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Faculty of Business Administration & Economics
Graduate Division

**An Exploratory Study on Adoption of Online
Banking in Lebanon**

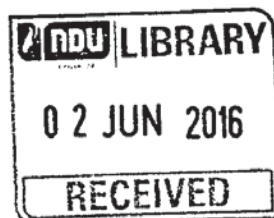
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Approval Certificate

**An Exploratory Study on Adoption of Online
Banking in Lebanon**

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February 1, 2016

DECLARATION

I hereby declare that this thesis is entirely my own work and that it has not been submitted as an exercise for a degree at any other University.

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ABSTRACT

Purpose – This thesis attempts to explore the impact of adoption of online banking, through its various media and communication channels, on branch expansion and overall banks profitability. We use a sample of 17 Lebanese commercial banks constituting 90 % of the Lebanese commercial banks sector, from 2004 till 2013.

Design/Methodology/Approach – This study is based on a quantitative model with a deductive approach. Secondary data was collected from BILANBANQUES to feed into a multiple regression models. The independent variables are the following variables: year adoption of mobile banking, phone banking and transactional website. Control variables are customers' deposits over total assets, loan to customers over total assets, average staff per branch, the number of branches and the crisis. Dependent variables are the Return on Assets and the Return on Equity and other performance measures.

Findings – After testing each hypothesis and based on a selected sample, results revealed that online banking channels have had minor effect on overall bank profitability, but in retrospect it affected the branch profitability bringing to bear the fundamental strategies of Lebanese banks, which use branch expansion as a marketing tool for the masses.

Research Limitations / Implications – Several limitations were encountered due to the small Lebanese banking sector and the lack of reliable data. The study focuses only on the top Lebanese banks and did not take into consideration the perceived risk of online banking, the ease of use and awareness of this new technology by customers.

Practical Implications – This research is meant to provide guidance to bank managers and executives in understanding the impact that online banking can have on their strategies. It sheds the light on aspects of commercial branch profitability that is rarely considered in their choices of future expansion.

Originality/Value – As far as we know, there has been no study of the sort in Lebanon. Our aim is to give a quantitative justification to the way banks expand and to their approach to commercial operations.

Keywords – Online banking, Internet banking, Mobile banking, Transactional website, Bank's profitability, Branch expansion, Lebanese banks.

LIST OF TABLES

Table 1: Data definitions	32
Table 2: List of Banks, establishment dates, total asset size, classification and years of adoption of online banking services	36
Table 3: Descriptive Statistics.....	41
Table 4: Correlation Matrix	42
Table 5: Results of the instrumental variable estimation <i>IVREG</i> for the impact of online banking on profitability and performance.....	44
Table 6: Results of OLS cross section firm level clustering for the impact of online banking on profitability and performance.....	45
Table 7: Results of the stepwise multivariate regression and Collinearity diagnostics for the impact of online banking on return on assets	47
Table 8: Excluded variables of multivariate regression for the impact of online banking on return on assets.....	48
Table 9: Results of the stepwise multivariate regression and Collinearity diagnostics for the impact of online banking on return on equity	49
Table 10: Excluded variables of multivariate regression for the impact of online banking on return on equity.....	50
Table 11: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on branch profit.....	51
Table 12: Excluded variables of multivariate regression for the impact of online banking on branch profit.....	52
Table 13: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on customer deposits.....	53
Table 14: Excluded variables of multivariate regression for the impact of online banking on customer deposits.....	54
Table 15: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on loan to customers	55
Table 16: Excluded variables of multivariate regression for the impact of online banking on loan to customers	56
Table 17: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on total interest income over total assets	56
Table 18: Excluded variables of multivariate regression for the impact of online banking on total interest income over total assets	57
Table 19: Results of the stepwise Using the multivariate regression and collinearity diagnostics for the impact of online banking on none interest income over operating	58
Table 20: Excluded variables of multivariate regression for the impact of online banking on total interest income over total assets	59

LIST OF FIGURES

Figure 1: Internet banking audience worldwide distribution	4
Figure 2: shows a brief explanation of what is an electronic banking.....	9

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Contents

ABSTRACT	IV
LIST OF TABLES	V
LIST OF FIGURES	VI
ACKNOWLEDGEMENTS	VII
Chapter 1	
1 Introduction	1
1.1 General background	1
1.2 Motivation of study:	3
1.3 Objective of Study.....	4
1.4 Research questions:	5
1.5 Structure of the Study.....	5
Chapter 2	
2 Review of literature	7
2.1 Introduction	7
2.2 Definition of online banking	7
2.3 History of online banking.....	10
2.4 Characteristics of Internet Banking.....	11
2.5 Goals of online banking	12
2.6 Drawbacks	13
2.7 Factors that affect bank costs	13
2.8 Profitability and performance of banks	14
2.8.1 Impact of internet banking on Banks' Profitability	15
2.8.2 Impact of Internet banking on Banks' Performance	15
2.9 Online banking: a competitive advantage	15
2.10 Overview economy in Lebanon.....	16
2.11 Lebanese banking sector	17
2.12 Characteristics of Lebanese banking sector	17
2.13 Classification of Lebanese banks	18
2.14 Profile of banks	18
2.15 Competitive advantage of the Internet for the Local Banks in Lebanon.....	19
2.16 Deriving research questions and hypothesis development.....	20

2.16.1	The effect of online banking (transactional website, mobile banking, phone banking) on the profitability of Lebanese bank: Previous Studies and Hypothesis Development	20
2.16.2	The impact of online banking (Transactional website, phone banking, mobile banking) on performance of Lebanese Banks: Previous Studies and Hypothesis Development	21
2.16.3	The effect of number of branches on the performance of Lebanese banks: Previous Studies and Hypothesis Development	22
2.17	Other empirical studies about online banking:.....	23
2.18	Conclusion.....	24

Chapter 3

3	PROCEDURES AND METHODOLOGY	25
3.1	Overview of chapter	25
3.2	Introduction	25
3.3	Research philosophy.....	26
3.4	Research Approach:	27
3.5	Research Design:	28
3.6	Research strategy.....	29
3.7	Research method	30
3.8	Selected variables	31
3.8.1	Independent variables:	33
3.8.2	Dependent variables:.....	33
3.8.3	Control variables	34
3.9	Methodology used	35
3.9.1	Sample selection:	35
3.9.2	Sources of Data	37
3.9.3	Data Analysis	37
3.10	General and moral concerns	38
3.11	Conclusion.....	38

Chapter 4

4	FINDINGS AND DISCUSSION OF THE RESULTS.....	40
4.1	Introduction	40
4.2	Descriptive Statistics	40
4.3	Main results	43

4.3.1	Results of cross section analysis of the regression models using <i>IVREG</i> statistical method.....	43
4.3.2	Cross section analysis firm level clustering.....	45
4.3.3	Results of impact of online banking on ROA.....	46
4.3.4	Results of the impact of online banking on ROE.....	48
4.3.5	Results of the impact of online banking on branch profit.....	50
4.3.6	Results of the impact of online banking on CDBRANCH.....	52
4.3.7	Results of the impact of online banking on LTCBRANCH.....	54
4.3.8	Results of the impact of online banking on TII/TA.....	56
4.3.9	Results of the impact of online banking on NII/OE.....	57
4.4	Discussion of the Findings and Hypotheses.....	59
4.5	Conclusion.....	61

Chapter 5

5	Conclusion and Further Research.....	62
5.1	Introduction.....	62
5.2	Summary of the Research.....	62
5.3	Limitations of study.....	64
5.4	Implications of study.....	64
5.5	Suggestions for Further Research.....	644
	References.....	67
	Appendix A – Minimum value for selected banks.....	71
	Appendix B- Maximum value.....	72
	Appendix C – Mean of dependent and independent variables.....	73
	Appendix D- Histogram of unstandardized residual.....	74

Chapter 1

1 Introduction

1.1 General background

Banks are a vital sector of any economy. They are the “life-line” of the economy. Their primary activity is to accept deposits, then use the proceeds to lend and invest. They have to maintain liquidity and profitability at the same time. Profitability is a primary measure of the overall success of a business and it refers to its ability to make profit. The bank's profit is derived from the interest rates paid and charged to depositors and borrowers respectively (Tanu, 2013).

