11%	11.11%	7.41%	7.41%
Average of 3 years (# of banks)		14%		-36.36%		9%	
Average per year	0.775516	0.848697	0.810174	0.742919	0.84706	0.811729	0.841401
Year Change		9.4%	-4.5%	-8.3%	14.0%	-4.2%	3.7%
Average of 3 years (score)		0.811463		2.70%		0.833396	
Change of 2010 vs. 2004	0.775516			8.50%			0.841401

From the previous table, there are some observations and findings:

a) Because of the Window - Constant definition which considers a straight efficient line, and compares all results from the different years together, the number of efficient banks (21 observations) and the average score were less than the BCC (122 observations) and the CCR (89 observations) results.

b) The result shows an average standard deviation for first period equal to 0.155 and 0.139 for the second period. This comply with the previous results that the variation of score became narrower in the 2nd period.

c) Each year, there is an average of 11.1% of the banks that are pure efficient. The number of efficient banks' observation (score 1) before 2007 (11 banks which are 61% of total observations) was higher than the number after 2007 (seven banks which are 39% of the total). Year 2006 has the highest number of efficient banks of six, while 2005 has the highest average score of 84.8%.

d) Although the number of efficient banks decreased dramatically, the average score increased slightly. The efficient banks' number decreased by -36.36%. However, this number might be deceiving as the average number of efficient banks is between 2-3 banks per year, but in year 2006, there were six banks that increased the average for the 1st period. The three years average score after 2007 (0.833) increased by 2.7% than the average score before 2007 (0.811). However, comparing the score of year 2010 versus year 2004, the change in efficiency was 8.5%.

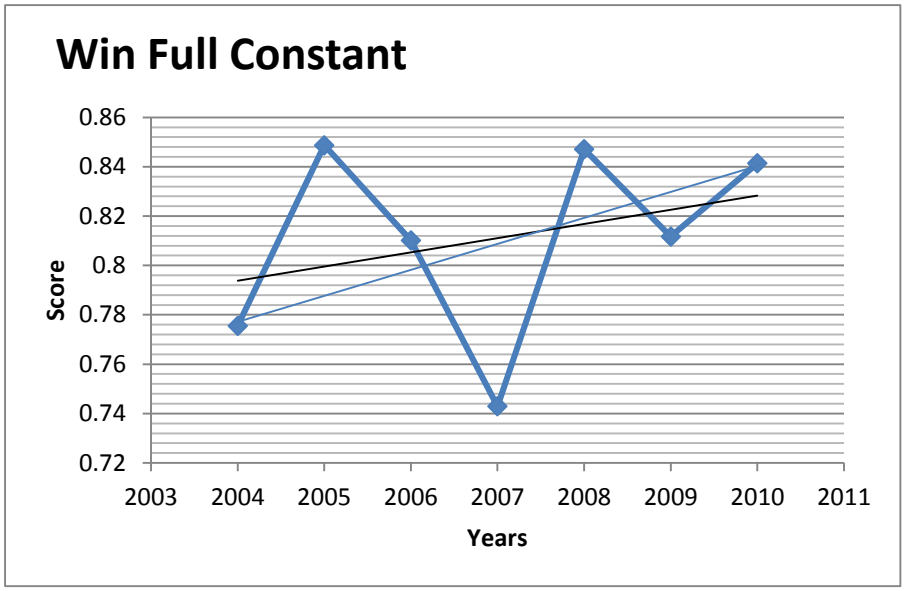
e) With the exception of year 2004 and 2007, the average score was very close to each other. No bank succeeded in maintaining an efficient score for the full period. Nine banks succeeded in scoring 100% at least once. The lowest score was bank Audi in year 2006.

f) Banks such as Union National bank, Suez Canal Bank, Piraeus Bank, ADIB, Bank Faisal, ElBaraka and ABC bank were performing relatively better in the 1st period in which there was larger number of banks, and many of them were of similar size. While in the 2nd period, their efficiency was less than the other banks that has larger balance sheet.

g) Comparing the Window – constant results (1st 81% & 2nd 83%) with the previous two tests the BCC (1st 93% & 2nd 96%) and the CCR (1st 88% & 2nd 92%), the difference in score was due to the definition and the formula used of each test. All of them showed an increase in the 2nd period but with different percentages.

The following graph presents the average score of the Win Constant test and shows that the average score increased by 2.7% from the 1st period to the 2nd period and 8.5% from first to last year on the sample.

Figure 5-3: Window Constant: Average efficiency per year



Looking at the percentage of the average score for the full test, the window analysis provided better distribution of the banks over the 7 years period.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6
# of results	21	43	49	30	27	19
%	11.1%	22.8%	25.9%	15.9%	14.3%	10.1%

From the table, 59.8% of the scores are above 0.8. The concentration is not near the efficiency frontier but it is within the 0.7 - 0.99 range. Comparing these results with the CCR which had 76.2% over the 0.8 and the BCC had 89.9%, might give better distribution of the sample over the different scores.

A correlation test among the DEA variables was conducted; the following table is the results.

Table 5-5: Window Constant- correlation

Win Full Constant Correlation						
Average	Funds	Equity	Net Loans	Securities	Operating income	Net Profit
Funds	1	0.893841	0.970643	0.972142	0.856002	0.367184
Equity		1	0.907878	0.865013	0.852774	0.577883
Net Loans			1	0.909015	0.819901	0.437872
Securities				1	0.876542	0.309789
Operating income					1	0.487335
Net Profit						1

From the average correlation table, like the previous tests, there is a positive and high correlation among Funds, Equity, Net Loans, Securities and Operating income. The average score for these variables is 0.892. However, there is a positive medium correlation with net profit with an average correlation of 0.436. As highlighted before, this could be due to the high provisions for the non-performing loans taken by the banks.

Using the Windows full sample constant Method, resulted in increase in efficiency of 2.70% and 8.50%, hypothesis one is proved. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.4. Window Analysis for Full sample using Variable approach

The previous test used the Window analysis using a constant return to scale, this test will use a variable return to scale, which normally provides higher efficiency rates.

The following table is the outcome summary from the Window Analysis using Variable return to scale run.

Table 5-6: Window Variable outcome

Window Variable Full							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	27	27	27	27	27	27	27
Standard Deviation (SD)	0.167381	0.121283	0.169981	0.16359	0.123511	0.16242	0.140096
Maximum	1	1	1	1	1	1	1
Minimum	0.420704	0.599723	0.26555	0.47944	0.610675	0.517888	0.563787
No. of inefficient Banks in the sample	24	20	20	22	19	19	21
% of inefficient Banks in the sample	88.89%	74.07%	74.07%	81.48%	70.37%	70.37%	77.78%
Number of efficient banks	3	7	7	5	8	8	6
% of efficient banks	11.11%	25.93%	25.93%	18.52%	29.63%	29.63%	22.22%
Average of 3 years (# of banks)		21%		29.41%		27%	
Average per year	0.828669	0.893699	0.845841	0.785799	0.87707	0.848304	0.872596
Year Change		7.8%	-5.4%	-7.1%	11.6%	-3.3%	2.9%
Average of 3 years (score)		0.85607		1.16%		0.86599	
Change of 2010 vs. 2004	0.828669			5.30%			0.872596

From the previous table of the window variable full sample, there are some observations and findings:

a) It is worth mentioning, that 50% of the efficient observation became pure efficient after rounding by 0.1^12.

b) Because of the Window - Variable definition that considers a convex efficient line, and compares all results together, the number of efficient banks (44 observations) was more than the Constant model, which are 21 observations.

c) Number of efficient banks' observation (score 1) before 2007 (17 observation which are 21% of total observation) was less than the number after 2007 (22 observation which are 27% of the total). Although the number of efficient banks increased by 29.4%, the average score increased slightly by 1.16%. As the three years average score after 2007 (0.866) is slightly better than the average score before 2007 (0.856). The score increased marginally by 1.16%, but when using the change from the first and the last year the percentage became 5.3%. It is worth noting that the high improvement in the number of efficient banks is due to the low base of them.

d) Year 2008 and 2009 had the highest number of efficient banks with eight efficient banks. While year 2004 was the least with only three efficient banks. Year 2004 was also the year that has the lowest efficiency average of 82%, while year 2005 was the highest with average efficiency of 89%.

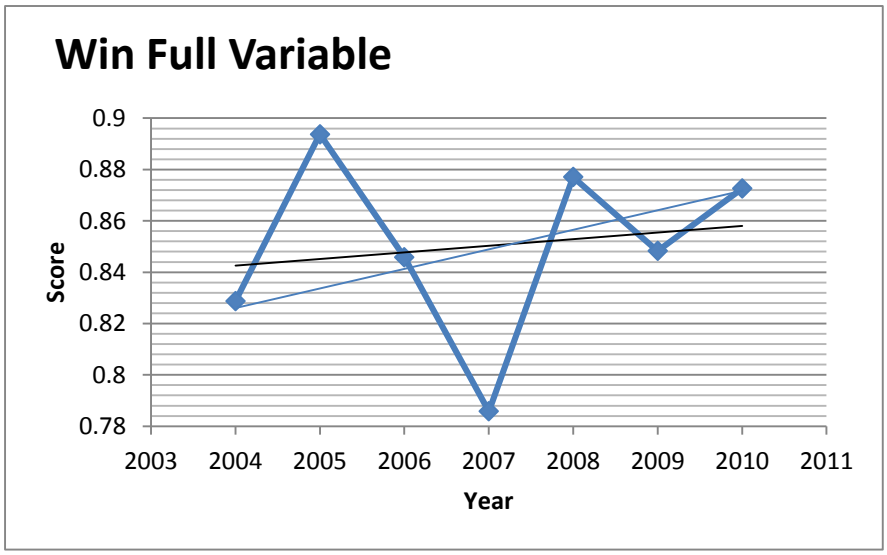
e) No bank succeeded in maintaining a full efficiency for the full period. However, there are 16 banks that scored 100% at least once, and 11 banks scored 100% more than once.

f) Bank Audi in year 2006 scored the lowest score of 26.5% as the previous tests.

g) The standard deviation for first period was 0.152 and 0.142 for the second period. This complies with the previous results that banks' efficiency clustered together.

The following graph illustrates the average score per year and the line describes the average over the years.

Figure 5-4: Window - Variable: Average efficiency per year



Using the same category as the previous test, the window provided better distribution of the banks over the 7 years period.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6
# of results	44	46	39	24	22	14
%	23.3%	24.3%	20.6%	12.7%	11.6%	7.4%

From the table, 68.3% of the scores are above 0.8. The concentration is not near the efficiency frontier but around the 0.9.

The average correlation results among the variable are the same as the Constant model.

Based on the previous results of 1.16% and 5.30% by using the windows full sample constant method, hypothesis one proved to be right. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.5. Window Analysis for Public banks using Constant approach

To be able to have a better understanding of the performance and the efficiency of the banks understudy, the researcher divided the sample into different segments. The results of the Window analysis are used in this segmentation. The first of these segments is the public – private segment. To identify the public banks, the researcher identified the shareholders of each bank and assumes that a public bank will be the bank that the Egyptian government through the Central bank or any other public entity or authority has a majority or a controlling stake in the bank. The following table shows the government ownership of banks.

Table 5-7: Government Ownership in Egyptian Banks

Bank	Central Bank of Egypt	National Investment Bank	Misr Insurance	Bank Misr	National Bank of Egypt	Awkaf Authority	Housing Ministry	Finance Ministry	Arab international Bank	Arab contractor	Suez canal Fund	total
1. Al Baraka Bank			5.5									5.5
2. Bank of Alexandria	20											20
3. AAIB	49.4											49.4
4. Arab International Bank	39											39
5. Banque du Caire	100											100
6. Bank Misr	100											100
7. Egyptian Gulf Bank			19.4									19.4
8. Export Development Bank EDBE		40		23	11							74
9. Faisal Islamic Bank						15.3						15.3
10. Housing & Development Bank			15			11.4	37					63.4
11. Industrial Development & Workers bank								84				84
12. Misr Iran Development Bank		30	30									60
13. National Bank for Development (ADIB)		12.4										12.4
14. National Bank of Egypt	100											100
15. SAIB			20						46	17		83
16. Suez Canal Bank									42		11	53
17. United bank	99.9											99.9

Based on the previous table, the Egyptian government has stakes in 17 banks in Egypt out of the 27 banks of the current sample of study, through different ownership in public organizations. The public banks in the sample were identified as the banks that the

government has a majority stake or has the controlling stake. According to this definition, 10 banks were selected to be the public bank sample.

The following table is the outcome summary from the Window Analysis on public banks using Constant return to scale run.

Table 5-8: Windows Constant - Public ownership outcome

Window Public Constant							
	2004	2005	2006	2007	2008	2009	2010
Total Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	10	10	10	10	10	10	10
Standard Deviation	0.209638	0.149417	0.154372	0.176249	0.155908	0.169899	0.121966
Maximum	1	1	1	1	1	1	1
Minimum	0.416371	0.522023	0.54538	0.557102	0.567805	0.433133	0.663209
No. of inefficient Banks in the sample	9	8	7	9	8	8	8
% of inefficient Banks in the sample	90.00%	80.00%	70.00%	90.00%	80.00%	80.00%	80.00%
Number of efficient banks	1	2	3	1	2	2	2
% of efficient banks	10.0%	20.0%	30.0%	10.0%	20.0%	20.0%	20.0%
Average of 3 years (# of banks)		20.0%		0.00%		20.0%	
Average per year	0.765299	0.852307	0.815621	0.765426	0.859121	0.830387	0.876208
Year Change		11.4%	-4.3%	-6.2%	12.2%	-3.3%	5.5%
Average of 3 years (score)		0.811075		5.44%		0.855239	
Change of 2010 vs. 2004	0.765299			14.5%			0.876208

From the previous table, there are some observations and findings:

a) Number of efficient banks observation (score 1) before 2007 (6 observations which are 20% of total observation) is equal to the efficient banks observation in the second period. Therefore, number of observation on the efficiency frontier stayed the same.

b) The three years average score after 2007 (0.855) was better by a percentage of 5.44% against the score before 2007 (0.811). However, the change in efficiency scores between 1st year and last year increased by 14.5%, which is considered the highest among all the tests conducted.

c) The test has an average standard deviation for first and second period of 0.171 and 0.149 respectively. Year 2004 is the exception with a SD of 0.209.

d) No bank succeeded in maintaining 100% for the full period. However, eight banks out of the 10 get a score of 100% at least once.