Nowadays, the banking industry is shifting from paper and branch banks to digitized and networked banking services. Information technology and more specifically, “the Internet”, has fundamentally changed the way banks do business. Whether ATMs, Phone Banking or Internet Banking, the internet penetration has remodeled financial services via alternate channels by which banks offer their services (Onay, 2013).

Worldwide, more and more retail banks are adding additional distribution channels to their financial services, whereby traditionally, they were reserved for “Bricks and Mortar” branches.

Internet banking has modernized and renewed the way banks operate. New Technologies are considered vital for the success of organizations and are central to their main activities. Banks, both domestic and foreign, offer their customers new banking technologies such as PC banking, mobile banking, ATM, electronic funds transfer, account to account transfer, paying bills online, online statements, credit cards and many other different services (Sumra, 2011) .

Modern technologies have become vital for banks to achieve many goals more efficiently. They implicitly increase productivity and maximize profits. Profitability stands as the main objective of every manager looking to maximize shareholder's equity. Both banks and their customers consider modern technologies as a must and the best medium to accomplish required transactions (Balwinder, 2004).

For example, Banks can profit from e-banking by advertising their products on their website, hence creating new revenues through online transactions. Additionally, they can achieve operational and transactional cost savings, customer retention and other services, by reducing marketing and customer acquisition expenses (Celent, 2000).

Various surveys show that around 97% of customers who perform online operations will carry on using this technology and many among them intend to maximize their transactions over the following months. In fact, customers are generally satisfied with e-commerce services and consider them as an effective, inexpensive and rapid way of doing business. They consequently use them for the purchase of a wide range of products and services (De Young, The performance of internet-based business models evidence from the banking industry, 2007).

It's clear that e-banking has changed the way banks and their customers interact. One to one banking services are disappearing at the expense of online banking. Top bankers, hence are actively looking for means to save and reduce their costs by decreasing the number of branches. The shrinking number of branches leads not only to lesser rent and construction expenses but also to a decrease in manpower that is replaced by this new technology (Stephens, 2014).

The Lebanese banking sector is considered as one of the most reliable sectors of the economy owing to an open and liberal political system. Although Lebanon has suffered from political problems and security instability, the Lebanese economy reached an annual growth of 2% in 2014 and an inflation rate below 4%. The central bank, according to BDL, was able to keep a stable exchange and interest rate, with foreign assets surpassing \$38 billion in March 2015. In December 2014, the total assets exceeded \$175 billion (BDL, 2015). Nowadays, Lebanese Banks are modifying their services to keep up with the consumer needs. Those electronic services are used as a tactical means that allows the banks to show how they stand out and to offer a safe sustainable Competitive influence able to establish Brand equity and Leadership Market Position (Charbaji, 2005).

In Lebanon, the introduction of internet banking has started picking up speed in 2008 with Byblos Bank followed by Audi Bank in 2009 (Annual report Bank & Annual report Byblos bank).

At the end of 2013, the number of banks operating in Lebanon reached 73, distributed among 56 commercial banks (There are 32 commercial Lebanese banks, 9 Lebanese banks with Arab control, 8 Arab banks, 4 foreign banks) and 17 investment banks. They are classified into four groups according to their respective total customer deposits (Association of banks In lebanon, 2015) .

The Alpha group banks have 80 % share of the market. The total assets of the banking sector stood at \$ 160,145 million in 2012 and \$ 176,360 million in 2013.

Due to the dollarization of the economy one third of the banks' balance sheet is in Lebanese pounds and two third is in dollars. The Lebanese banking sector is very liquid; its deposits reached \$117 billion in 2012 and loans to customers stand around USD 41 billion. Eighty four percent of deposits in Lebanese banks are from residents and around seventeen percent from Lebanese living abroad (BILANBANQUES, 2014).

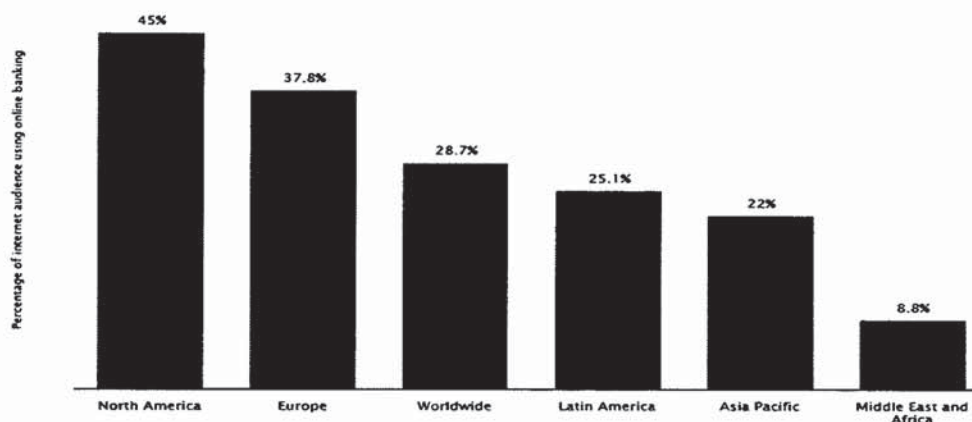
Clearly, online banking offers a "one step service and information unit" capable of providing banks and consumers with considerable benefits. The objectives of a strong banking sector are to encourage economic growth and to preserve financial stability for the financial system of every country. Thus, in order to highly increase the returns and attract more customers who require great services, information and revolutionary technology stimulated banks to increase their investments in online banking (Al-Wabel, 2011).

Moreover the new technologies and strategies for oriented marketing became a vital means for these institutions. Their final goal is to set up a culture which gives the priority to the customer, ensures a climate of trust and increases the consumer's knowledge and loyalty. While different means of media such as computers, mobiles, Internet, TV and cable have become complementary and necessary, the physical location of a bank is no longer important. All what matters to the customers are flexible payment services without extra charges whenever, whatever and wherever they want (Toufaily & Daghfous, 2009).

1.2 Motivation of study:

E-banking is commonly used in modern countries. However, it's growing slowly in emerging ones as a result of poor economies, low education levels, bad infrastructure, lack of trust in new technologies and financial risks perceived by consumers. According to figure 1, developed countries with advanced infrastructure and high levels of education such as North America and Europe present the highest percentage of online banking unlike the non-developed countries like the Middle East and Africa where this percentage is the lowest.

Figure 1: Internet banking audience worldwide distribution



Source: Statistica, global Online Banking penetration in April 2012, by region.

More importantly, banks such as Wells Fargo, JP Morgan, and Bank of America are decreasing the number of their branches, since millions of Americans, according to the U.S Financial Bureau are now using Smartphone to perform their daily transactions. According to Stephens (2014), mobile banking users are increasing at the pace of 74,000 new users per day. Worldwide, many researchers investigated the effect of online banking on banks' profitability, but there is no precise agreement about its effect on the performance of Lebanese banks. Based on the discussed literature in following chapter, we found that in most developed countries the adoption of online banking has a positive impact on banks profitability and it decreases bank costs as well. In addition, being a Lebanese banker and working as counter and in customer services pushed me to choose this topic since today the major teller operations are conducted through internet.

1.3 Objective of Study

The purpose of this thesis is to study explore the impact of online banking on the profitability of the Lebanese commercial banks on one hand, and the impact that online transactions have on the expansion of bricks-and-mortar branches on the other hand. In order to analyze this impact, the following dummy variables for internet banking will be used: year adoption of mobile banking (INTERNET¹), year of adoption of phone banking and traditional website (INTERNET²), year of adoption of transactional website (INTERNET³), as well as the following ratios : customer

deposit over total assets (CD/TA) , loan to customer over total assets (LTC/TA), average staff per branch (ASPB), the number of branches (BRANCH) and to measure banks profitability we use two financial ratios : Return on average assets (ROA) , return on average equity (ROE) and some other performances measures like branch profit, loans per branch, cost to income, deposits per branch , none interest expenses and total interest expense. The study will consider the profile of seventeen commercial Lebanese banks from 2004 till 2013 and presenting 170 observations. Therefore, the findings can give accurate results and can be generalized to the Lebanese banks.

1.4 Research questions:

This thesis attempts to investigate the current situation of online banking in Lebanon and its impact on profitability. It attempts to study (i) the relation between the adoption of online banking and profitability of banks (ii) the impact of online banking on physical branches, as well as to provide recommendation for improving this new service. In order to assess the effect of online banking on Lebanese banks' profitability, the below questions will be raised in this study:

- 1- Is there any effect for online banking (as measured by mobile banking, transactional website, phone banking) on Lebanese Banks' profitability (as measured by ROA and ROE)?
- 2- Is there any impact for online banking (as measured by mobile banking, transactional website, phone banking) on the performance of Lebanese Banks?
- 3- Is internet banking used as complement or substitute for physical bricks-and-mortar branches? (effect of number of branches)

1.5 Structure of the Study

In addition to the abstract, this chapter was introductory, including a background and showing the importance of this study as well as its research objective and questions. The remaining part of the thesis is organized as follows: chapter two reviews the literature relevant to online banking locally and internationally as well as other research relevant to the study and from which I derived the research questions and hypothesis. In chapter three, we will discuss the methodology used, the research

design, the selected sample, independent and dependent variables and the statistical techniques used. Chapter four will include the study results and discuss their analysis. It shows the descriptive statistics and multivariate results of this research with the acceptance or rejection of the hypotheses as well as a comparison between these research findings and those of previous studies available in chapter two to derive a useful conclusion. Finally, chapter five will highlight the main findings, conclusion, limitations and recommendations

Chapter 2

2 Review of literature

2.1 Introduction

This chapter provides a clear overview about online banking. In the first part it includes definition of online banking by many authors, history of online banking, characteristics of internet Banks, goals of online banking, Factors that affect bank costs, advantages and drawbacks of online banking. Later, we start talking about economy in Lebanon as well as importance of Lebanese banking sector its characteristics, classification and the competitive advantage of online banking in Lebanon. In the second part, we mentioned other empirical studies about e-banking with findings from which we developed hypothesis and we end chapter with a useful conclusion.

2.2 Definition of online banking

There are various ways to define online banking. According to Daniel (1999), online banking is considered as a means that supplies information and services that a bank offers to its customers through electronic wired or wireless channels. In fact, online banking, electronic banking (e-banking) or internet banking can usually replace one another in the financial sector. Mols (1999) defines E-banking as the latest channel via which banks deliver their services. He stated that the definitions of electronic banking change to some extent from one researcher to another due to the different kinds of services that allow customers the access to information and the performance of many retail banking services through mobile phones, televisions or computers connected to a network. Electronic banking deals with various kinds of services which allow customers easy access to necessary information and banking services. Online banking, according to the definition of the Basel Committee banking supervision, involves the stipulation of retail and small value banking products and services via electronic channels in addition to many other electronic wholesale banking services (Basel, 2003). Mubarak (2007) considered Electronic Banking as the medium to deliver automated, new and conventional banking services and products to consumers by using electronic and interactive communication channels. Internet banking is a system of oriented transactions that can allow customers to

perform online banking transactions. That's how those customers benefit from advanced 24/7 services which are always available, although they can change from one bank to another.

As a definition, IB or online banking is the means that lets consumers carry out banking transactions simply by using a computer connected network (Loyd, 2007). According to Loyd, these services involve balance checking in one's bank account, transferring money between accounts, and paying bills. Lee (2009) defined IB as a channel that delivers banking services from distance by using the internet; and an internet bank as a bank that promotes transactions through internet too. The technologies of E-banking involve financial transactions ranging from ATM which are everywhere to other services like performing direct deposits, paying bills and transferring funds electronically, executing telephone banking and online banking.

This supplementary channel grants each customer and small business better services and more convenience since accounts and transactions can be always accessed from home or work reducing consequently the effort and time needed to go to a bank. Some customers regard this additional convenience as the best way to perform transactions. By using IB, a bank offers a reason for the customer to switch his bank or to stay and even to carry out more transactions with it (Nelson, P. & Richmond, W., 2007).

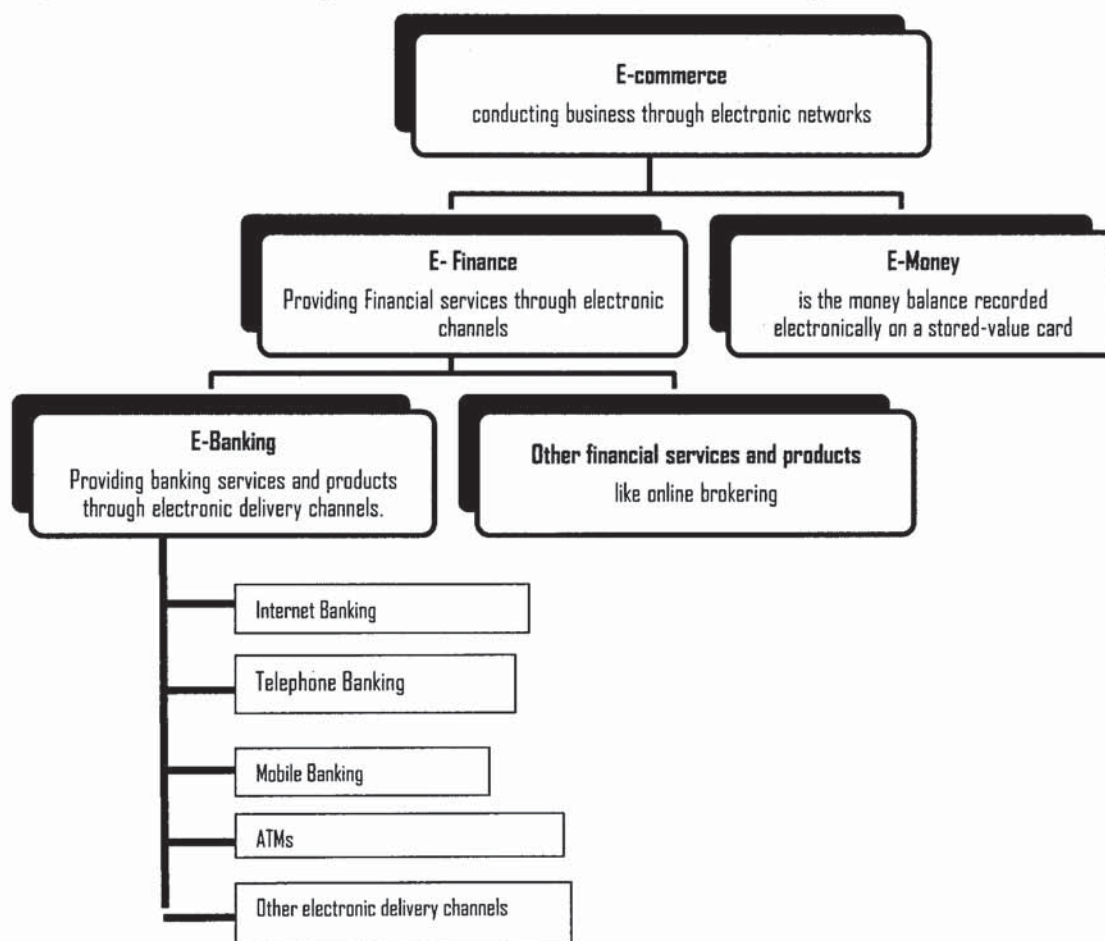
Ramath S. & Hema, (2010) consider that Internet banking, except for cash withdrawals, offers consumers access to most banking transactions by simply clicking on a mouse. In Dube, Chitura and Runyowa's opinion (2009) there are three types of internet banking available in the market and they are: Informational, Communicational and Transactional. E-banking offers various products and services such as (1) Automated Teller Machines, (2) Telephone Banking, (3) Electronic Clearing Cards, (4) Smart Cards, (5) Electronic Funds Transfer (EFT) System, (6) Electronic Clearing Services, (7) Mobile Banking, (8) Internet Banking, (9) Telebanking, and (10) Door Step Banking.