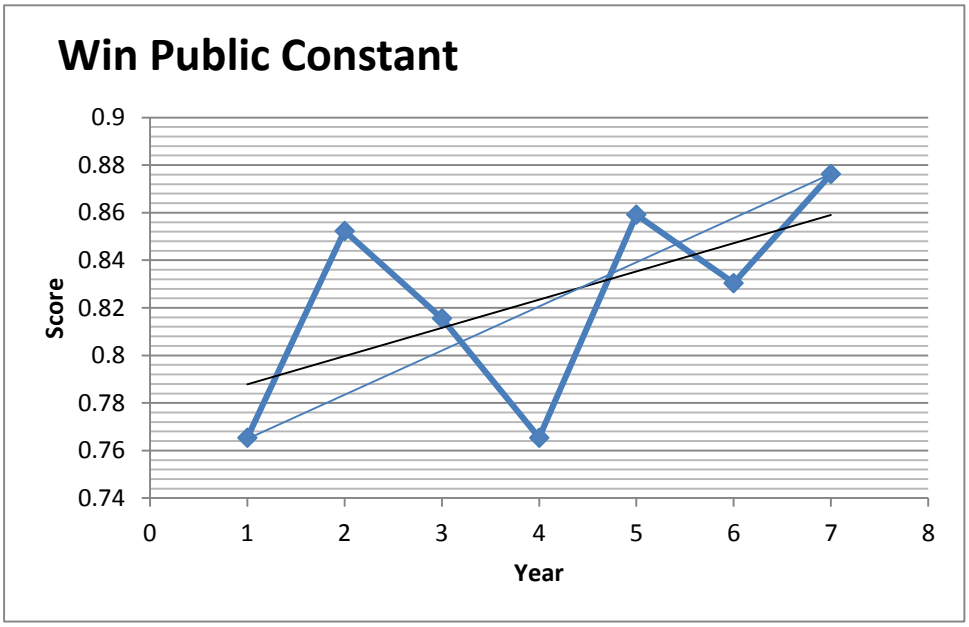
e) Arab International bank was the least efficient among the public banks. It has an average of score of 53% across the years of study. The second least efficient bank was SAIB which scored 75%

f) Misr Iran was the best performing bank, followed by Banque du Caire and Export Development bank.

g) Year 2005 witnessed the highest rate of efficiency either efficient bank (3 banks) or average score (81.5%). Year 2004 was the lowest in number of efficient banks and average score with only one bank on the frontier, and an average score of 76.52%.

The following graph illustrates the average score per year and the line describes the average over the years.

Figure 5-5: Window - Public - Constant: Average efficiency per year



Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	13	15	18	6	10	8	0
%	18.6%	21.4%	25.7%	8.6%	14.3%	11.4%	0.0%

From the previous table for the distribution of the score, 65% of the scores are above 0.8. The concentration is near the 0.9 score.

Table 5-9: Windows – Public - Constant - Correlation

Win Public Correlation						
Average	Funds	Equity	Net Loans	Securities	Operating income	Net Profit
Funds	1	0.958253	0.981986	0.97142	0.898499	0.517833
Equity		1	0.941838	0.928532	0.859425	0.527164
Net Loans			1	0.920582	0.851479	0.53422
Securities				1	0.927778	0.438385
Operating income					1	0.434516
Net Profit						1

From the average correlation table, there is also a positive and high correlation among Funds, Equity, Net Loans, Securities and Operating income. The average score for these variables is 0.924. However, there is a positive medium correlation with net profit with an average correlation of 0.490.

Based on the previous results and using the windows full sample constant Method, which produced an efficiency improvement of 5.4% and 15.4%, hypothesis one can be proved for the public sector. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.6. Window Analysis for Public banks using Variable approach

The following table is the outcome summary from the Window Analysis on public banks using variable return to scale run.

Table 5-10: Windows Public – Variable- outcome

Window Public Variable							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	10	10	10	10	10	10	10
Standard Deviation	0.218218	0.11263	0.13484	0.151987	0.111507	0.162221	0.114148
Maximum	1	1	1	1	1	1	1
Minimum	0.420704	0.657198	0.661673	0.570022	0.667255	0.517888	0.695904
No. of inefficient Banks in the sample	8	6	6	7	6	5	7
% of inefficient Banks in the sample	80.00%	60.00%	60.00%	70.00%	60.00%	50.00%	70.00%
Number of efficient banks	2	4	4	3	4	5	3
% of efficient banks	20.00%	40.00%	40.00%	30.00%	40.00%	50.00%	30.00%
Average of 3 years (# of banks)		33.3%		20%		40%	
Average per year	0.821084	0.92099	0.885115	0.84912	0.91957	0.897253	0.914418
Year Change		12.2%	-3.9%	-4.1%	8.3%	-2.4%	1.9%
Average of 3 years (score)		0.87573		3.96%		0.910414	
Change of 2010 vs. 2004	0.821084			11.4%			0.914418

From the previous table, there are some observations and findings:

a) The variable approach provided higher scores than the constant one. Number of efficient banks observation (score 1) before 2007 (10 observation which are 33.3% of total observation) was less than the efficient bank observation number after 2007 (12 observations which are 40% of the total). The number of efficient banks increased by two observations (20%) from 10 to 12. Therefore, number of observation on the efficiency frontier increased slightly.

b) The three years average score increased by 3.96%, from 0.875 in the first period to 0.91 in the second period. The change from year 2004 to 2010 increased by 11.4%. This is considered the second highest increase in efficiency in the sample.

c) The test has an average standard deviation for first and second period of 0.155 and 0.129 respectively. Year 2004 is also the exception with a SD of 0.218.

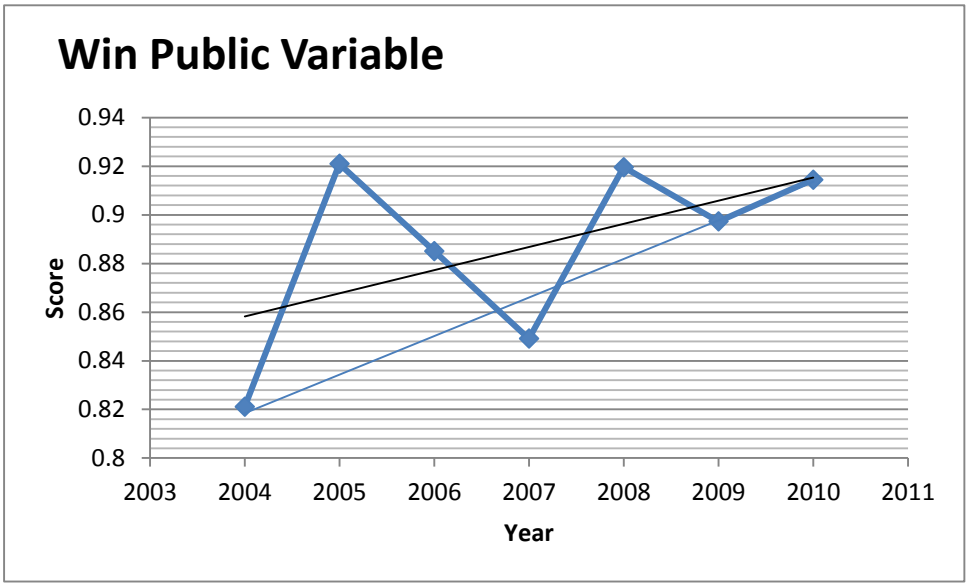
d) Again, none of the banks had a full efficiency for the period of study. Arab International bank was the lowest efficient bank by an average of 63% with the nearest bank was SAIB with 76% efficiency.

e) In this test National Bank of Egypt was the most efficient with an average score of 99.5% followed by Misr Iran Bank with 99.4% efficiency.

f) Year 2004 has the lowest number of efficient banks with two efficient banks, while 2009 has the highest with five efficient banks. Year 2004 has the lowest average score of 82.1% while 2005 has the highest of 92%. Most of the acquisition and sales of stakes of public banks happened in year 2005 and 2006. This might affect the performance of the involved parties.

The following graph illustrates the average score per year and the line describes the average over the years.

Figure 5-6: Window - Public - Variable: Average efficiency per year



For distribution of scores, 77.1% of the scores are around 0.9. The concentration is near the efficiency frontier.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	25	18	11	5	7	4	0
%	35.7%	25.7%	15.7%	7.1%	10.0%	5.7%	0.0%

Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency, is proved using the using the windows public sector sample variable Method, because the efficiency improvement were 3.96% and 11.4%.

5.1.7. Window Analysis for Private Banks using Constant approach

The following table is the outcome summary from the Window Analysis on private banks using Constant return to scale run. There are 17 private banks in this test.

Table 5-11: Window - Private - Constant : outcome

Window Private Constant							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	17	17	17	17	17	17	17
Standard Deviation	0.144937	0.117476	0.186806	0.158127	0.122012	0.14474	0.139284
Maximum	1	1	1	1	1	0.96162	0.99317
Minimum	0.444063	0.594034	0.261172	0.473604	0.610285	0.551483	0.562495
No. of inefficient Banks in the sample	16	16	14	15	16	17	17
% of inefficient Banks in the sample	94.12%	94.12%	82.35%	88.24%	94.12%	100.00%	100.00%
Number of efficient banks	1	1	3	2	1	0	0
% of efficient banks	5.9%	5.9%	17.6%	11.8%	5.9%	0.0%	0.0%
Average of 3 years (# of banks)		9.8%		-80.00%		2.0%	
Average per year	0.781527	0.846574	0.806971	0.72968	0.839965	0.800753	0.820926
Year Change		8.3%	-4.7%	-9.6%	15.1%	-4.7%	2.5%
Average of 3 years (score)		0.81169		1.09%		0.820548	
Change of 2010 vs. 2004	0.781527			5.04%			0.820926

From the previous table, there are some observations and findings:

a) Number of efficient private banks' observation (score 1) before 2007 were 5 observations which is 9.8% of total observations. There is only one observation after 2007 which is 2% of the total). Moreover, in year 2009 and 2010 there is no private bank on the efficiency frontier. The efficient banks' number decreased by -80%.

b) The three years average score before and after 2007 were (0.811) and (0.820) respectively, which almost stayed the same with a slight increase of 1.09%. using the 1st and last year comparison, the increase in efficiency is 5.04%

c) The average standard deviation of the test for first period is 0.149 and 0.135 for the second period.

d) The best performing bank was Faisal Islamic bank with an average score of 97% followed by CIB with 92.3% and then Ahly United bank with 91.3%. It is worth mentioning that Ahly United bank had the high average score because it had a high efficient score for the first 3 years, then reduced in efficiency in the following years.

e) Bank Audi was the lowest efficient bank followed by Blom Bank with a score of 62.2% and 66% respectively.

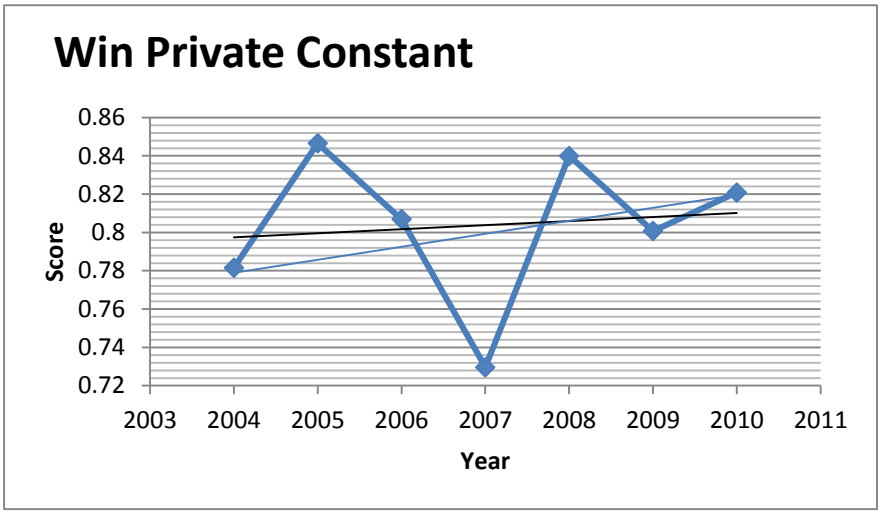
f) Credit Agricole, CIB, EGB, and Barclays bank had improved in the efficiency throughout the years. While Piraeus, ABC, AlBaraka and National Bank of Development decreased in efficiency.

g) Credit Agricole increased in efficiency from 44% in 2004 to 96% in 2010. While the worst performing bank, is Piraeus as it scored 79% in 2004 and 56% in 2010.

h) With the exception of year 2007, 2004 was the lowest performing year with an average score of 78% while 2005 has the highest average score of 84%.

The following graph presents the average score of the Window on a sample of Private banks using constant return to scale test and shows that the average score increased over the years with only 1.09% and 5.04% for the first and last year.

Figure 5-7: Window - Private - Constant: Average efficiency per year



For distribution of scores, 56% of the scores are above 0.8. The concentration is near the 0.8 score.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	8	28	31	24	17	11	0
%	6.7%	23.5%	26.1%	20.2%	14.3%	9.2%	0.0%

Table 5-12: Window - Private - Constant: Correlation

Win Private Correlation						
Average	Funds	Equity	Net Loans	Securities	Operating income	Net Profit
Funds	1	0.876399	0.942398	0.940816	0.865536	0.750018
Equity		1	0.834889	0.833409	0.885599	0.837683
Net Loans			1	0.830321	0.766266	0.720282
Securities				1	0.838735	0.65608
Operating income					1	0.842212
Net Profit						1

From the average correlation table, there is also a positive and relatively high correlation among Funds, Equity, Net Loans, Securities and Operating income and also with net profit. The average correlation is 0.828. This is the first time that shows a relatively high correlation with net profit. The public banks were having a medium correlation with net profit. One can argue that this is due to the fact that private banks were having less off balance sheet activities and less amount of provisions for non-performing loans compared to the results of the public banks.

Based on the previous results of 1.09% and 5.04% by using the Window on a sample of Private Banks using constant return to scale method, hypothesis one can be proved ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.8. Window Analysis for Private Banks using Variable approach

The following table is the outcome summary from the Window Analysis on private banks using variable return to scale run.