OP papers (2008) shows that internet banking is a practical and safe way to accomplish our banking transactions online by simply using an Internet network. Many products and services that e-banking offers, it has become evident that the more people use the internet, the more dramatically online banking will grow.

Evidently, people's age and the levels of education and income will extremely affect this expected expansion.

Although these online services have appeared since 1995, the growth of the internet banking mechanism has been slow but most customers and observers confirm that it has been progressing steadily. Nowadays, customers in addition to engaging in online transactions, request getting SMS and email messages for all their financial activities and their latest financial updates no matter when or where they need them (Nwobodo, 2011).

Figure 2, shows a brief explanation of what is an electronic banking.



2.3 History of online banking

The word online banking appeared in the 80's and made banking an interesting subject. Back then, even some devices were related to this online banking mechanism and were used to access the banking system once connected to a telephone line such as a workstation keyboard and a television set or monitor. Chase Manhattan, Citibank, Manufacturers Hanover and Chemical, four main banks in the USA, began using online services in 1981. In fact, they used the Videotext system, also known as "Interactive Videotext", in order to deliver home banking services and it was considered as one of the first achievements of an "end-user information system". Using Videotext didn't last as a result of some new technologies that made banking services famous worldwide (Aldrich, 2003).

In October 1994, Stanford Federal Credit Union became the first financial institution in the U.S. to present internet banking to its customers. A year after, Presidential Bank became the first bank in the country to offer customers access to their accounts online. Customers were uncertain about using online banking for different reasons. They didn't trust its security features, were hesitant of how to use it and didn't care to spend an amount of time to start up. After engaging into e-commerce, the idea slowly began to grab on. In 2000, 80 % of banks in USA offered online banking services. In 2001, Bank of America was the first financial institution to reach more than 3 million online banking customers, which was 20 percent of its customers (Woods, 2014).

The Lebanese banking sector was heavily affected by the civil war (1975-1990) eighty percent of the Lebanese infrastructure was destroyed. During this period banks lacked for the information technology revolution in the banking sector. In the end of 1990, in order to face the foreign competition Lebanese banks planned to implement new information technology by providing off-site banking facilities such as ATM. They started to automate their work procedures and database for example Bank Audi has purchased an online information system that provides up dated customer information and an online branch network. In 1993, Arab bank was the pioneer in launching ATMs in Lebanon while other banks followed it in 1994 by establishing a network using link cards (Ghaziri, 1998).

Also, to enter into the world's digital economy, Lebanon in the end of 1997 witnessed the emergence of online banking when Master Card issued a special cash

card that could be used to conduct electronic purchases online. Later, most of the top Lebanese banks started offering secure online transactions (Asmar, 2000).

2.4 Characteristics of Internet Banking

There are two ways to offer internet banking. The first and most common one is through banks known as "Brick and Mortar" banks that establish their own website to be able to transit from rendering traditional banking to offering financial online services. The second one is through virtual banks; in other words banks without a physical location and their services are executed through the internet only (Nwobodo, 2011).

All large banks such as co-operative banks, credit unions, depository institutions and even regional banks are currently providing online banking known as PC banking, Internet / electronic banking or even home banking. These are the "brick-to-click" banks and they differ from Brick-and-mortar banks since these ones still use the traditional ways of banking and they are also different from virtual banks. Among these banks Citibank which is one of the UK most important financial institutions with only four physical locations in the UK. However, it provides banking services to a large number of consumers in London by simply using a well-connected network that services online banking (Furst, 2002) .

The Virtual banks are banks with no physical locations. Through a computer server in a house or an office as a legal address, this type of banks provides transactions. Thus, customers don't need any physical or direct contact with these banks. In fact, virtual banks have no physical location and no bricks appear for customers to see them and understand the way they operate, they should know that they only exist on the Internet. Like other kinds of banks, they follow the same federal regulations and provide the same services as traditional banks but with better online packaging. However, consumers have difficulties in placing their physical complaints to their banks which is the only problem that appears with this type of banks. It should be stated that virtual banks appeared after the first ATMs were installed in the 1970s which pushed the banking industry to offer more mechanized banking services such as phone banking, intranet and Internet banking as well as smart cards (Furst, 2002).

These days, the market benefits from three types of websites or platforms serving the internet banking, and they are the Informational websites, the Communicative websites and the Transactional websites. To begin with, an Informational website is

very simple and basic for internet banking. It permits potential customers to surf the banks sites to get necessary information about them and the way they function. On the other hand, through Communicative websites, users have the possibility to interact with the banks, submit their requests and receive answers from the banks by e-mail. Finally, Transactional websites are considered as the actual internet banking system where all cash transactions take place. This system, in comparison with the communicative and informational ones, is subject to high risks and request maximum procedures of safety and control against hackers and attacks (Hernando, I. & Nieto, M., 2006).

2.5 Goals of online banking

Most Banks find in an online channel the most effective means to offer their services with the best costs. This channel provides as well a solid Return on Investment (ROI). Online banking customers provide 30% more profits than offline consumers and the most profitable among all are bill payers with 100% more profits, based on a research from the Boston Group and many other research firms. According to banks perspective, Internet banking sites should reach many goals that we will summarize them in the following points. They should allow independent revenue to generate new means, create more harmony between revenue generation and other channels, preserve customers, establish new mechanisms and strategies, create a brand, look after it and enhance it, provide offline to online migration and finally decrease costs (Celent, 2009).

Without doubt, the main reason for banks to offer internet services when needed and asked for is profitability. Therefore, banks are interested in profitable products capable of raising their value and creating more profits. As a result, internet banking became a great opportunity for banks to create more profits and decrease their operational costs. Banks that offer internet services provide more profits with less cost, and better revenue once compared with traditional banks. To improve their technologies, banks' expenses in the USA reached \$20 billion per year (Saunders, A. & Cornett ,M., 2008). In their Saunders and Cornett demonstrated that a bank or a financial institution with an effective technological system can lead to:

- Better profitability of market services, especially in retail banking.
- Higher incomes via creating and selling a wider range of financial services to users.
- Modified methods that allow customers to access the bank's services and products.

- Reduced costs by using automated machines instead of paper-based intensive methods.

- The decrease of cost per staff is the reason behind the increase of profits made by banks incorporating the Internet as a delivery channel.

- Despite reducing staff costs, IT and marketing expenses are increasing but at the same time they ensure an important impact on the banks' profits on the long run.

We can identify that these benefits are for banks, but applying E-banking has also an impact on customers and employees. By using this new service, banks provide for their customers a certain number of solutions. First, a “self-inquire” facility that facilitates checking transactions in the account. Second, a remote banking that enables customers to make inquiries online without leaving their offices or houses. Third, the “anytime” banking: installation of ATMs and point of sale (POS) machines. Fourth, Telebanking: a 24 hours service through which customers can make transactions over the phone. Finally, electronic banking provides high value for customers as information is updated and available at all places. This will lead to an effective time reduction waiting at branches (Ghaziri, 1998).

2.6 Drawbacks

The banking sector which led the way for use of electronic systems can offer experiences that show the possible dangers related to e-commerce. It's known that customers have been highly using ATMs and home banking systems away from traditional banking facilities to perform the majority of their financial transactions. This was convenient for banks trying to reduce costs since it was proven that electronic transactions were seven times cheaper than those performed manually by a bank teller. However, the interaction between customers and banks was limited to unsophisticated electronic devices which made it difficult for banks to sell various products to their consumers. This reduced contact may also be escorted with little understanding for customers' needs since they are unable to communicate their requests, comments or criticisms while using machines (Ghaziri, 1998) .