Table 5-13: Window - Private - Variable: Outcome

Window Private Variable							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	17	17	17	17	17	17	17
Standard Deviation	0.136688	0.126602	0.187599	0.162831	0.1265	0.160271	0.15109
Maximum	1	1	1	1	1	1	1
Minimum	0.470343	0.599723	0.26555	0.47944	0.610675	0.552549	0.563787
No. of inefficient Banks in the sample	16	14	14	15	13	14	14
% of inefficient Banks in the sample	94.12%	82.35%	82.35%	88.24%	76.47%	82.35%	82.35%
Number of efficient banks	1	3	3	2	4	3	3
% of efficient banks	5.88%	17.65%	17.65%	11.76%	23.53%	17.65%	17.65%
Average of 3 years (# of banks)		13.7%		42.86%		19.6%	
Average per year	0.833131	0.877646	0.822738	0.748551	0.852071	0.81951	0.847995
Year Change		5.3%	-6.3%	-9.0%	13.8%	-3.8%	3.5%
Average of 3 years (score)		0.844505		-0.55%		0.839858	
Change of 2010 vs. 2004	0.833131			1.78%			0.847995

From the previous table, there are some observations and findings:

a) Number of efficient banks' observation (score 1) before 2007 (7 observations which are 13.7% of total number of observations, which was three observations less than the efficient bank number after 2007 which was 10 observations that account for 19.6% of the total). The efficient banks' number increased by 42.8%.

b) The three years average score before 2007 was (0.844) and after 2007 was (0.839). The average decreased slightly by -0.55 %. This is the first time to have a decrease in average efficiency score among the previously conducted tests. The change in efficiency between the first year and the last year is 1.78%, which is the lowest among our tests.

c) The average standard deviation of the test for first period is 0.15 and 0.145 for the second period.

d) With the exception of year 2007, all average scores were close to each other's.

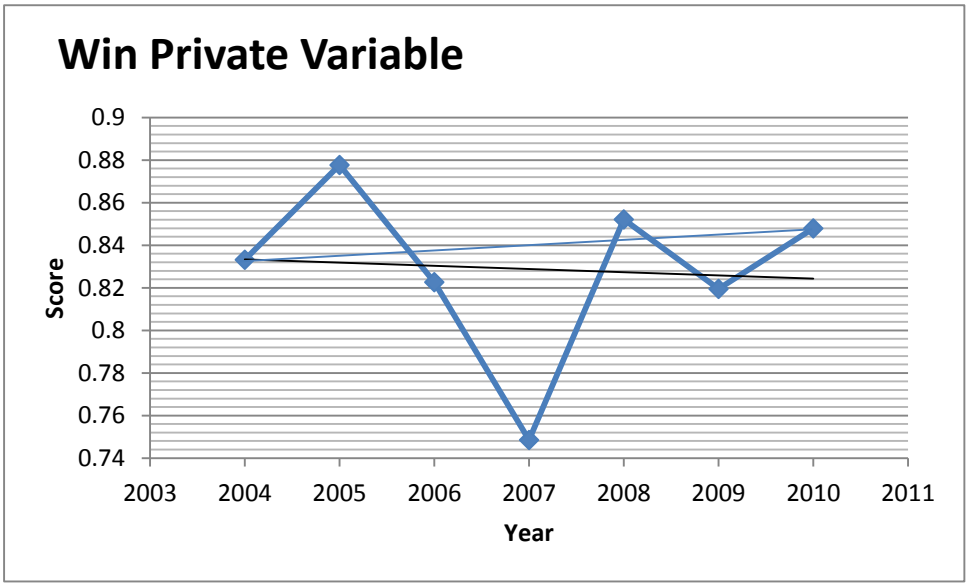
e) Like the previous test, Faisal Islamic bank was the best performing bank with an average score of 99.3% followed by CIB with 97.1%. The least performing bank was Blom Bank with 67.3% preceded by Bank Audi 68.9%.

f) With the exception of year 2007, 2009 has the lowest performing average score of 85.2% while 2005 has the highest average score of 87.7%. Year 2004 has the lowest efficient banks with only one efficient banks while year 2008 has the highest number of efficient banks of four banks at the efficiency frontier.

g) Credit Agricole, EGB, Barclays Bank and Alwatany, and are the banks that improved in efficiency over the years. On the other hand, banks such as ABC, AlBaraka, Audi, Piraeus Bank, National bank for Development and Union National Bank reduced in efficiency. One can claim that these banks are the main driver for the declining percentage between the 1st period and the 2nd period.

The following graph illustrates the score per year.

Figure 5-8: Window - Private - Variable: Average efficiency per year



For distribution of scores, 63% of the scores are above 0.8. The concentration is around the 0.85 score.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	19	29	27	19	15	10	0
%	16.0%	24.4%	22.7%	16.0%	12.6%	8.4%	0.0%

Based on the previous results and using the Window on a sample of Private Banks using variable return to scale method, which provided a decline in efficiency by -0.55% and 1.78%, hypothesis one cannot be proved for the private sector. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.9. Window Analysis for Egyptian and Regional banks using Constant approach

Segmenting the sample will provide better understanding of the efficiency and the performance of the banks. This segmentation divided the sample into Egyptian & Regional backed banks versus International backed banks. The reason behind this division is due to the fact that the there is no private banks owned by Egyptian, only the public owned banks are considered Egyptian ownership. So the segmentation made on the sample to have International, European ownership and brand versus banks owned by Middle Eastern and Egyptian including the public ones. The following list is the selected Egyptian and regional banks.

1. ABC
2. Ahly United Bank
3. Al Baraka Bank
4. Al Watany Bank
5. Arab African International Bank
6. Arab International Bank
7. Audi
8. Blom Bank
9. CIB
10. EGB
11. Faissal Islamic Bank
12. National Bank For Development ADIB
13. SAIB
14. Suez
15. Union National Bank
16. Misr Iran Development Bank

The following table is the outcome summary from the Window Analysis on Egyptian and Regional banks using Constant return to scale run.

Table 5-14: Window - Region - Constant: outcome

Window region Constant							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	21	21	21	21	21	21	21
Standard Deviation	0.168238	0.134163	0.182531	0.175652	0.140067	0.165965	0.130215
Maximum	1	1	1	1	1	1	1
Minimum	0.416371	0.522023	0.261172	0.473604	0.567805	0.433133	0.650422
No. of inefficient Banks in the sample	19	19	16	19	19	19	19
% of inefficient Banks in the sample	90.48%	90.48%	76.19%	90.48%	90.48%	90.48%	90.48%
Number of efficient banks	2	2	5	2	2	2	2
% of efficient banks	9.5%	9.5%	23.8%	9.5%	9.5%	9.5%	9.5%
Average of 3 years (# of banks)		14.3%		-33.33%		9.5%	
Average per year	0.77523	0.844754	0.813659	0.731696	0.838468	0.795827	0.835416
Year Change		9.0%	-3.7%	-10.1%	14.6%	-5.1%	5.0%
Average of 3 years (score)		0.811214		1.48%		0.823237	
Change of 2010 vs. 2004	0.77523			7.76%			0.835416

The following observations and findings are based on the Window Region Constant run results:

a) Number of efficient banks' observations (score 1) before 2007 was 9 observations which are 14.3% of total observation which was three observations more than the efficient bank number after 2007 (six observation which are 9.5% of the total). The efficient bank's number decreased by -33.3%.

b) The three years average score before 2007 was 81.1% while after 2007 was 82.3%, which made a slight increase of 1.48%. However, the sample has an increase of 7.76% when comparing year 2004 and 2010.

c) The result shows an average standard deviation for the first period of 0.161 and 0.145 for the second period.

d) With the exception of 2007, the lowest average score was for year 2004 with 77% average efficiency, while the highest year was 2005 with 84.4% score. The highest number of efficient bank was in 2006 with five banks made the efficiency frontier, while the other years had two efficient banks on the frontier.

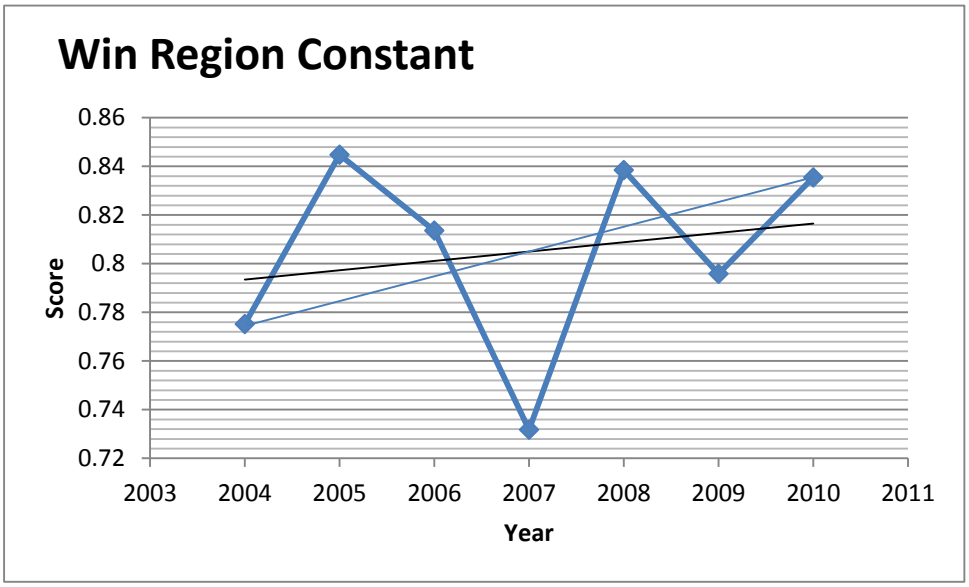
e) The lowest score was made by Bank Audi in 2006. While the lowest performing bank for the full period was Arab International Bank with 53% average efficiency, followed by Bank Audi with 62.2%. On the other side, the best performing banks were Misr Iran (98.9%), then Export Development Bank (97.7%) then Faisal Islamic Bank (97.1%).

f) Misr Iran bank achieved the highest number of being on the efficiency frontier with five times.

g) ABC, AlBaraka, National bank for Development, Suez Bank and Union National banks had a tendency to score lower efficiency on the 2nd period. On the other side, EGB, SAIB, Elwatany increased in performance. The other banks almost stayed the same.

The following figure is presenting the average score and the average trend for the Regional sample using window analysis with constant return to scale. It indicates a slight increase in average score, and the increase from the first year to the last year..

Figure 5-9: Window - Region - Constant: Average efficiency per year



Looking at the distribution of results on the efficiency scores, 59.9% of the scores are above 0.8. The concentration is below the 0.9 score.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	17	33	38	17	26	16	0
%	11.6%	22.4%	25.9%	11.6%	17.7%	10.9%	0.0%

Table 5-15: Window - Region - Constant: Correlation

Win region Correlation						
Average	Funds	Equity	Net Loans	Securities	Operating income	Net Profit
Funds	1	0.915145	0.975785	0.974554	0.892573	0.416835
Equity		1	0.917146	0.893575	0.88675	0.615086
Net Loans			1	0.919621	0.856217	0.475818
Securities				1	0.916527	0.376797
Operating income					1	0.515253
Net Profit						1

From the average correlation table, there is also a positive and relative high correlation among Funds, Equity, Net Loans, Securities and Operating income. Average correlation is 0.914. There is an average correlation of 0.479 between the variables and the net profit.

Based on the previous results and using the windows analysis on the regional and Egyptian banks with constant return to scale Method, hypothesis one could be accepted due to the improvement of efficiency of 1.48% and 7.76%. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.10. Window Analysis for Egyptian and Regional banks using Variable approach

The following table is the outcome summary from the Window Analysis on Egyptian and Regional banks using variable return to scale run.

Table 5-16: Window- Region - Variable: Outcome

Window region Variable							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	21	21	21	21	21	21	21
Standard Deviation	0.124621	0.179173	0.1786	0.130029	0.176464	0.13521	0.340442
Maximum	1	1	1	1	1	1	1
Minimum	0.420704	0.599723	0.26555	0.47944	0.610675	0.517888	0.651694
No. of inefficient Banks in the sample	18	16	15	17	15	14	17
% of inefficient Banks in the sample	85.71%	76.19%	71.43%	80.95%	71.43%	66.67%	80.95%
Number of efficient banks	3	5	6	4	6	7	4
% of efficient banks	14.3%	23.8%	28.6%	19.0%	28.6%	33.3%	19.0%
Average of 3 years (# of banks)		22.2%		21.43%		27.0%	
Average per year	0.834418	0.896909	0.855246	0.781911	0.872414	0.834022	0.866556
Year Change		7.5%	-4.6%	-8.6%	11.6%	-4.4%	3.9%
Average of 3 years (score)		0.862191		-0.53%		0.857664	
Change of 2010 vs. 2004	0.834418			3.9%			0.866556

Based on the results of the test, there are some comments:

a) Number of efficient banks' observations (score 1) before 2007 was 14 observations which are 22.2% of total observations which was three observations less than the efficient bank number after 2007 (17 observation which are 27% of the total). The number of efficient banks increased by 21.43%. Therefore, number of observation on the efficiency frontier increased slightly.

b) The three years average score decreased slightly by -0.53 %. Before year 2007, the score was (0.862) and after 2007, the score was (0.857). However, the average score at year 2010 increased by 3.9% over the average score of year 2004.

c) The result shows a standard deviation for first period of 0.157 and 0.147 for the second period. This comply with the all the previous results that the variation of score became narrower in the 2nd period.

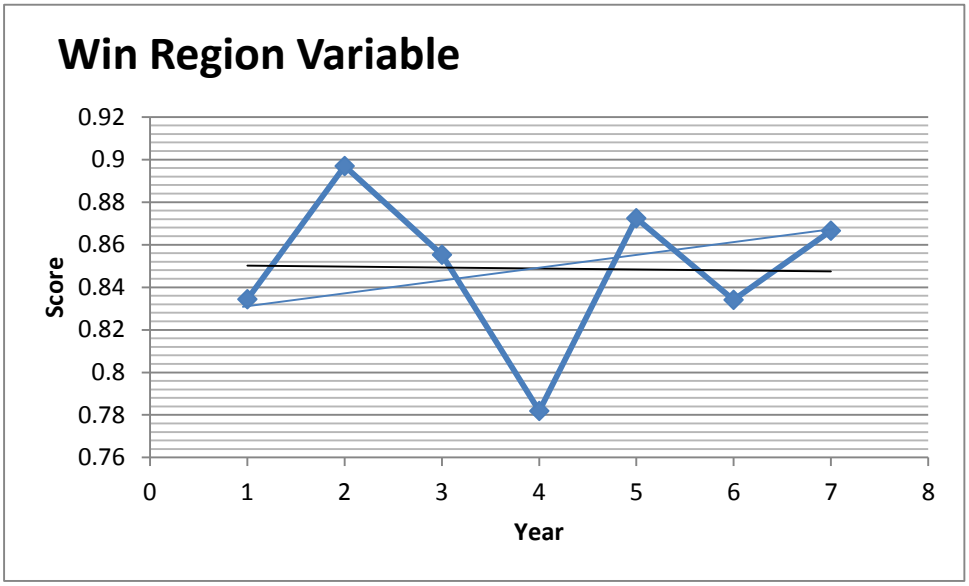
d) Excluding year 2007, year 2004 and year 2009 are the year with the lowest average efficiency score of 83%. While year 2005 has the highest score of 89.6% average efficiency.

e) This is the second test that has a reduction in efficiency in the 2nd period after the private variable return to scale test.

f) National Bank of Egypt, Misr Iran Bank, Faisal Islamic bank and Banque du Caire were the best overall banks with average score over the period of 99.5%, 99.4%, 99.3% and 99.3% respectively. On the contrary, Arab International Bank was the worst performing with 63% efficiency followed by Bloom Bank with 67%.

The following figure is presenting the average score and the average trend for the Regional sample using window analysis with variable return to scale.

Figure 5-10: Window - Region - Variable: Average efficiency per year



For distribution of scores, 57.5% of the scores are above 0.8. The concentration is above the 0.9 score and closer to the efficient frontier.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	32	31	21	14	19	29	0
%	21.9%	21.2%	14.4%	9.6%	13.0%	19.9%	0.0%

Based on the previous test using the windows Egypt and Regional sample variable Method, and the results of -0.53% and 3.9%, hypothesis one cannot be proved for the regional and Egyptian banks. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.11. Window Analysis for International banks using Constant approach

The international banks in this test are defined the banks that have a background or owned by non-Egyptian or non-regional banks. Six banks complies with this definition, they are the British, French, Italian and Greek banks as follow:

1. Alex Bank
2. Barclays
3. BNP Paribas
4. Credit Agricole
5. HSBC
6. NSGB
7. Piraeus Bank

The following table is the outcome summary from the Window Analysis on International banks using Constant approach run.

Table 5-17: Window - International- Constant: Outcome

Window International Constant							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	6	6	6	6	6	6	6
Standard Deviation	0.182872	0.109981	0.145462	0.108366	0.109468	0.071732	0.155578
Maximum	0.99442	1	1	1	1	0.94632	0.97367
Minimum	0.444063	0.705863	0.568766	0.702507	0.698781	0.771521	0.562495
No. of inefficient Banks in the sample	6	5	5	5	5	6	6
% of inefficient Banks in the sample	100.00%	83.33%	83.33%	83.33%	83.33%	100.00%	100.00%
Number of efficient banks	0	1	1	1	1	0	0
% of efficient banks	0.0%	16.7%	16.7%	16.7%	16.7%	0.0%	0.0%
Average of 3 years (# of banks)		11.1%		-50.00%		5.6%	
Average per year	0.77652	0.862497	0.797979	0.782198	0.877131	0.867383	0.862349
Year Change		11.1%	-7.5%	-2.0%	12.1%	-1.1%	-0.6%
Average of 3 years (score)		0.812332		6.97%		0.868954	
Change of 2010 vs. 2004	0.77652			11.05%			0.862349

From the previous table, there are some observations and findings:

a) Number of efficient banks observation before 2007 was two observations, which are 11.1% of total observations. However, only one bank succeeded to be on the efficiency frontier on the second period.

b) The three years average score before 2007 is 81.2% while after 2007 it became 86.8% that made an increase of 6.97%, which is the among the highest improvement in all the tests. Using the comparison between 1st and last year, the efficiency improvement is 11.05%

c) The result shows an average standard deviation for first period of 0.146 and 0.112 for the second period. Although this might be a large reduction in the standard deviation but the sample size was also small which might affect the results.

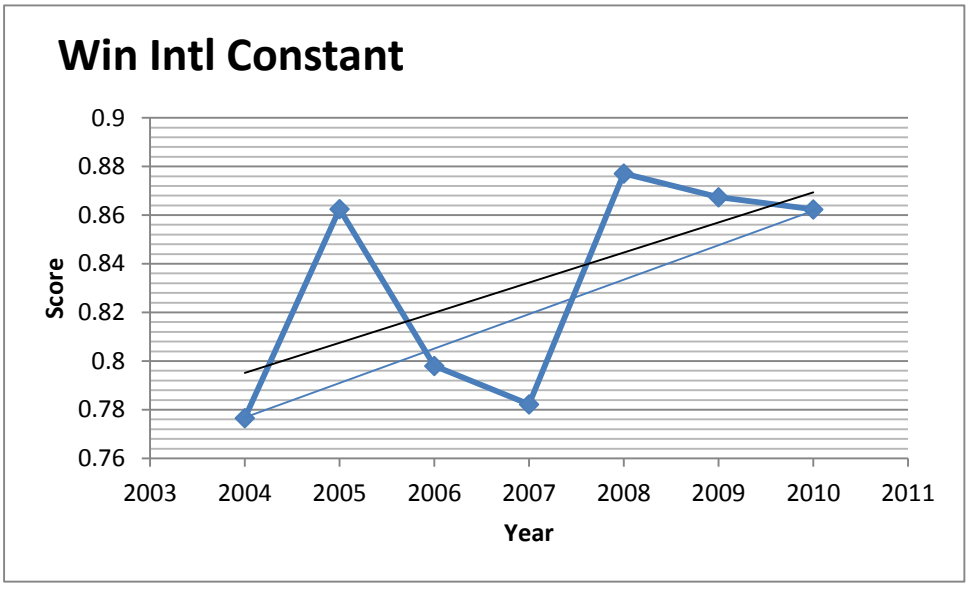
d) Also excluding 2007, year 2004 had the lowest score of 83.4% with only one bank on the frontier; year 2009 was the best with an average score of 93.3% and two banks on the frontier.

e) NSGB although was not on the efficiency frontier for the full period, but it had the highest average score of 91% followed by HSBC with 89.6%. Credit Agricole has the lowest score of 71.4%, however, in year 2010 it scored 96% to make the highest improvement in the sample.

f) Barclays Bank, Credit Agricole and HSBC had their efficiency improved in the 2nd period, while Piraeus and Alex bank's score were reduced in the 2nd period.

The following graph presents the average score of the Windows International Constant test.

Figure 5-11: Window - International - Constant: Average efficiency per year



For distribution of scores, 59.5% of the scores are above 0.8. The concentration is around the .9 score.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	4	10	11	13	1	3	0
%	9.5%	23.8%	26.2%	31.0%	2.4%	7.1%	0.0%

Table 5-18: Window – International- Constant: Correlation

Win Intl constant Correlation						
Average	Funds	Equity	Net Loans	Securities	Operating income	Net Profit
Funds	1	0.831014	0.940305	0.922227	0.861091	0.53399
Equity		1	0.814786	0.771574	0.742943	0.498583
Net Loans			1	0.797237	0.782224	0.499439
Securities				1	0.790983	0.383995
Operating income					1	0.710675
Net Profit						1

From the average correlation table, there is also a positive and relatively high correlation between Funds and Equity, Net Loans, Securities and Operating income of 0.88. Then it became relatively less with a correlation of 0.78 among Equity, Net Loans, Securities and Operating income. Correlation with the net profit is average with score of 0.525. The correlation between the operating profit and the net profit were higher than the other variables with net profit as it stand of 0.71.

The windows analysis on International sample using constant Method, resulted in increase of efficiency of 6.97% and 11.05%, therefore, hypothesis one could be accepted. ***Hypothesis 1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.***

5.1.12. Window Analysis for International banks using Variable approach

The following table is the outcome summary from the Window Analysis on International banks using Variable return to scale run.

Table 5-19: Window - International - Variable: Outcome

Window International Variable							
	2004	2005	2006	2007	2008	2009	2010
Number of Banks	61	59	43	41	40	39	39
No. of Banks in the sample	6	6	6	6	6	6	6
Standard Deviation	0.177708	0.119051	0.141993	0.106226	0.106233	0.093618	0.168056
Maximum	0.99921	1	1	1	1	1	1
Minimum	0.470343	0.715777	0.579916	0.704447	0.718792	0.773025	0.563787
No. of inefficient Banks in the sample	6	4	5	5	4	5	4
% of inefficient Banks in the sample	100.00%	66.67%	83.33%	83.33%	66.67%	83.33%	66.67%
Number of efficient banks	0	2	1	1	2	1	2
% of efficient banks	0.0%	33.3%	16.7%	16.7%	33.3%	16.7%	33.3%
Average of 3 years (# of banks)		16.7%		66.67%		27.8%	
Average per year	0.808548	0.882466	0.812922	0.799406	0.893365	0.89829	0.893739
Year Change		9.1%	-7.9%	-1.7%	11.8%	0.6%	-0.5%
Average of 3 years (score)		0.834645		7.25%		0.895131	
Change of 2010 vs. 2004	0.808548			10.54%			0.893739

From the previous table, there are some observations and findings:

a) Number of efficient banks' observations (score 1) before 2007 was three observations which are 16.7% of total observations which was less by two observations after 2007 (five observation). The number of efficient banks increased by 66.67%.

b) The three years average score before 2007 is 83.4% and is 89.5% after 2007 which indicates an increase of 7.25%. comparing the first year with the last year in the test indicates an increase of 10.54%

c) The average standard deviation for first period is 0.146 and 0.12 for the second period.

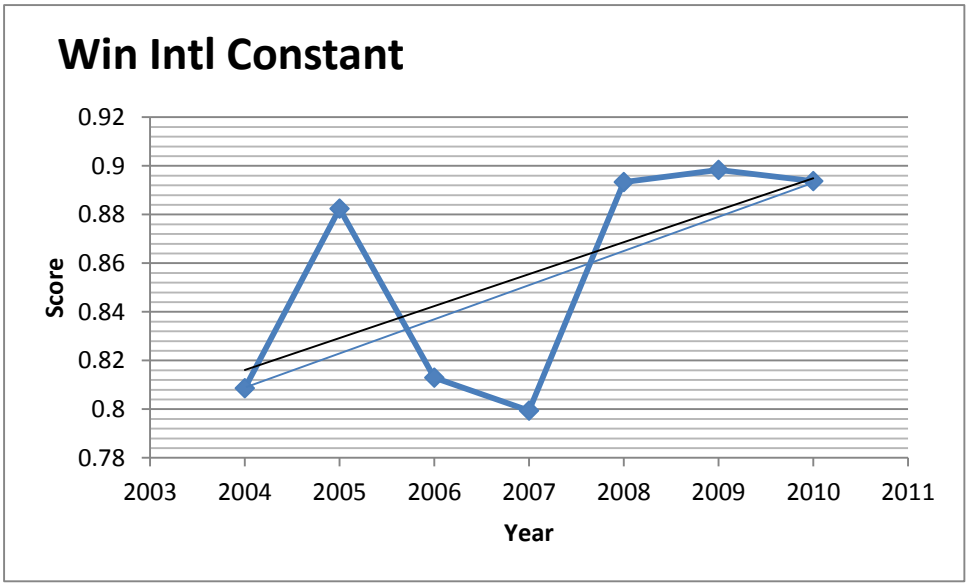
d) Excluding year 2007, the lowest score was in year 2004 with a score of 80%. While the highest score was in year 2009 with 89.8%.

e) The highest performing bank was NSGB (94.7%) followed by HSBC (91.6%), while Credit Agricole was the worst performing with an average score of 73%. However,

Credit Agricole score 99% on the last year of 2010. Bank of Alexandria and Piraeus bank's efficiency score were reduced in the 2nd period.

The following graph presents the average efficiency score.

Figure 5-12: Window - International - Variable: Average efficiency per year



For distribution of scores, 71.4% of the scores are above 0.8. The concentration is around the 0.9 score.

Category	e=1	1>e>.9	.9>e>.8	.8>e>.7	.7>e>.6	e<.6	Unavailable
# of results	9	8	13	9	0	3	0
%	21.4%	19.0%	31.0%	21.4%	0.0%	7.1%	0.0%

Based on the previous results of 7.25% and 10.54% by using the windows Variable return to scale on the international bank sample, the first hypothesis***: The greater the capital resources of operating bank in Egypt, the higher the efficiency***, can be accepted.

5.1.13. Discussion of DEA results

Based on the previous tests, the following table summarizes and highlights on the results:

Table 5-20: Summary of results

	Test	Year 2004	Average first Period	Average second period	Year 2010	Change (Period)	Change (2010 vs. 2004
1	**BCC**	0.918	0.932	0.963	0.969	3.27%	5.55%
2	**CCR**	0.857	0.881	0.920	0.940	4.33%	9.62%
3	**Window Full Constant**	0.776	0.811	0.833	0.841	2.70%	8.50%
4	**Window Full Variable**	0.829	0.856	0.866	0.873	1.16%	5.30%
5	Window Public Constant	0.765	0.811	0.855	0.876	5.44%	14.49%
6	Window Public Variable	0.821	0.876	0.910	0.914	3.96%	11.37%
7	Window Private Constant	0.782	0.812	0.821	0.821	1.09%	5.04%
8	Window Private Variable	0.833	0.845	0.840	0.848	-0.55%	1.78%
9	Window Regional Constant	0.775	0.811	0.823	0.835	1.48%	7.76%
10	Window Regional Variable	0.834	0.862	0.858	0.867	-0.53%	3.85%
11	Window International Constant	0.777	0.812	0.869	0.862	6.97%	11.05%
12	Window International Variable	0.809	0.835	0.895	0.894	7.25%	10.54%
	Average	**0.815**	**0.845**	**0.871**	**0.878**		

To comment on the previous tests, four main DEA tests were conducted on the sample of 27 banks out of 39 banks. Then the outcome of the Window analysis tests were divided into different segments based on ownership and origin to form another eight tests. The tests were from year 2004 to 2010. The DEA methods used are the BCC, CCR and Window analysis. With the exception of the BCC and the CCR, all Window tests were conducted two times, once using constant return to scale and another run using variable return to scale. The results then divided into two periods with 2007 to be the break year, the first periods includes year 2004, 2005 & 2006 and the second period includes year 2008, 2009 & 2010. In addition to the previous tests that were conducted to investigate hypothesis one, another correlation test was used on the selected input and output variables applied in the DEA. Based on the results for the first Hypothesis, ***The greater the capital resource of operating banks in Egypt, the higher the efficiency,*** the four main tests showed an increase in efficiency with an average of 2.86% using the period average and 7.24% using the first and last year comparison. All segmented tests showed increase in efficiency for both measurements with the exception of

two tests. These two tests are the Private VRS and Regional VRS that showed a reduction in the average score for the period but showed an increase in the first to last year comparison.

These results comply with the literature of Peristiani, (1997), Lim & Randhawa (2005) and Hughes, Mester & Moon (2000) who argued that increase in size will lead to increase in efficiency. Moreover, Mester (2008) debated that the consolidation in the banking sector and by having bigger banks, will lead to increase in efficiency product mix and X-efficiency.

The outcome of Reda (2012 & 2013) conformed to the outcome of this thesis. She debated that efficiency increased in post duration, public banks were more efficient, and private banks increased in efficiency and reached the level of the public ones in later years. This as well confirms the results of Farrag and Lang (2012) and Poshakwale, and Qian (2011) who did their study on Egypt but for longer time span. They agreed that the reform helped in increasing the efficiency of the Egyptian banks.