2.7 Factors that affect bank costs

It's known that the two main factors that influence bank costs are the cost of money (what is paid as interest on deposits and other funds) and operational costs (what is paid for IT, buildings, labor, etc.). It's true that internet banking (IB) doesn't

influence the bank's price of funds, but it will increase the amount of funds subject to interests if online banking attracts more customers or encourages current ones to deepen their relationships with the bank when they increase their deposit accounts. The impact of internet banking on operational costs is more complicated. On one hand, with all IT, we can identify fixed costs relevant to IB purchase, implementation and maintenance. On the other hand, total variable cost and fixed cost reductions connected to the replacement of the previous technology are tightly connected to the intensity of using IB. Internet banking transactions cost less than those done via an ATM or teller due to the infrastructure of IB and its "less-paper" nature (Nelson, P. & Richmond, W., 2007).

A study done by *Goldfinger* demonstrates that IB expense rate is one third of traditional banking with a pre transaction cost of \$0.01 for IB versus \$0.27 for an ATM transaction and \$1.07 for a teller transaction. Despite a reduced cost per transaction, if the IB total number of transaction increases due to more transactions per customer or more customers, the total variable may increase too. Moreover, IB may also cause a reduction in the fixed infrastructure costs connected to the number of tellers or branch banks for example if IB transactions are much higher than offline transactions (Goldfinger, 2003). Otherwise, according to Sullivan banks with IB may risk facing more non-interest expenditures (Sullivan, 2000).

2.8 Profitability and performance of banks

The profitability of banks is determined by many factors and is split into two groups: The first group is related to bank managerial decisions (asset quality, revenue diversification, asset structure, size, efficiency, capitalization, and financial structure). The second group involves factors linking profitability to the macroeconomic environment and the industry structure (inflation, interest rates, industry concentration, and economic growth) (Albertazzi, 2009).

Moreover, determinants of bank profitability can be divided into internal and external. The internal ones are considered as factors affected by policy objectives and banks' managerial decisions. The differences in bank management objectives, decisions, actions, and policies are the reasons behind management effects. These differences are clear in the bank operating results, including profitability. Albertazzi (2009) found that the bank performance is tightly related to management decisions

regarding loan portfolio concentration, and the management quality is evaluated according to the senior officers' awareness and control of the bank's policies and performance. In a two year study, he worked out income statement and balance sheet ratios for all the member banks of the US Federal Reserve System. The results showed that most ratios were extremely connected to profitability, mainly capital ratios, salaries and wages, interest paid and received. He also indicated that in order to improve management a guide should focus on fund source management; funds use management and expense management.

2.8.1 Impact of internet banking on Banks' Profitability

Internet banking offers some profitability to banks over their competitors. Furst (2002) discovered that banks with Internet banking are more profitable than the ones not offering this service, thus creating more revenues without interests. Ciciretti, et al. (2009) found a link between the implementation of Internet banking and traditional banks' profitability.

However, some "Internet-only" banks were faced with huge losses, causing them to exit their respective markets; loan procurement needed physical interaction at bank branches that decreased the profits of these banks. This was clearly stated by De Young (2001) showing that Internet-only bank wasn't as profitable as an average branching bank with similar conditions.

2.8.2 Impact of Internet banking on Banks' Performance

Banks initially used Internet banking to increase net income and market share, and to reduce operational cost. However, it's really challenging to identify the effect of Internet banking on banks performance since this performance can be related to profit margins, return on assets (ROA), return on equity (ROE), net income, or marketing and expenditures costs over total average assets. Therefore, results can vary from one to another according to the size and intensity of online activities.

2.9 Online banking: a competitive advantage

Banks' profits will increase when using internet banking all along other investment venues, thus generating revenues by indirectly reducing costs. If IB weren't profitable, customer wouldn't use their services; so higher profits are expected since

internet banking was in the first place introduced as a competitive advantage. Therefore, banks that incorporated IB should expect higher profits than those that didn't. As a result, IB became a necessity for competition in order to allow banks to implement it in a bid to achieve better profits than banks without IB. These banks are more likely to be less profitable since they don't benefit from the competitive advantage of IB (Vrechopoulos, A., & Siomkos G., 2002) . Bank profits result from reduced costs and/or high revenues originating from two sources: fees on services and interest on loans. On one hand, when banks provide IB, they attract more customers who will increase loan revenues especially when they use bank's loan products like credit cards, mortgages and installment loans. In addition, IB encourages current consumers to strengthen their relationships with the bank and use loan products as a result. On the other hand, when IB attracts more customers and encourages existing ones to use fee-based services, it may increase fee revenues. Banks can also benefit by charging for some or all of their IB services. To sum up, revenues increase due to IB whether they result from increased fees or loans and due to IB adoption by the bank's consumers (Woodford, 2001).

2.10 Overview economy in Lebanon

A free-market economy and a prosperous commercial tradition characterize Lebanon. It's true that the government doesn't limit foreign investment but the consequences can't be neglected since the investment environment suffers from bureaucracy, corruption, random licensing decisions, high taxes, tariffs and fees, outdated legislation, and weak intellectual property rights. The Lebanese economy is based on services and the main growing sectors are banks and tourism. The Lebanese economic infrastructure suffered tremendously from the civil war between 1975 and 1990, which also reduced the production to half and put an end to the position of Lebanon as the center of trade and banking in the Middle East. However, Lebanon managed to build once again its infrastructure that was physically and financially damaged by the war through big loans mainly from local banks. In order to reduce the growing public debt, the Rafic Hariri government started in 2000 a strict system to restrain expenses, increase revenues and pass legislations to privatize governmental enterprises; but the results of the economic and financial reform weren't up to expectations and the national debt grew more and more despite the more than \$2 billion offered by the 2002 Paris II Donors Conference as a bilateral

assistance. Later in January 2007, donors met again at the Paris III Donor Conference and offered Lebanon more than \$7.5 billion to help development projects and budget support and required the progress of Beirut's fiscal reform and privatization program in return. The Doha Accord of May 2008 created political stability which, along with a strong banking sector, boosted tourism and led to 7% growth per year in the GDP in 2009-10 although the area witnessed a hold back (Coleman, 2014) .

Lebanon doesn't have oil reserves or natural resources like other countries in the Middle East. However, it has been the center of commerce in the area due to its high level of literacy and its traditional commercial culture. Lebanon has an experienced banking system that is financially well established; in addition to many flexible small and medium manufacturers. (Ghobril, 2006)

2.11 Lebanese banking sector

One of the most dynamic sectors in Lebanon, the banking one, has always surpassed the performance of the other sectors. Historically, the banks owned by the private sector have been the sole players in the national market and not even one bank has been nationalized. Thus, the banking industry in Lebanon, unlike in many other Arab countries, didn't face any competition with governmental entities or monopoly. The Central Bank in Lebanon is considered as the main, conservative and practical regulator of the banking sector. In order to raise this sector up to the standards of the international level, the Central Bank has implemented a number of wise guidelines and regulations (Ghobril, 2006).

The banking sector has played a major role in financing the reconstruction of the country after the war and has been directly affected by the government policies in the last 15 years. This sector also financed the deficits of the government. Moreover, the banks held the portfolio of government securities which reached 29 % of the deposit base at the end of 2004, but their total exposure, including banks' deposits at the Central Bank of Lebanon, was 65% of deposits (Ghobril, 2006).

2.12 Characteristics of Lebanese banking sector

According to BDL annual report Lebanese banks have four major characteristics:

- Free exchange system: Lebanese currency can be exchanged freely with any other currency and no restrictions on foreign and capital earnings.

- Banking secrecy law: All employees in banks cannot reveal what they know about their customers' names, holdings to any party otherwise they will be subjected to many judicial sanctions.
- Tax exemption: Banks offer exemptions from income tax on all interest and revenues earned on all types of accounts.
- Awareness in money laundry.