The results of the public banks versus the private banks, were interesting and against expectation. As the public banks, although were considered fat organization and not a market driven or even were not providing an exceptional customer services, performed better than the private ones in the constant and variable return to scale. Their general performance increased in a much better rate than the private ones. The average efficiency score of the public banks was even higher than the private banks. Even with year 2007, in which most of the banks performed badly, public banks efficiency did not got affected with the same level. One can claim that this is due to the fact that the government relay heavily on public banks for loans and as public expenditure driver. These results could be related to a similar outcome of Mukherjee et al (2002) on the Indian banking sector. They claimed that the Indian public banks are more efficient than the foreign or private banks because they are spread nationwide through large network of branches, which is similar to the situation of the Egyptian public banks.

The international banks performed better than the Egyptian and regional banks in terms of efficiency level and percentage of increase in efficiency. The regional and Egyptian banks were having fluctuation in efficiency, while the international banks were having a steady increase in performance. A note that should be made that some of the international banks bought distressed banks with low efficiency and small balance sheet such as HSBC. These results complies with previous research conducted by Claessens et al (2001) who did research on 80 countries including Egypt but for a different period of 1988 to 1995. They discovered that foreign banks in developing countries perform better and take market share from the local ones. Moreover, it is in line with the outcome of Mohieldin and Nasr (2003 & 2007) and El-Shazly (2009) that foreign banks performed better than the other banks. This is also proved in the following section of concentration.

Banks that performed extremely well in increasing the in performance are, SAIB, Credit Agricole with more than 100% improvement and AAIB with an average of 50% improvement. While banks that had a decrease in efficiency relative to the others are Piraeus, Audi, Union National banks and National Bank for development. Most of these banks were having high percentage of non-performing loans, and had to take high amount of provisions to cover them, which affected on their performance. However, this could be in line with Omran (2007) that some of the privatized banks performed worse than the public ones after the privatization.

The correlation conducted among the variables, showed a positive and relatively high correlation among Funds, Equity, Net Loans, Securities and Operating income, while the correlation with the net profit is positive and average, which could be justified by the other expenses and the provisions taken to cover the non-performing loans. In the private bank sample, the correlation among the variables and the net profit was medium high, which could highlight on the relative good quality of their portfolio in comparison to the public banks; moreover, they have better management of overhead and general expenses.

The DEA tests on the bank efficiency provided a robust investigation on efficiency improvement over the years and it proved the first hypothesis. It showed that efficiency improvement was not equal to all the banks or even to the different segments. This means that one of the objectives of the reform and the government which related to efficiency improvement was achieved to some extent.

To continue on the analysis of the changes of the banking industry, another trend analysis was made to compliment and expand on the readings and outcome of the banking sector. This investigation will be a descriptive analysis concerning the changes that happened in the banking sector in term of activities, size, branches, deposits and credit and it will segment the beneficiaries into government, private sector and household, in order to coming to a conclusion and understanding of the reform in the banking sector. Moreover, a concentration index will be made for the Egyptian banking sector. This will be covered in the following chapter.

5.2. K Bank concentration ratio

The government stated in their reform objectives that the reduction of the number of banks, and encouraging them to increase their paid in capital will results in having banks with relative similar sizes. This will increase competition and will results in better services, better pricing and better reach.

Among the common tests that are conducted to assess the banking structure, is the K bank concentration ratio CR*k.* As mentioned before in the literature review the CRk is measured by the following formula.

$$\mathrm{CR}k = \sum_{i=1}^{k} S_i.$$

The sum of the largest selected banks were added then divided by the total market size once for the deposits and another for the loans. The range of the index is:

$$0 < \mathrm{CR}k \leq 1.$$

If the Score is closer to the 1 indicates that the market is concentrated and few banks are dominating the sector. If the score is closer to the 0 means that there is no concentration and that almost all banks have the same market share (Bikker & Haaf 2002 and Tushaj 2010).

The data of the largest banks were based on the financial statements gathered and used for the previous DEA tests. The total market size data were gathered from the central bank reports, which are used for the descriptive analysis. To assess the concentration in the banking sector in Egypt during the period from year 2004 to year 2010, two variables were used: the deposit and the credit. These two variables are the main ones in assessing bank market share. The previous formula was used on deposits and on credits (including investment in treasury bills and bonds) to assess the effect of changes in bank structure on concentration.

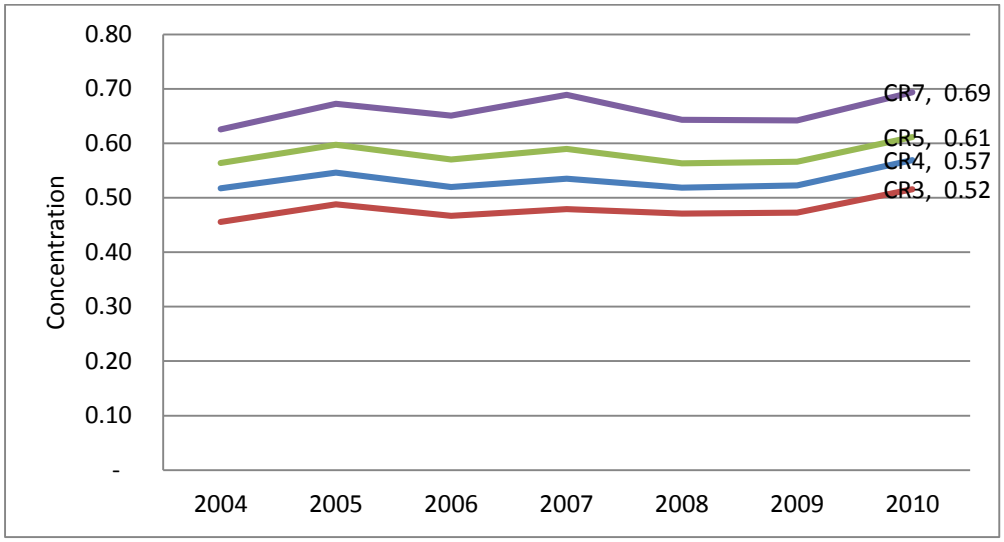
Four indices types were selected to conduct the bank concentration based on the largest three banks CR3, four banks CR4, the largest five banks CR5 and the largest seven banks CR7.

The following tables describe the results.

Table 5-21: Concentration index for the Egyptian banking industry on Deposits

	2004	2005	2006	2007	2008	2009	2010
Index type	Deposits	Deposits	Deposits	Deposits	Deposits	Deposits	Deposits
CR3	0.46	0.49	0.47	0.48	0.47	0.47	0.52
CR4	0.52	0.55	0.52	0.53	0.52	0.52	0.57
CR5	0.56	0.60	0.57	0.59	0.56	0.57	0.61
CR7	0.63	0.67	0.65	0.69	0.64	0.64	0.69

Figure 5-13: Concentration index for the Egyptian banking industry on Deposits



In year 2004, the three largest banks had 46% market share of total deposits. The four largest banks had 52% of total deposits in the banking sector in Egypt. While the five largest banks had 56%, and the largest seven banks had 63% market share. The banks that dominated the market in year 2004 are mainly the public banks. Based on size order, the seven largest banks that dominated the deposits are NBE, Bank Misr, Banque du Caire, Alex Bank, CIB, Arab International Bank and Faisal Islamic Bank. These percentages did not change much throughout the years of the study. In 2007, the year that most of the private and international banks were having decrease in efficiency based on the previous DEA tests, the concentration increased, and the public related banks also dominated the sector, with the exception that NSGB was among the largest seven instead of Faisal Islamic Bank. In year 2010, the concentration index for the CR3, CR4, CR5 and CR7 increased to its highest level to be 52%, 57%, 61% and 69% respectively. The seven largest banks in order are NBE, Banque Misr, CIB, NSGB, Banque du Caire, Arab African International Bank and HSBC.

Among the findings are the development that occurred to the banks, such as bank Audi that increased its deposit size 30 times, followed by Credit Agricole and NSGB that increased in

deposit size 6.4 times and 5 times respectively. The average increase in deposit portfolio is 1.84 times for the entire sample. On the contrary, Bank of Alexandria, which was privatized, reduced in total deposits by -3%. The largest public banks NBE and Bank Misr increased their deposits by an average of 2 times, which is relatively higher than the average market of 1.84 times. Other banks that didn't increase their deposit portfolio and almost stayed the same are Bank du Caire, Arab International Bank and Suez Canal Bank.

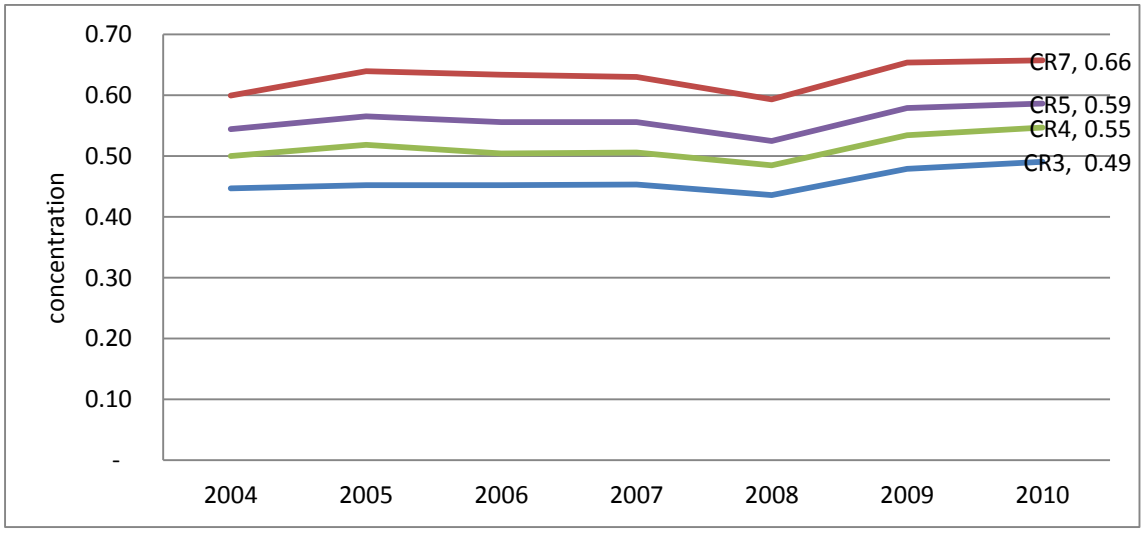
Year 2008 and 2009 witnessed a decrease in concentration for most of the indices used, then in year 2010 the concentration increased. This could be due to the effect of merging and acquisition that occurred. As many banks after the merge focus on setting the system and to restructure the bank then go after growth and market share. Although the increase happened in 2010 but the composition of the banks were different.

The following part illustrates the concentration index for the credit market.

Table 5-22: Concentration index for the Egyptian banking industry on Credit

	2004	2005	2006	2007	2008	2009	2010
Index type	Credit	Credit	Credit	Credit	Credit	Credit	Credit
CR3	0.45	0.45	0.45	0.45	0.44	0.48	0.49
CR4	0.50	0.52	0.50	0.51	0.48	0.53	0.55
CR5	0.54	0.57	0.56	0.56	0.53	0.58	0.59
CR7	0.60	0.64	0.63	0.63	0.59	0.65	0.66

Figure 5-14: Concentration index for the Egyptian banking industry on Credit



The concentration indices for the credit portfolio, are similar to the deposit portfolio. In year 2004, the CR3, CR4, CR5 and CR7 were 45%, 50%, 54% and 60% respectively of the credit market size. These banks are the same as the deposits ones even in the size order, NBE, Bank Misr, Banque du Caire, Alex Bank, CIB, Arab International Bank and Faisal Islamic Bank.

By year 2010, the CR3, CR4, CR5 and CR7 were 49%, 55%, 59% and 66% respectively. The largest banks are also the same like the deposit banks, NBE, Banque Misr, CIB, NSGB, Banque du Caire, Arab African International Bank and HSBC

The average increase in credit portfolio is 4 times. Bank Audi made an impressive increase in credit portfolio of 37.5 times followed by Credit Agricole with 11 times. If Bank Audi to be excluded from the calculation then the average increase is 2.7 times.

Year 2008 had the lowest concentration score in the sample at hand. As mentioned in the deposit part, banks after the restructure phase direct their attention to the market and expansion. That is why, smaller banks started to gain some market share. However, in year 2009 and 2010 the concentration indices started to increase again which means that the large banks start to gain the majority of the market of credit.

Some banks didn't increase their credit portfolio and almost kept the same credit given are Bank du Caire, which had a reduction in its portfolio by 10%, Bank of Alexandria and Suez Canal Bank.

Based on these results, the bank reform that included the privatization of public banks, reduction of the number of operating banks and foreign bank entry, did not overcome the high concentration that the sector was suffering from. Comparing these results with a similar banking condition in Albania, Tushaj (2010) debated that the industry concentrations were reduced dramatically in 6 years. He conducted his research using CR3 and CR5 out of 17 banks in years 1993 to 1999. The concentration index for assets reduced from 80% to 55% for the CR3 and from 89% to 74% for the CR5. For deposits, the concentration reduced from 84% to 62% for the CR3 and 92% to 78% for the CR5. In addition, for credit, the CR3 reduced from 78% to 47% and the CR5 reduced from 91% to 68%. Although the number of banks were different, but the reform conducted succeeded in reducing the concentration index. Especially that the reform conducted in Albania, was very similar to the one in Egypt in term of privatization, increasing paid in capital, merging, acquisition and foreign entry.

The outcome of the concentration index compiles with most of the literature on concentration effect on the banking industry. For example, Berger and Hannan (1998), Berger & Humphrey (1997) and Berger et al (2004) debated that high concentration would mostly lead to larger banks that can absorb shocks but also will lead to higher profit for the banks. Moreover, the customers will have fewer options to get their finance and will have to accept the rate and the collaterals set by the banks.

These results are supported by other researchers such as Heffernan (2005), Casu & Girardone (2006) and Fairburn and Geroski (1989) who argued that increase in concentration will lead to collusion and will make the large players set prices, quality and exercise monopolistic

behaviour over the market and the customers. However, they also argued that increase in concentration would result in reduction in efficiency, which contradicts with the results of this study. However, this could be due to the change in nature of the banking sector in Egypt which pass through high growth stage and the western banking sector, which is in the maturity phase.

The results of this study could also be compared with the outcome of the research of Casu & Girardone (2006) on 15 European Union countries over the period of 1997 to 2003 using concentration index for 3 & 5 banks. They argued that the high concentration lead to more market power of the operating banks. Moreover, the high concentration didn't lead to higher competition.