2.13 Classification of Lebanese banks

In Lebanon banks are classified according to the total customer deposits we have four groups:

- Alpha group includes banks with customers' deposits over 2 Billion USD.
- Beta group includes banks with customers' deposits between 500 Million and 2 Billion USD.
- Gamma group includes banks with customers' deposits between 200 and 500 Million USD.
- Delta group includes banks with customers' deposits under 200 Million USD.

2.14 Profile of banks

According to the association of banks in Lebanon, the number of banks operating in Lebanon reached 73, distributed among 56 commercial banks (There are 32 commercial Lebanese banks, 9 Lebanese banks with Arab control, 8 Arab banks, 4 foreign banks) and 17 investment banks. It adheres to the latest adoption of the international best practices like Basel III, the Basel II ratio was 11.8% in 2013. Due to the dollarization of the economy, one third of the banks' balance sheet is in Lebanese pounds and two third is in dollars. The Lebanese banking sector is very liquid, its deposits reached \$117 billion in 2012 and loans to customers reached \$41 Billion. Eighty four percent of deposits in Lebanese banks are from residents and around 17 % from the Lebanese living abroad. Lebanese banks enjoy the banking secrecy law, and it is in open competition with other countries. The central bank's reserves are at historic peaks more than 30 billion USD without the gold reserves.

In our study we choose top 17 banks that operate in Lebanon : Bank Audi , Bank of Beirut (BOB), Blom Bank, Societe Generale de Banque au Liban (SGBL), Banque Libano-francaise (BLF), Credit Libanais (CL), Banque of Beirut and the Arab countries (BBAC), Fransabank, BankMed, Byblos Bank ,Creditbank,

Intercontinental Bank of Lebanon (IBL) , First National Bank (FNB) , HSBC Middle east limited , Lebanese Swiss bank , Federal Bank of Lebanon and Al-Mawarid Bank .

2.15 Competitive advantage of the Internet for the Local Banks in Lebanon

According to the literature, the banking sector witnessed an essential transformation due to the expansion of the internet. Therefore, e-banking is seen as a rapidly progressing phenomenon and is expected to change the traditional banking industry. The banking sector cannot be considered as a model of innovation since its ways of doing business, tradition and goodness have been the factors that brought pride to this sector (Charbaji, 2005).

Wang et al., in 2003 said that traditional retail banking based on branches is the most common way of performing banking transactions worldwide. Consequently, all Lebanese banks, providing e-banking services like most international banks, must familiarize with the banking language of the future. They should understand the supply factors as well as demand that will inevitably influence the increase of internet banking usage in Lebanon.

The truth is that the Lebanese market is currently launching “e-businesses” and some local banks have established their personal websites to provide “24/7” online services. The implementation of this friendly technology has recently become a very common way used by banks to offer traditional banking services to customers. However, it has become imperative to know if internet banking will put an end to branch banking.

Internet banking in Lebanon with its computerized banking services is providing a variety of transactions ranging from ATM to personal e-cards. Lebanese customers will enjoy the opportunity of staying home while discovering the new banking services.

In general, the number of branches of local banks offering online banking in Lebanon didn't change in the past few years. This could be related to the fact that internet banking was only a part of the activities offered by branches. It's obvious that the slight change in the number of branches didn't match the changing level of banking transactions which matches the ideas mentioned in an earlier research stating that the Internet banking could be considered as another distribution channel. In fact,

Internet banking will not put an end to branch banking; it only explains the need to train employees continuously (Charbaji, 2005).

2.16 Deriving research questions and hypothesis development

2.16.1 The effect of online banking (transactional website, mobile banking, phone banking) on the profitability of Lebanese bank: Previous Studies and Hypothesis Development

According to Elysian and Mehdian, profits in the U.S. banks are the result of the technological progress. On the other hand, England et al. (1998) and Sullivan (2000) couldn't establish a convincing proof that shows the gains of Internet banking in U.S. Brick-and-Mortar banks. However, Altunbas et al. (1999) offer evidence regarding productivity profits and cost reduction due to technological advancements in European Union banks. At the same time, Jayeward and Foley (2000) show that Internet banking generates costs and efficiency profits for British banks. Simpsons finds that e-banking operations are mainly targeting the reduction of operational cost and the increase of operating revenue. He sets a comparison of Internet banking in emerging and developed markets based on data from 17 banks in the U.S. versus 40 banks in emerging markets and shows that reduced costs and better revenues are obvious in developed markets. Later, a study by Furst et al. (2002) shows that banks in the federally chartered U.S. benefit from a higher ROE if the business model of the click and mortar banks is applied. Yet, some authors came to the conclusion that since 2002, Internet banking didn't play a major role in banks profitability. Claessens et al. (2001) state that e-finance offers important opportunities to emerging countries albeit their poor financial structures and systems. These countries can profit from the right to use new technologies to establish their financial intermediation infrastructure:

"E-finance permits countries to build a financial system even in the absence of a financial infrastructure fully operating. Since e-finance is a lot cheaper, it reduces switching costs and search for consumers, and processing costs for providers, the latter can supply financial services related to smaller transactions to borrowers with lower-income even in distant areas. Furthermore, the government's key role is to improve the necessary environment."

Claessens et al. (2002) add that the most vital matters will deal with setting the convenient environment for e-finance; which is providing regulatory and other structures to enforce contracts, privacy, and information as well as security and the public infrastructure when dealing with telecommunications. The development of the financial sector in emerging countries can also profit to a certain extent by reducing costs, maximizing the size and quality, and increasing the access to financial services. Claessens et al. (2002) state that the change at the end will leads to a decrease in revenues because of the margins with lower interests, fees and commissions.

The study of Hernado and Nieto 2006 attempts to identify and estimate the impact of the adoption of internet banking on banks' profitability by using a sample of 72 Spanish commercial banks over the period 1994-2002. They found that the adoption of the Internet as a delivery channel has a positive impact on banks' profitability (ROA and ROE) after one and a half years, mainly explained by the lower overhead expenses and, in particular, staff and IT costs after the same period.

Based on above literature we will derive the below hypothesis.

H1: Adoption of online services has a significant effect on the profitability.

2.16.2 The impact of online banking (Transactional website, phone banking, mobile banking) on performance of Lebanese Banks: Previous Studies and Hypothesis Development

Many studies have deduced that controlling expenses is the main determinant of bank performance since expense management is a primary and reliable opportunity for profitability improvement. The efficient use of labor is considered as a key determinant of relative performance due to the large size and differences in wages and salaries. Logically speaking, staff expenses are supposed to be inversely related to profitability since these costs decrease the "bottom line" or the bank total operations. The study of Atlumbas (1999) proved a positive relation between total profits and staff expenses. He implies that high profits earned by firms in a regulated industry can be fitted in the form of higher payroll expenses. External determinants of bank profitability are related to the factors that are not affected by the specific decisions and policies of the banks, but by the events that are irrelevant to the bank.

Many of these determinants are separately integrated while examining the bank performance in order to isolate their influence from that of bank structure to clearly determine the influence of the formers on profitability. A study by De Young et al. (2007) examines the U.S. community banks market in order to look into the influence of Internet banking on bank performance. Therefore, they set a comparison between the performance of the brick and mortar banks and the click and mortar banks which have over three-year period of transactional websites. The results suggest that Internet banking enhanced the profitability of the banks by increasing the revenues resulting from the charges on deposit services. An increase in the use of brokered deposits as well as higher wages for the employees in click and mortar banks due to the movement of deposits from checking accounts to money market accounts was also noticed. Although there were no changes in the loan portfolio mix, their results verify that of Hernando and Nieto (2007). In his study, Toufaily (2009) examines the structural, strategic and organizational, structural factors that can affect the adoption of E-banking innovations in the Lebanese banks. He found that the organizational variables like bank size, technical staff, infrastructure, functional divisions have significant impact on the adoption of E-banking. From the structural factors, the relative advantage of innovation and the internal technological environment have also an impact on the adoption. The degree of international operation related to the strategic factors was also found to be positively significant to the adoption of e-banking (Ciciretti, Hasan, & Zazzara, 2009). Their study offers a more lucid measure of this variable by dividing Internet banking into separate categories according to the bank online services. Their analysis illustrates that the positive influence of Internet banking on performance.

Based on the above discussion, the second hypothesis is proposed:

H2: There is a significant influence of online banking (INTERNET¹, INTERNET², INTERNET³, and INTERNET⁴) on performance as measured by CDBRANCH, LTCBRANCH, and PRBRANCH.

2.16.3 The effect of number of branches on the performance of Lebanese banks:

Previous Studies and Hypothesis Development

Hernando and Nieto (2006) considered Internet banking as an additional channel to traditional banking. They estimated the influence of adopting a transactional website on more than 70 Spanish banks between 1994 and 2002 and discovered a gradual

decline related to overhead and staff expenditures resulting from the adoption which they link to improved bank profits. Their findings also show an interval of 18 months in this effect and they point as well to the fact that Internet banking is considered as an additional channel for delivery not as an alternative that replaces brick and mortar branches. Also, Onay and Ozsoz (2013) demonstrate that in turkey the adoption of internet banking has a positive impact on profits, loans and deposits per branch. In their study, they took a sample of 18 banks in turkey that use internet banking during the period of 1990 and 2008; they analyze the impact of the adoption of Internet banking on the performance of banking sector in turkey. They confirmed that internet banking facilitates branch activities and internet banking is a complement not a substitute for branches.

Based on these two studies, the following hypothesis is proposed:

H3: The internet banking is a complement and not a substitute for branches.

2.17 Other empirical studies about online banking:

In fact, there were few studies conducted and they were related to the evaluation of bank performance after banking systems in developing countries adopted Internet banking. Due to available data, most studies focus on U.S. and European banking systems. Centeno (2004) is the pioneer in examining the adoption of Internet banking by the 'Acceding and Candidate countries' (ACCs) in the European Union. His study focuses on the elements that affect the banks decisions related to the adoption of Internet banking. In his opinion, Internet banking adoption factors can be divided into two categories: 1) the factors related to infrastructure and technology and 2) the factors relevant to specific retail banking. The first category involves the rates of Internet access, the skill level of customers using the Internet and related technologies, in addition to attitudes regarding privacy, technology, and security concerns. The second category includes the Internet banking push, e-banking culture, banking culture, and trust in the banking institution. A lack of PC and Internet access are still an entry obstacle for the progress of Internet banking in EU15 as well as ACCs according to Centeno (2004). In Central Europe and Eastern Europe countries, the cost of access to services is a major issue for PC and Internet penetration. Gurau (2002) has the same conclusions regarding the banking system in Romania where there are outside factors like the entry of foreign banks in the adoption process. In Lebanon there is no study that examines the impact of online banking on banks'

profitability. There was a study conducted by Arnaout 2015 that examines the factors that affect the adoption and acceptance of the technological advancement and internet system in the banking sector in Lebanon. It concentrates on the factors that determine the customer behavior while applying this new service. It illustrates the extension of two theories: The Technology Acceptance Model (TAM) and the Theory of Planned Behavior and Trust. Quantitative approach was used in this paper to test hypothesis. The primary data was collected from the surveys filled by bank customers; then qualitative research was used to analyze the results. The variables in this study were: trust, intention, and perceived ease of use, attitude, perceived behavioral control, subjective norms, and perceived usefulness. This research focuses more on customer behavior toward online banking. The perceived behavioral, subjective norms, perceived usefulness and attitude have positive and significant impact on intention. The trust has positive and significant impact on intention, attitude, perceived behavioral control and subjective norms. Moreover the perceived ease of use has positive and significant impact on perceived usefulness, trust and attitude. This study is similar to Al-fahmi 2012 study for Malaysian banks.

2.18 Conclusion

In light of the above literature, it is clear that the new generation of internet banking technologies creates opportunities as well as challenges. Many research papers in developed countries have shown that the adoption of online banking has a positive impact on their profits, deposits and loans. Major operational activities are depleted from branches; employees and branch managers are focusing on collecting deposits and generating loans. Lebanese banks have rapidly introduced this new technology to compete with international banks so, it is important to know if the adoption of this new technology will have a positive or negative impact on Lebanese banks profitability.

Chapter 3

3 PROCEDURES AND METHODOLOGY

3.1 Overview of chapter

This chapter will help the readers to understand the methodology process used in this study. It includes the research process, research method, research approach and research design adopted, followed by sections on the data collection method, sample selection, selected variables, type of statistical test, and the data analysis approach undertaken in this study. Motivations and justifications have been given for all adopted methods in this study.

3.2 Introduction

Researchers have found that internet banking influence the strategy and performance of banks. It's obvious that almost all banks performing online transactions organize them along with the bank branches as part of a click-and-mortar business model. To understand better the importance of this new technology, we can consider a business model of Internet-only banks which perform without physical branches as a good starting point to comprehend the possible influence of the Internet on the bank performance. The strategy of the Internet-only banking model is based on eliminating the branch offices in order to decrease the overhead expenses – mainly the manpower needed to operate the branch offices where online banking is shifting work and automated processes from the bank to the customer. This decrease allows the Internet-only bank to have a hypothetical advantage to compete with other banks by offering customers lower fees and loan rates, and higher deposit rates which will stimulate a rapid growth and consequently considerable scale economies. According to this business model, Internet banking is a process of innovation performing in the first place as a replacement for physical branches for offering banking services. The Internet-only model is viewed as an extreme one (all clicks, with no bricks). However, its main principle related to the reduction of the overhead costs could be simply embraced by banks changing from the brick-and-mortar to the click-and-mortar model as long as this change is allowing the Internet channel to replace the branch channel to some extent. That's why click-and-mortar banks are expected to run less branches, decrease labor fees, take lower interest rates on loans and/or

charge less fees, pay better interest rates on deposits, and expand faster comparing to traditional brick-and-mortar banks. Today, customers are making major banking operations without going to branches; this can imply that in the long term online banking will substitute branches. Previous studies have shown that online banking affects banks costs and profits so is the core of our study that answers these major questions by using profitability ratios and looking at the variation of deposits and loans.

The objective of this study is to determine the impact of online banking on banks profitability. Based on literature from chapter 2, the research frameworks were identified to include variables that might have an influence on the adoption and usage of Internet banking services in Lebanon. Hypotheses were formulated to investigate the impact of these factors using data collected from financial statements of Lebanese banks. This study attempts to provide a better understanding of the relation between bank performance and internet banking adoption and usage in Lebanon.

3.3 Research philosophy

As business researchers we need to be aware of the philosophical commitments we make through our choice of research strategy since this has a significant impact on understanding what we are investigating. There are two types of philosophical dimension, a positivistic paradigm and a phenomenological paradigm. The purpose of research in both approaches is to understand better the actions of institutions or individuals and to analyze the influence on each other.

- Positivism approach: In positivism the role of the researcher depends on data collection and the interpretation is through objective approach and the research findings are quantitative. Also, the researcher is independent form the study and there are no necessities for human interests within the study. The positivism approach relates to the perspective that the researcher needs to focus on facts and consider the world to be external and objective. (McKenzie, Powell, & Usher, 2005)

- Phenomenology approach: The Phenomenology approach is based on experiences, events and occurrences with disregard or minimum regard for the external and physical reality. The ideas are generated from large amount of data by relying on induction and human interests. In addition, the stakeholders' perspectives may have their reflection on the study. In other words, the researcher is subjective. (McKenzie, Powell, & Usher, 2005)

It is evident that our study is within the positivistic approach rather than the phenomenological approach, as the study intends to have an overview of the current situation of the adoption of online banking. In addition, the research is carried out through financial ratio valuations and through statistical tests. The hypotheses were formulated by using a logical reasoning to the findings of other studies. These hypotheses will be tested with data collected from financial statements of banks that we found in annual reports and BILANBANQUES book using variables based on similar prior studies.