Among the interesting reflection of the results of the concentration index in Egypt on the competition theory, is the argument made by Perloff (2013) and Pindyck & Rubinfeld (2012). They argued that government intervention in limiting licencing is among the main reasons of having monopolistic or oligopolistic firms. Moreover, Lipczynski et al (2009) supported that by having small number of firms, companies go either into price competition or into war in which they all loose- the assumption that was made by the Egyptian government, or they collate and make joint decision.

Based on the concentration index analysis made for Egypt during the period of 2004 to 2010 for the largest three, four, five and seven banks, the concentration indices increased. Three banks dominate 52% of the deposit market and 49% of the credit market, while seven banks dominate 69% of the deposit market and 66% of the credit market. This means that the assumption of the government that by reducing the number of banks and increasing their sizes, concentration will be less. So hypothesis 2: ***The lower the number of operating banks in Egypt, the lower the concentration*** proved to be wrong and that the lower the number of operating banks, the higher the concentration.

The change in the largest banks' market share raises some questions about the pace that different banks followed during the period of the study. To be able to analyse and compare the change in market share of the banks, segmentations were made based on public ownership, international ownership and private non-international ownership. The public ownership and international ownership are derived from the DEA segmentation previously conducted.

As mentioned before the deposit size increased for the full market by 1.84 times, while the credit increased by 1.9 times. This is clear from the following table:

Table 5-23: Deposit and Credit change by segment

	Deposit	Credit
Market	1.84 times	1.9 times
Public banks	1.97 times	2.01 times
International banks	2.71 times	3.17 times
Private excluding international	2.44 times	2.43 times

This table shows that the market increased in deposits by 1.84 times and in credit by 1.9 times. The public banks were the least in growing their deposit and credit portfolio in the duration of study. The best performing public banks in deposit were SAIB with 5.4 times followed by AAIB with 4.7 times. While for credit, AAIB was the best performing with an increase of 6.6 times followed by SAIB 4.6 times. The largest bank in Egypt, the NBE had an increase of 2.35 and 2.2 times for deposits and credit respectively. The least public performing banks were Suez Canal bank and Banque du Caire. Their portfolio increased slightly by 5% for the seven years for either deposits or credit.

The international banks were having a good increase especially in the credit side. They had 2.71 times and 3.17 times increase in deposits and credit respectively. The best performing international banks were Credit Agricole and NSGB with 6.4 and 5.04 times for deposits and 11.5 and 6.16 times for credit. The least performing is bank of Alexandria, which decreased in deposits by 3% and increased in credit by 15% during the period of 7 years.

The private banks (excluding international banks) also performed better than the market and the public banks but less than the international ones. The deposits increased by 2.44 times, while the credit increased by 2.43 times. The best performing banks were Bank Audi which has an increase of 30 times on deposits and 37 times on credit. Followed by CIB and Baraka bank with an average increase of 3 times for credit and deposit for both banks. This result complies with the outcome of Mohieldin and Nasr (2003 & 2007) that private banks performed better than public banks from the period of 1995 to 2005.

This chapter presented the development that happened to the size of the banking sector in term of number of banks, branches, deposits, lending and the share of public, private and household credit and deposits. Based on the previous data, it is very clear the contribution of the household in building up deposits that serve the public and private sectors. The public sector is competing with the private sector in the credit market, the private sector was the major credit receiver in most of the years till 2008, when the public spending increased and public sector became the main credit receiver verses the private sector. The concentration indices showed increase in market share of the largest banks, which contradict with the objective that the government had set of reducing the dominance of the large ones, and to create large banks of similar sizes.

6. Chapter 6: Discussion and Conclusion

6.1. The Research

Banks in Egypt passed through different stages concerning the financial and economic development that was affected by the political orientation of each era. In the past years, the Egyptian governments represented by Prime Minister Nazif's cabinet, followed different strategies, activities and regulations concerning the financial and the banking sector that affected the structure of the banking sector and made dramatic change in size of operation. The government was claiming that these strategies would help in developing a strong banking and financial sector that can overcome, absorb and benefit from the different economic cycle and shocks. These objectives will be achieved by divesting the public ownership in banks, create larger banks with larger resources to be able to expand, grow and compete with the other banks on reaching new clients, or to provide better services and process to the current ones. The strategy and regulations followed by the government to make the financial sector reform covered many factors for the banking sector such as:

1) Increasing the paid-in capital of banks to £ 50 million from £10 million (either by injection, merging or acquisition)
2) Setting higher risk weighted capital adequacy ratio at 10% instead of 8%
3) Stopping the issuance of new banking license
4) Privatization of public banks (Bank of Alexandria so far)
5) Divestment of public bank shares in other banks or joint venture banks
6) Restructuring and turning around current public banks and hiring professional management.
7) Redefining the non-performing loans NPL based on strict category, which depends on defaulting list, which implies a percentage of provisions that could reach 100% of the loan.

8) Acquiring small banks or struggling banks by the large public banks
9) Merging small banks to form a larger bank.

These activities and directions resulted in reaching some of the required objectives such as:

1) Reduction of the number of operating banks from 71 to 39,
2) Increase in foreign direct investment with the foreign banks that acquired the existing ones
3) Improvement of the capital adequacy ratio,
4) Increasing the amount of deposits, loans and number of branches,
5) Non-performing loans decreased from 26% to 11%,
6) Provisions against non-performing loans increased to cover 100% of the NPL.
7) Net spread income declined from 5.9% to 4.8% for some banks.

There were many arguments that were made against the government's plan questioning the effectiveness of these activities. There were different literature supporting these activities and other literatures were against and another group claiming that there is no significant effect on the market especially in the issue of consolidation and reducing the number of players. Therefore, the literature did not provide a clear direction on effect of reform strategy on the financial sector and especially on banks. Never the less, the effect of foreign bank entry into a local market is also debatable. Moreover, the literature on Egypt did not fully cover the effectiveness of the reform and the change in efficiency on banks during this period. To assess the implication of these development and reform, it was important to investigate the impact of reform and consolidation on market structure, efficiency and banks' performance. To provide an answer to the change in efficiency and the change in industry structure in Egypt, a banking industry analysis was conducted to test the following Hypotheses

H1: The greater the capital resource of operating banks in Egypt, the higher the efficiency.

This hypothesis is used to question the government claim that with larger resources and capital, banks will be forced to utilize them and increase their efficiency.

H2: The lower the number of operating banks in Egypt, the lower the concentration,

The second hypothesis is to question the effect of the consolidation and the reduction of the number of the banks on the industry structure and the dominance of the large banks on the sector.

After reviewing different theories and analysis tools, the financial intermediation theory and the Data Envelopment analysis (DEA) tool were selected to test the efficiency of the banks, as they are the norm in the financial sector. While a bank concentration index (CR*K*) will be used to test hypothesis two.

From the 39 banks in Egypt, 27 banks were selected based on a random sample; the sample represents the largest banks in Egypt with more than 90% of market share of the banking activities deposit, credit and branches. The period of the study was from 2004 to 2010 that covers the years that witnessed the reform. It is worth mentioning that the period of the study terminates before the Egyptian revolution that occurred in 2011 to exclude any effect it had on the economy, the banking sector and their profits. The three DEA tests that were selected were the BCC, CCR and Window analysis. For each of the Window analysis DEA tests, two runs were conducted; one was using the constant return to scale approach and another using the variable return to scale approach to take account for size change. To have a better analysis of the sample, the outcome of the Window analysis were divided into full sample in which all banks were compared with each other; Public vs. private banks in which public banks were identified as banks that the government has a controlling or majority stake; And finally regional & Egyptian backed banks versus International backed banks. The tests used output orientation. The input variables were the available funds and the owners' equity, while the output variables were net loans, securities, operating profits and net profit.

Moreover, correlation among the variables was conducted for each of the different tests to identify the relation among the variables. Year 2007 which was the deadline for banks to comply with the new regulation, was chosen to differentiate between pre reform and post reform.

Moreover, to investigate the development of the sector, descriptive analysis of the changes that occurred in the banking sector on a macro level in terms of number of banks, numbers of branches, the deposits and the credit on the national level then segmented by credit and deposits given to private business, household, public entities. The descriptive analysis had a longer time span, which is from 1995 to 2010 to have longer view of the changes.

To test hypothesis two, the industry structure, the K bank concentration ratio was used on two variables: deposit and credit. Four concentration ratios were selected CR3, CR4. CR5 and CR7, which are the market share of the largest 3, 4, 5 and 7 banks.

6.2. The Discussion

The DEA results showed an increase in efficiency by 2.86% when comparing the first period against the second period, and 7.24% when comparing year 2004 to 2010, which complies with the first hypothesis, The greater the capital resource of operating banks in Egypt, the higher the efficiency.

Most of the different segments made witnessed increase in efficiency based on the two measurement (average and first versus last year), with the exception of the Private VRS and Regional VRS that showed a reduction in the average score for the period but showed an increase in the first to last year comparison. Among the interesting results, is the increase in efficiency of public banks versus private banks. Public banks performed better than some of the private banks in term of overall efficiency level and in efficiency increase. The international banks performed better than the regional ones in term of efficiency level and increase in efficiency.

The outcome of the DEA tests and the first hypothesis supports the outcome of the literature, that a reform, liberalization and reduction of number of banks, will results in better and higher efficiency on the industry level. However, the increase in efficiency is not equal to all segments, whereas mostly the international banks benefit the most and increase in efficiency in higher pace than the local banks. Moreover, the efficiency of the public banks will be affected but the change in their efficiency will depend on the bank itself and its management more than the dynamics of the industry. This was supported as well in the concentration index analysis.

The correlation conducted among the selected variables of input and output, showed a high positive correlation among Funds, Equity, Net Loans, Securities and Operating income. However, the correlation with the net profit was mainly positive medium relation that could be due to the off balance sheet activities conducted by the bank, or by the provision taken to cover the non-performing loans. The results of the private banks had a positive medium high correlation with the net profit. This could be justified that the quality of the portfolio of the private banks was better than the public ones. Another justification could be that the private banks were following strict risk management, which ensure that provisions are taken if there is a signal of default. Redefining the categories of nonperforming loans and the amount of the provision to be taken based on the default level, was among the new regulations that the central bank enforce on the sector to follow.

After proving the first hypothesis, ***The greater the capital resource of operating banks in Egypt, the higher the efficiency***, and in order to have different view of the banking sector, a different perspective of the development made was needed. The number of branches increased by a higher rate in the last period, as they increase from 2783 branches in 2004 to

3502 in 2010. The domestic credit increased from 422 billion LE in 2004 to 775 billion in 2010 with also an accelerated rate in the last period. Private business credit increased from 223 billion LE in 2004 to 326 billion LE in 2010. The household credit increased from 37 billion LE in 2004 to 93 billion LE in 2010, with an accelerated rate especially in year 2008. The public and government credit is a major player in the domestic credit in Egypt. It increased from 162 billion LE in 2004 to 356 billion LE in 2010 with a very high increasing rate in the last few years.

The total deposits increased from 462 billion LE in 2004 to 892 billion in 2010 with an accelerated rate in the last period. Private business deposits increased from 65 billion LE in 2004 to 169 billion LE in 2010. The household deposits increased from 296 billion LE in 2004 to 575 billion LE in 2010. The public and government deposits increased from 99 billion LE in 2004 to 143 billion LE in 2010.

Banks increased their branches, deposits increased on all sectors, credit increased in all sectors and their efficiency increased. It is worth mentioning that the government and the public sector are competing with the private and the households for the credit market, and they provide better risk profile and larger amounts. By looking back in years, the private sector credit were more than the public sector, however, in the last few years especially from 2008 onwards, the public sector credit is more than the private sector. Banks were having a relative lower risk for their deposits by buying government bonds and bills. As the government gets the credit, they need from banks by issuing T-bill and T-bonds with competitive prices, banks prefer to lend the government than to lend the private sector. The researcher claims that competition among banks will increase, once the percentage of loans given to the government is reduced. Based on the results, the effect of the government regulations and requirements affected the number of bank by reducing it, size of the banks that almost doubled in term of branches, deposits and loans.

The concentration index conducted for the largest 3, 4, 5 and 7 banks on deposits and credit, showed a high concentration ratio of an average of 60% for deposits and 57% for credit in year 2010 while, the average was 54% for deposit and 52% for credit in year 2004. This indicates that the concentration and the domination of the banking sector by few banks increased, while the claim of the reform is to reduce the dominance of few banks on the sector. As mentioned in some of the literature, the consolidation of the banking sector and reducing the number of banks will lead to higher concentration because the market will go into an oligopoly like structure as stated by most of the researchers such as Heffernan (2005), Casu & Girardone (2006), Fairburn and Geroski (1989), Berger and Hannan (1998), Berger & Humphrey (1997) and Berger et al (2004). This means that the second hypothesis ***The lower the number of operating banks in Egypt, the lower the concentration,*** can't be proved, and actually the lower the number of operating banks in Egypt, the higher the concentration.

Although a government claim could assume that the increase in efficiency and growth that the banking sector experience could be due to the reform and the activities that Nazif's government and the central bank conducted. However, this argument may not be accurate. During that time many changes occurred to the Egyptian economy, having a large amount of foreign direct investment, increase in exporting, and increase in number and revenue of tourists and the GDP increased by 6 and 7%. So the increase in size of the banks in term of deposits and credit could be due to the general market growth and not due to the direct effect of the reform.

As mentioned before the government were assuming that the reform would help in increasing the size of the banks and make them of equal size, which will force them to compete on the same clients or to explore underserved segments. The literature especially from the competition theory stated that by reducing the number of the player, you make the industry goes into a monopoly oriented market, in which the main players collaborate to control the market and set the prices. In the case of this research, looking at the results in relation to each other (increase in efficiency, increase in size and increase in concentration) might provide different reading. This could be as follow: by reducing the number of banks, and by proving that the concentration increased, banks became price setters, which resulted in increase in their profitability and then efficiency. Which could assume that the increase in efficiency was mainly due to the monopolistic behaviour conducted by the banks and not because they were able to utilize their resources in a better way.

Another issue is the measurement used to assess the effectiveness of the reform. The general measurements that were used for the economy are the general macroeconomics measurements such as the GDP growth, the FDI, and remittance of Egyptian abroad. For the banking sector, they were using foreign currency reserve, number of banks, number of branches, bank penetration rate and the total deposits and loans. There is no clear and specific measurement that Nazif's government used to assess the effectiveness of the reform and how it affected efficiency. Moreover, no measurement is used to assess competition in the banking sector. However, this could be because the majority of banks, and the market share is still dominated by publicly owned banks, so any regulation toward increase in competition and limitation of the dominance of the large banks will affect the performance of the public banks.

6.3. The Conclusion

Based on the current paper and the research that was conducted, one can say that the financial and the banking reform conducted in Egypt helped in laying the foundation of the infrastructure to have proper and larger institutions that can support the economy. However, still the financial sector is dominated by the few banks that are backed by public ownership, which prefers to lend the government and to be the main source of saving and deposit collector. The stock market, although it is well developed, but the size of IPOs, daily volume and market capitalization is relatively small compared to the size of the Egyptian economy and the GDP. The debt instruments are in the early stage and lagging behind the equity instruments either for the short term or for long term debt instruments. Other financial institutions such as mortgage, factoring and micro-finance are also still in their early stages with the exception of the leasing which could be considered in the growth stage. The private equity and venture capital are still lacking regulations, structure and the exit scenarios that can support in growing the sector.

Many supporting institutions were developed and start to gain their momentum and experience which should positively affect the economy such as the I-Score, the EFSA, the credit guarantee company and the export guarantee company which can foster the financial sector, expanding the client base and facilitating the process of credit award or risk management.

One can argue that better regulations that can help in raising funds for the financial institutions apart from the natural source of funds, which are capital or debt from banks, will be required to reduce cost of funds and make better competitions. Moreover, expansion in the trade finance and project finance to cover the different needs of funds is needed. Finally, other regulations for the equity side are needed. This could be in enhancing the regulation that facilitate the establishment of equity funds, venture capital, entrepreneurial finance, small and medium size enterprises and micro finance.

6.4. Limitation

This research has limitations that should be acknowledged and addressed in reviewing the results.

First are the sample size and the data collection. Although the 27 banks that were selected out of the 39 banks represents only 69.2% of the total number of banks, but these 27 banks were considered the largest banks and contribute of 90% of the total banking sector deposits and 88% of total banking sector loans in Egypt either in addition to number of branches. Therefore, another test that can take into consideration all the 39 operating banks will be more indicative and comprehensive on its results. The main challenge that was encountered was to get the published data of the financial statements for the full period of study for the missing banks.

Second the individual behaviour of banks. Based on the results, banks have different efficiency behaviour and trend; some of them were improving, some stayed the same, other became worse, and few were fluctuating with no clear direction. That means that some banks might be positively, negatively or neutrally affected by the consolidation in the banking sector or by the change in resources or size. Separate and individual research to analysis each bank might be conducted and be compared with the average score or based on different classification.

Third is the bank size. As efficiency is a ratio, large banks were compared with small banks, and although the variable return to scale of the DEA accommodates for size difference, but another test that segment the sample based on size either based on shareholder equity or for the loan portfolio might provide different insights and results.

Fourth is the break year assumption. Among the assumptions that were made is the one concerning the mid-year to compare the pre vs. the post reform results. Average efficiency results of year 2007 results were very low especially for the private banks, it was argued that this year is considered the year in which the government made the deadline to comply with the regulations and accordingly, most of the merging and acquisition were actually executed in this year. Therefore, year 2007 was chosen to be the mid-year or the break year to compare the pre and post 2007 results.

Fifth is number and selection of variables. The efficiency test were performed using a number of variables as output and input which might not be exhaustive, Bank performance is affected as well by other quantifiable and unquantifiable variables that were not computed in this model and might have their effect on the results.

Sixth is the duration. Another test that takes into consideration longer period of study or the long term effect on the banks might add to the literature, especially that the researcher had to stop at year 2010 to eliminate the effect of the 2011 revolution on the economy and the results.

Seventh is the software. The software used although it is considered among the good DEA standalone software but it has its limitation as statistical one. The software cannot accommodate for control variable, or using advanced statistical tools such as the one at the STATA and SPSS, which might provide different results. Although the STATA and SPAA don't have a DEA module, but they can compute the equation.

Eighth is the input orientation. This study was constructed based on the output orientation only, which might give different results than a model constructed with input orientation, or a model that use both input and output orientation. Again, this limitation was due to the options available to the applied software.

6.5. Recommendation for further research

Based on the findings and the limitation of the study, the researcher can recommend research opportunities related to the performance and efficiency of the banks in Egypt.

First, in this research, scale of banks were not taken into consideration, it is suggested that new research to be conducted to look at size difference and compare performance based on size. This could be conducted by identifying the scale efficiency versus the pure efficiency.

Second, this research used the DEA from an output perspective, a similar research could be conducted to look at the data from an input perspective, and the outcome of both studies could be compared. The input orientation assumes that the bank cannot control the output because it is based upon market dynamics, but can control the input and cost.

Third, The DEA is non- parametric techniques, a parametric approach such as the stochastic frontier approach, the thick frontier approach, and the distribution-free approach could be used and compare the results.

Fourth, the theoretical framework used in the research is taking the financial institutions as intermediaries (the banking theory); a future research can use another theory, such the financial institutions from the competition theory, resource dependency theory or the production approach. These theories will affect the variables used in the DEA model that could affect the results. In addition to that, using more than one theory will give comprehensive insight over the results. For example suing the political economy theory on top of the banking theory will provide more empirics and understanding.

Fifth, it is suggested to take into account the economic and business cycle, by comparing the change in efficiency with the change in other measurement such as GDP.

7. Appendix

The following tables are the detailed results of the 12 tests.

Appendix 1: BCC detailed results

	BCC	2004	2005	2006	2007	2008	2009	2010
No.	DMU	Score	Score	Score	Score	Score	Score	Score
1	ARAB BANKING CORPORATION	0.867607	1	1	0.678683	1	1	1
2	Ahly United Bank	1	1	1	0.99901	1	1	1
3	Al Baraka Bank	1	0.814852	0.851997	0.898837	1	1	1
4	Al Watany Bank	1	0.945829	1	1	0.969767	1	1
5	Alex Bank	0.9457	1	1	0.931145	0.918468	1	1
6	Arab African International Bank	0.808073	0.947413	1	0.899246	1	1	1
7	Arab International Bank	0.837038	0.853953	0.897684	0.94745	0.811211	0.536605	0.704517
8	Audi	1	1	0.273204	0.500624	0.786371	0.78244	0.964611
9	Banque du Caire	1	1	1	1	1	1	1
10	Banque Misr	1	1	1	1	1	1	1
11	Barclays	1	1	1	0.837751	1	1	1
12	Blom Bank	0.817086	0.626884	0.995569	1	1	0.786789	0.91129
13	CIB	1	1	1	1	1	1	1
14	Credit Agricole	0.542166	1	0.610853	0.846236	0.843812	0.900861	1
15	EGB	0.689396	0.895499	0.964454	0.877451	1	0.840218	1
16	Export Development Bank EDBE	0.984557	1	1	1	1	1	1
17	Faissal Islamic Bank	1	1	1	1	1	1	1
18	Housing & Development Bank	1	1	1	1	1	1	0.966609
19	HSBC	1	1	1	1	1	1	1
20	National Bank For Development ADIB	0.942311	0.902495	0.852344	0.685385	1	0.89367	1
21	National Bank of Egypt	1	1	1	1	1	1	1
22	NSGB	1	1	0.870602	0.971769	1	1	1
23	Piraeus Bank	1	0.710822	0.966079	0.815556	1	0.995851	0.870002
24	SAIB	0.498242	1	0.954959	0.646156	1	0.99192	1
25	Suez	0.924972	0.907788	0.866428	0.738724	1	0.745851	0.749272
26	Union National Bank	0.934195	1	1	1	1	1	1
27	Misr Iran Development Bank	1	1	1	1	1	1	1

Appendix 2: CCR Detailed Results

	CCR	2004	2005	2006	2007	2008	2009	2010
No.		Score	Score	Score	Score	Score	Score	Score
1	ARAB BANKING CORPORATION	0.783	1	1	0.553	0.771	0.796	0.866
2	Ahly United Bank	1	1	0.984	0.979	0.948	0.973	1
3	Al Baraka Bank	0.884	0.814	0.817	0.542	0.748	0.763	1
4	Al Watany Bank	0.968	0.946	1	1	0.956	1	1
5	Alex Bank	0.910	1	1	0.877	0.914	1	1
6	Arab African International Bank	0.721	0.828	0.888	0.756	1	1	1
7	Arab International Bank	0.505	0.531	0.545	0.655	0.686	0.499	0.682
8	Audi	0.607	1	0.273	0.487	0.778	0.760	0.907
9	Banque du Caire	1	1	0.887	1	1	1	1
10	Banque Misr	1	1	0.826	0.999	1	1	1
11	Barclays	1	1	1	0.838	1	1	1
12	Blom Bank	0.728	0.623	0.802	0.735	0.843	0.599	0.723
13	CIB	0.957	1	1	1	1	1	1
14	Credit Agricole	0.503	1	0.600	0.826	0.838	0.892	1
15	EGB	0.641	0.882	0.814	0.825	1	0.824	1
16	Export Development Bank EDBE	0.979	1	1	1	1	1	1
17	Faissal Islamic Bank	1	1	1	1	1	1	1
18	Housing & Development Bank	1	1	1	1	0.997	1	0.941
19	HSBC	1	1	1	1	1	1	1
20	National Bank For Development ADIB	0.925	0.902	0.847	0.684	0.719	0.672	1
21	National Bank of Egypt	0.933	0.781	0.722	0.844	1	1	1
22	NSGB	1	1	0.797	0.867	1	0.983	1
23	Piraeus Bank	0.914	0.707	0.950	0.760	0.979	0.892	0.766
24	SAIB	0.492	1	0.906	0.640	1	0.940	0.998
25	Suez	0.881	0.904	0.836	0.727	1	0.741	0.747
26	Union National Bank	0.815	0.840	1	0.991	0.949	0.658	0.741
27	Misr Iran Development Bank	1	1	1	1	1	1	1

Appendix 3: Window - Constant: Detailed Results

No:	Window Full Constant	2004	2005	2006	2007	2008	2009	2010
1	ARAB BANKING CORPORATION	0.753572	0.873681	0.883926	0.473604	0.705439	0.727977	0.665267
2	Ahly United Bank	0.914089	0.934462	0.944949	0.898546	0.916859	0.901876	0.880393
3	Al Baraka Bank	0.771969	0.788857	0.815535	0.523558	0.610285	0.605953	0.671357
4	Al Watany Bank	0.830769	0.913303	0.903668	0.858269	0.845671	0.954871	0.948016
5	Alex Bank	0.750546	0.930066	1	0.750573	0.815545	0.887826	0.86622
6	Arab African International Bank	0.615519	0.804878	0.669271	0.651511	0.955813	0.864727	0.814183
7	Arab International Bank	0.423834	0.522023	0.54538	0.557102	0.567805	0.433133	0.663209
8	Audi	0.57926	0.836462	0.261172	0.480272	0.784829	0.691009	0.723457
9	Banque du Caire	0.902678	0.957141	0.877463	1	0.976511	0.932779	0.886422
10	Banque Misr	0.802614	0.815605	0.76255	0.693766	0.737825	0.820431	1
11	Barclays	0.827022	0.933243	0.747161	0.736801	0.867175	0.876124	0.973676
12	Blom Bank	0.667731	0.594034	0.75734	0.629452	0.805705	0.551483	0.650422
13	CIB	0.877738	0.967684	0.898928	0.848379	0.959647	0.953051	0.958303
14	Credit Agricole	0.444063	0.789387	0.568766	0.751034	0.698781	0.791479	0.960138
15	EGB	0.600591	0.637144	0.624689	0.667819	0.930656	0.853926	0.993175
16	Export Development Bank EDBE	0.924299	1	1	0.951104	1	1	0.968222
17	Faissal Islamic Bank	1	0.984066	1	1	0.985055	0.961621	0.866492
18	Housing & Development Bank	0.934812	0.990711	1	0.894022	0.984046	1	0.897476
19	HSBC	0.852536	0.816426	0.804601	1	1	0.946325	0.853985
20	National Bank For Development ADIB	0.846971	0.868379	0.840418	0.677453	0.627012	0.575044	0.707753
21	National Bank of Egypt	0.807663	0.733268	0.721274	0.652531	0.661661	0.791936	0.941388
22	NSGB	0.994426	1	0.773382	0.752274	0.963571	0.931026	0.957578
23	Piraeus Bank	0.79053	0.705863	0.893965	0.702507	0.917711	0.771521	0.562495
24	SAIB	0.416371	0.861712	0.765653	0.569767	0.883032	0.844344	0.913371
25	Suez	0.825197	0.837733	0.814615	0.685385	0.824518	0.685728	0.677806
26	Union National Bank	0.784141	0.818694	1	0.654017	0.845466	0.631692	0.717017
27	Misr Iran Development Bank	1	1	1	0.99907	1	0.93079	1

Appendix 4: Window - Variable: Detailed Results

No:	Window Full Variable	2004	2005	2006	2007	2008	2009	2010
1	ARAB BANKING CORPORATION	0.810052	0.940214	0.947228	0.47944	0.713822	0.734169	0.676808
2	Ahly United Bank	0.939804	0.968127	0.949537	0.898848	0.919282	0.903285	0.888917
3	Al Baraka Bank	0.775293	0.791035	0.828259	0.52437	0.610675	0.606345	0.688305
4	Al Watany Bank	0.840309	0.913508	0.909636	0.860269	0.850857	0.978104	0.975435
5	Alex Bank	0.818988	1	1	0.772216	0.84752	0.917617	0.914234
6	Arab African International Bank	0.616489	0.82439	0.695895	0.78136	1	0.916221	0.895283
7	Arab International Bank	0.519978	0.657198	0.661673	0.723625	0.667255	0.517888	0.695904
8	Audi	0.999999	1	0.26555	0.484027	0.788315	0.691994	0.729192
9	Banque du Caire	0.985649	1	0.972737	1	1	1	0.995942
10	Banque Misr	0.955494	0.963597	0.918944	0.871328	0.843887	1	1
11	Barclays	0.869582	0.953461	0.757774	0.73915	0.873682	0.894542	1
12	Blom Bank	0.683742	0.599723	0.770311	0.639809	0.814392	0.552549	0.651694
13	CIB	0.913892	0.994611	0.947038	0.947209	1	1	1
14	Credit Agricole	0.470343	0.794089	0.579916	0.754057	0.718792	0.809096	0.990397
15	EGB	0.641593	0.661364	0.64778	0.674967	0.942204	0.858367	1
16	Export Development Bank EDBE	0.927352	1	1	0.954731	1	1	0.973467
17	Faissal Islamic Bank	1	0.984079	1	1	1	1	0.969932
18	Housing & Development Bank	0.94286	1	1	0.904339	0.990234	1	0.897509
19	HSBC	0.861381	0.831466	0.826925	1	1	1	0.894013
20	National Bank For Development ADIB	0.848704	0.872003	0.843677	0.681174	0.628304	0.578207	0.747015
21	National Bank of Egypt	1	0.995742	1	1	0.972721	1	1
22	NSGB	0.99921	1	0.809069	0.826565	1	0.99546	1
23	Piraeus Bank	0.831786	0.715777	0.903847	0.704447	0.920199	0.773025	0.563787
24	SAIB	0.420704	0.894829	0.768376	0.570022	0.891713	0.866675	0.958302
25	Suez	0.842314	0.874143	0.83353	0.685799	0.829886	0.710757	0.727772
26	Union National Bank	0.85854	0.900529	1	0.738815	0.857156	0.638905	0.726191
27	Misr Iran Development Bank	1	1	1	1	1	0.960992	1

Appendix 5: Window - Public - Constant: Detailed Results

Window Public Constant	2004	2005	2006	2007	2008	2009	2010	Change	Average
Arab African International Bank	0.6155	0.8049	0.6693	0.6515	0.9558	0.8647	0.8142	32.3%	0.768
Arab International Bank	0.4238	0.522	0.5454	0.5571	0.5678	0.4331	0.6632	56.5%	0.5304
Banque du Caire	0.9027	0.9571	0.8775	1	0.9765	0.9328	0.8864	-1.8%	0.9333
Banque Misr	0.8026	0.8156	0.7625	0.6938	0.7378	0.8204	1	24.6%	0.8047
Export Development Bank EDBE	0.9243	1	1	0.9511	1	1	0.9682	4.8%	0.9777
Housing & Development Bank	0.9348	0.9907	1	0.894	0.984	1	0.8975	-4.0%	0.9573
National Bank of Egypt	0.8077	0.7333	0.7213	0.6525	0.6617	0.7919	0.9414	16.6%	0.7585
SAIB	0.4164	0.8617	0.7657	0.5698	0.883	0.8443	0.9134	119.4%	0.7506
Suez	0.8252	0.8377	0.8146	0.6854	0.8245	0.6857	0.6778	-17.9%	0.7644
Misr Iran Development Bank	1	1	1	0.9991	1	0.9308	1	0.0%	0.99

Appendix 6: Window - Public - Variable: Detailed Results

Window Public Variable	2004	2005	2006	2007	2008	2009	2010	Change	Average
Arab African International Bank	0.61649	0.82439	0.69589	0.78136	1	0.91622	0.89528	45.2%	0.81852
Arab International Bank	0.51998	0.6572	0.66167	0.72363	0.66725	0.51789	0.6959	33.8%	0.63479
Banque du Caire	0.98565	1	0.97274	1	1	1	0.99594	1.0%	0.99348
Banque Misr	0.95549	0.9636	0.91894	0.87133	0.84389	1	1	4.7%	0.93618
Export Development Bank EDBE	0.92735	1	1	0.95473	1	1	0.97347	5.0%	0.97936
Housing & Development Bank	0.94286	1	1	0.90434	0.99023	1	0.89751	-4.8%	0.96213
National Bank of Egypt	1	0.99574	1	1	0.97272	1	1	0.0%	0.99549
SAIB	0.4207	0.89483	0.76838	0.57002	0.89171	0.86668	0.9583	127.8%	0.76723
Suez	0.84231	0.87414	0.83353	0.6858	0.82989	0.71076	0.72777	-13.6%	0.78631
MISR IRAN DEVELOPMENT BANK	1	1	1	1	1	0.96099	1	0.0%	0.99443

Appendix 7: Window - Private - Constant: Detailed Results

Window Private Constant	2004	2005	2006	2007	2008	2009	2010	Change	Average
ABC	0.753572	0.873681	0.883926	0.473604	0.705439	0.727977	0.665267	-11.7%	0.726209
Ahly United Bank	0.914089	0.934462	0.944949	0.898546	0.916859	0.901876	0.880393	-3.7%	0.913025
Al Baraka Bank	0.771969	0.788857	0.815535	0.523558	0.610285	0.605953	0.671357	-13.0%	0.683931
Al Watany Bank	0.830769	0.913303	0.903668	0.858269	0.845671	0.954871	0.948016	14.1%	0.89351
Alex Bank	0.750546	0.930066	1	0.750573	0.815545	0.887826	0.86622	15.4%	0.857254
Audi	0.57926	0.836462	0.261172	0.480272	0.784829	0.691009	0.723457	24.9%	0.622351
Barclays	0.827022	0.933243	0.747161	0.736801	0.867175	0.876124	0.973676	17.7%	0.8516
Blom Bank	0.667731	0.594034	0.75734	0.629452	0.805705	0.551483	0.650422	-2.6%	0.665167
CIB	0.877738	0.967684	0.898928	0.848379	0.959647	0.953051	0.958303	9.2%	0.92339
Credit Agricole	0.444063	0.789387	0.568766	0.751034	0.698781	0.791479	0.960138	116.2%	0.714807
EGB	0.600591	0.637144	0.624689	0.667819	0.930656	0.853926	0.993175	65.4%	0.758286
Faissal Islamic Bank	1	0.984066	1	1	0.985055	0.961621	0.866492	-13.4%	0.971033
HSBC	0.852536	0.816426	0.804601	1	1	0.946325	0.853985	0.2%	0.896268
National Bank For Development ADIB	0.846971	0.868379	0.840418	0.677453	0.627012	0.575044	0.707753	-16.4%	0.734719
NSGB	0.994426	1	0.773382	0.752274	0.963571	0.931026	0.957578	-3.7%	0.910322
Piraeus Bank	0.79053	0.705863	0.893965	0.702507	0.917711	0.771521	0.562495	-28.8%	0.763513
Union National Bank	0.784141	0.818694	1	0.654017	0.845466	0.631692	0.717017	-8.6%	0.778718

Appendix 8: Window - Private - Variable: Detailed Results

Private - Variable	2004	2005	2006	2007	2008	2009	2010	Change	Average
ABC	0.810052	0.940214	0.947228	0.47944	0.713822	0.734169	0.676808	-16.4%	0.75739
Ahly United Bank	0.939804	0.968127	0.949537	0.898848	0.919282	0.903285	0.888917	-5.4%	0.923972
Al Baraka Bank	0.775293	0.791035	0.828259	0.52437	0.610675	0.606345	0.688305	-11.2%	0.689183
Al Watany Bank	0.840309	0.913508	0.909636	0.860269	0.850857	0.978104	0.975435	16.1%	0.904017
Alex Bank	0.818988	1	1	0.772216	0.84752	0.917617	0.914234	11.6%	0.895797
Audi	0.999999	1	0.26555	0.484027	0.788315	0.691994	0.729192	-27.1%	0.708439
Barclays	0.869582	0.953461	0.757774	0.73915	0.873682	0.894542	1	15.0%	0.869741
Blom Bank	0.683742	0.599723	0.770311	0.639809	0.814392	0.552549	0.651694	-4.7%	0.673174
CIB	0.913892	0.994611	0.947038	0.947209	1	1	1	9.4%	0.971821
Credit Agricole	0.470343	0.794089	0.579916	0.754057	0.718792	0.809096	0.990397	110.6%	0.730956
EGB	0.641593	0.661364	0.64778	0.674967	0.942204	0.858367	1	55.9%	0.775182
Faissal Islamic Bank	1	0.984079	1	1	1	1	0.969932	-3.0%	0.99343
HSBC	0.861381	0.831466	0.826925	1	1	1	0.894013	3.8%	0.916255
National Bank For Development ADIB	0.848704	0.872003	0.843677	0.681174	0.628304	0.578207	0.747015	-12.0%	0.742726
NSGB	0.99921	1	0.809069	0.826565	1	0.99546	1	0.1%	0.947186
Piraeus Bank	0.831786	0.715777	0.903847	0.704447	0.920199	0.773025	0.563787	-32.2%	0.773267
Union National Bank	0.85854	0.900529	1	0.738815	0.857156	0.638905	0.726191	-15.4%	0.817162

Appendix 9: Window - Region - Constant: Detailed Results

win region constant	2004	2005	2006	2007	2008	2009	2010	Change	Average
ABC	0.753572	0.873681	0.883926	0.473604	0.705439	0.727977	0.665267	-11.7%	0.726209
Ahly United Bank	0.914089	0.934462	0.944949	0.898546	0.916859	0.901876	0.880393	-3.7%	0.913025
Al Baraka Bank	0.771969	0.788857	0.815535	0.523558	0.610285	0.605953	0.671357	-13.0%	0.683931
Al Watany Bank	0.830769	0.913303	0.903668	0.858269	0.845671	0.954871	0.948016	14.1%	0.89351
Arab African International Bank	0.615519	0.804878	0.669271	0.651511	0.955813	0.864727	0.814183	32.3%	0.767986
Arab International Bank	0.423834	0.522023	0.54538	0.557102	0.567805	0.433133	0.663209	56.5%	0.530355
Audi	0.57926	0.836462	0.261172	0.480272	0.784829	0.691009	0.723457	24.9%	0.622351
Banque du Caire	0.902678	0.957141	0.877463	1	0.976511	0.932779	0.886422	-1.8%	0.933285
Banque Misr	0.802614	0.815605	0.76255	0.693766	0.737825	0.820431	1	24.6%	0.804684
Blom Bank	0.667731	0.594034	0.75734	0.629452	0.805705	0.551483	0.650422	-2.6%	0.665167
CIB	0.877738	0.967684	0.898928	0.848379	0.959647	0.953051	0.958303	9.2%	0.92339
EGB	0.600591	0.637144	0.624689	0.667819	0.930656	0.853926	0.993175	65.4%	0.758286
Export Development Bank EDBE	0.924299	1	1	0.951104	1	1	0.968222	4.8%	0.977661
Faissal Islamic Bank	1	0.984066	1	1	0.985055	0.961621	0.866492	-13.4%	0.971033
Housing & Development Bank	0.934812	0.990711	1	0.894022	0.984046	1	0.897476	-4.0%	0.957295
National Bank For Development ADIB	0.846971	0.868379	0.840418	0.677453	0.627012	0.575044	0.707753	-16.4%	0.734719
National Bank of Egypt	0.807663	0.733268	0.721274	0.652531	0.661661	0.791936	0.941388	16.6%	0.758532
SAIB	0.416371	0.861712	0.765653	0.569767	0.883032	0.844344	0.913371	119.4%	0.750607
Suez	0.825197	0.837733	0.814615	0.685385	0.824518	0.685728	0.677806	-17.9%	0.764426
Union National Bank	0.784141	0.818694	1	0.654017	0.845466	0.631692	0.717017	-8.6%	0.778718
Misr Iran Development Bank	1	1	1	0.99907	1	0.93079	1	0.0%	0.98998

Appendix 10: Window - Region - Variable: Detailed Results

Region - Variable	2004	2005	2006	2007	2008	2009	2010	Change	Average
ABC	0.810052	0.940214	0.947228	0.47944	0.713822	0.734169	0.676808	-16.4%	0.75739
Ahly United Bank	0.939804	0.968127	0.949537	0.898848	0.919282	0.903285	0.888917	-5.4%	0.923972
Al Baraka Bank	0.775293	0.791035	0.828259	0.52437	0.610675	0.606345	0.688305	-11.2%	0.689183
Al Watany Bank	0.840309	0.913508	0.909636	0.860269	0.850857	0.978104	0.975435	16.1%	0.904017
Arab African International Bank	0.616489	0.82439	0.695895	0.78136	1	0.916221	0.895283	45.2%	0.81852
Arab International Bank	0.519978	0.657198	0.661673	0.723625	0.667255	0.517888	0.695904	33.8%	0.634789
Audi	0.999999	1	0.26555	0.484027	0.788315	0.691994	0.729192	-27.1%	0.708439
Banque du Caire	0.985649	1	0.972737	1	1	1	0.995942	1.0%	0.993475
Banque Misr	0.955494	0.963597	0.918944	0.871328	0.843887	1	1	4.7%	0.936179
Blom Bank	0.683742	0.599723	0.770311	0.639809	0.814392	0.552549	0.651694	-4.7%	0.673174
CIB	0.913892	0.994611	0.947038	0.947209	1	1	1	9.4%	0.971821
EGB	0.641593	0.661364	0.64778	0.674967	0.942204	0.858367	1	55.9%	0.775182
Export Development Bank EDBE	0.927352	1	1	0.954731	1	1	0.973467	5.0%	0.979364
Faissal Islamic Bank	1	0.984079	1	1	1	1	0.969932	-3.0%	0.99343
Housing & Development Bank	0.94286	1	1	0.904339	0.990234	1	0.897509	-4.8%	0.962135
National Bank For Development ADIB	0.848704	0.872003	0.843677	0.681174	0.628304	0.578207	0.747015	-12.0%	0.742726
National Bank of Egypt	1	0.995742	1	1	0.972721	1	1	0.0%	0.995495
SAIB	0.420704	0.894829	0.768376	0.570022	0.891713	0.866675	0.958302	127.8%	0.767231
Suez	0.842314	0.874143	0.83353	0.685799	0.829886	0.710757	0.727772	-13.6%	0.786314
Union National Bank	0.85854	0.900529	1	0.738815	0.857156	0.638905	0.726191	-15.4%	0.817162
MISR IRAN DEVELOPMENT BANK	1	1	1	1	1	0.960992	1	0.0%	0.994427

Appendix 11: Window - International - Constant: Detailed Results

International Constant	2004	2005	2006	2007	2008	2009	2010	Change	Average
Alex Bank	0.750546	0.930066	1	0.750573	0.815545	0.887826	0.86622	15.4%	0.857254
Barclays	0.827022	0.933243	0.747161	0.736801	0.867175	0.876124	0.973676	17.7%	0.8516
Credit Agricole	0.444063	0.789387	0.568766	0.751034	0.698781	0.791479	0.960138	116.2%	0.714807
HSBC	0.852536	0.816426	0.804601	1	1	0.946325	0.853985	0.2%	0.896268
NSGB	0.994426	1	0.773382	0.752274	0.963571	0.931026	0.957578	-3.7%	0.910322
Piraeus Bank	0.79053	0.705863	0.893965	0.702507	0.917711	0.771521	0.562495	-28.8%	0.763513

Appendix 12: Window - International - Variable: Detailed Results

International Variable	2004	2005	2006	2007	2008	2009	2010	Change	Average
Alex Bank	0.818988	1	1	0.772216	0.84752	0.917617	0.914234	11.6%	0.895797
Barclays	0.869582	0.953461	0.757774	0.73915	0.873682	0.894542	1	15.0%	0.869741
Credit Agricole	0.470343	0.794089	0.579916	0.754057	0.718792	0.809096	0.990397	110.6%	0.730956
HSBC	0.861381	0.831466	0.826925	1	1	1	0.894013	3.8%	0.916255
NSGB	0.99921	1	0.809069	0.826565	1	0.99546	1	0.1%	0.947186
Piraeus Bank	0.831786	0.715777	0.903847	0.704447	0.920199	0.773025	0.563787	-32.2%	0.773267

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