3.4 Research Approach:

The selection of research approach is very important because it helps the researcher to formulate a better idea about research design, which is more than the methods by which information is collected and analyzed (Saunders, Lewis, & Thornhill, 2009). Figure 3 summarizes some of the major differences between deduction and induction.

Deduction approach	Induction approach
- scientific philosophy	- gaining and understanding of the meanings humans attach to events
- moving from theory to data	- a clear understanding of the research framework
- the collection of quantitative data	- the collection of qualitative data
- the use of controls to ensure validity of data	- a more flexible structure to permit changes of research emphasis as the research progresses
- researcher is independent	- researcher is part of the research process
- a highly structured approach	
- the essential of selecting samples with sufficient size in order to generalize conclusions	

Source: Research Methods for Business Students, Pearson Education 2009

The inductive approach is concerned with the generation of a new theory emerging from data. In other words, it is moving from a specific observation to a broader generalization and theories, on which the conclusion is premised. With induction, data are collected and a theory developed as a result of the data analysis. However, the deductive approach aims at testing the theory. It works from the more general to the more specific where the conclusion is based on available fact. Scientific research is highly related to deduction. In fact, it's related to the progress of a theory that is meticulously tested. Accordingly, natural sciences rely on this main research approach where laws permit the expectation of phenomena, predict when they are taking place which allows controlling them and offering the necessary explanation. According to Lewis (2009), deductive research progresses through five chronological phases: deducing a hypothesis (a testable suggestion concerning the connection between variables or concepts from the theory); stating the hypothesis in operational terms (which shows how to exactly measure the variables or the concepts), which suggests a relation between two precise variables or concepts; testing this operation ; checking the specific result of the inquiry (that will validate the theory or show the need to modify it); altering if necessary the theory according to what was found (Saunders, Lewis, & Thornhill, 2009).

This study starts with a description of online banking and profitability of banks and then the focus is on the Lebanese market. Its main objective is to test the cause-effect relation between online banking and the profitability of the Lebanese banking sector. This study will formulate hypothesis to be tested statistically and will compare and analyze data to either accept or reject the hypothesis. The hypotheses will be tested using a regression model formed of financial ratios (ROA, ROE, BRPROFIT, CDBRANCH, LTCBRANCH, ASPB, CD/TA, LTC/TA, CTI, NII/OE, NI/TI, and TII/TA) in order to reach a conclusion. Therefore, this study will adopt a deductive approach.

3.5 Research Design:

A research design is a means to answer a research question, a way to test the hypothesis. Choosing design researchers is related to the hypothesis, the research question and certainly the goal of the research. That's why the selection of the research design is a major step in the research procedure. Exploration, description

and explanation are the three important objectives of business research. (Saunders, Lewis, & Thornhill, 2009)

Researchers conducting explorative research try to discover phenomena which are not completely understood and they often attempt to discover satisfying explanations. On the other hand, the goal of descriptive research is to show reality. However, explanatory research goes beyond that and tries to find the causes relating the variables tested in the study. To reach that goal, three conditions are needed:

- The cause needs to come before the effect,
- No other variables explains the outcome,
- The two variables must co-vary.

Explanatory studies look for explanations for the nature of relationships between variables. The hypothesis tested provides an understanding of relationship that exists, and this research emphasizes on studying the causal relationships between variables of online banking and profitability of Lebanese banks, so the research design will be in form of an explanatory study.

3.6 Research strategy

According to Saunders, Lewis, & Thornhill (2009) the following research strategy could be: survey, experiment, action research, case study, archival research, ethnography, or grounded theory.

- The survey strategy is frequently related to the deductive approach. It's a common strategy in management research and business. It's usually answers the questions who, where, what, how and how much. That's why it's used for descriptive and exploratory research. Consequently, it permits the gathering of a considerable amount of data from a substantial population in a very economical way.
- Experiment is a kind of research based on natural sciences, even though it appears enormously in social science research such as psychology.
- Action research is the implementation of techniques of psychological and social research to determine social problems in a community or a group including effective participation of investigators in order to solve these problems. This procedure includes investigation relying on activity not on theoretical response.

- Case study is in fact a strategy for carrying research which includes experimental investigation of a specific current phenomenon from real life by using various sources of evidence.
- Ethnography is strongly present in inductive approach and its goal is to clarify and describe the social world of the research subjects from their points of view.
- Grounded theory is simply considered as the best example of the inductive approach. It mainly helps in conducting research to predict and explain behavior, by focusing on the building and developing theory.
- Archival research mainly uses documents and administrative records for data. It's true that the word archival is related to history but it can also be connected to recent and historical documents at the same time. The strategy relying on archival research offers answers to research questions focusing on the past and the changes over time. This research is usually more complicated and needs more time than internet and library research since it faces more challenges related to specifying, locating and analyzing relevant documents. The data obtained are known as fixed data and because they are the result of completed activities they don't change. Therefore, original data can be used in case statistical experts have already processed Archival data. This thesis uses archives as a supply of information, since we collect Data from financial statements of Lebanese banks.

3.7 Research method

In general, the collection of information analyzed numerically, tables and graphs as well as results that are presented and based on statistics characterize the quantitative research methods.

The objective of the quantitative research method is the testing of hypotheses already determined and producing general results. Based on statistics, the outcome of quantitative analysis can verify or rebut hypotheses related to the influence of a disaster and the resulting needs of the population in question. Therefore, scientific measurement is crucial to quantitative research. Since quantitative data is based on numbers, it's more common to collect and analyze data from representative samples. Most of deductive approach emphasize on the collection of quantitative data. The research method employed in this study is quantitative research since it highlights quantification of the data collection and analysis.

3.8 Selected variables

To test the hypotheses, a multivariate regression model will be built in order to assess the effect of online banking on profitability of Lebanese banks. We use the following statistical approaches:

-A cross section analysis of the regression models using a two-step instrumental variable approach (*IVREG*). This method fits the model by two stages least square and it is equivalent to direct variable estimation when the number of instruments is equal to the number of predictors.

- Estimations are first reported with OLS (Ordinary Least Squares) with cross-section fixed effects, using firm level clustering as in (Petersen 2009). We had the choice in clustering by “Year” or by “Firm”, and we opted to report clustering by “Firm”, as result have shown to be more consistent.

- Stepwise regression is includes regression models in which there is an automatic selection of significant independent variables. Stepwise regression can be achieved either by eliminating predictor variables that are not statistically significant.

Table 1, summarizes all variables used to build the model. In our study we follow an empirical model based on previous works by and Nieto (2006), Deyoung (2007), and Onay and Ozsoz (2013) where we defined bank performance as follow:

$$\begin{aligned} PERFORM_{it} = & \alpha_0 + \beta_1 INTERNET_{in}^1 + \beta_2 INTERNET_{in}^2 + \beta_3 INTERNET_{in}^3 \\ & + \beta_4 INTERNET_{in}^4 + \beta_5 BRANCH_{it} + \beta_6 ASPB_{it} + \beta_7 CD/TA_{it} \\ & + \beta_8 LTC/TA_{it} + \beta_9 CRISIS_{it} + \varepsilon_{it} \end{aligned}$$

In the above regression equation we define proxies of online banking as $INTERNET^1$, $INTERNET^2$, $INTERNET^3$ and $INTERNET^4$, the control variables are $BRANCH$, $ASPB$, CD/TA , LTC/TA and $CRISIS$.

Where,

α_0 : intercept, fixed effect, regression slope.

$\beta_{1...n}$: is the coefficient for each variable n

ε_{it} : The mean zero, standard error.

$PERFORM_{i,t}$ refers to the performance of bank i in year t : we use the following indicators as performance criteria:

ROA is the return on average assets for banks in the period t

ROE is return on average equity for banks in the period t

TIITA is total interest income to total assets for banks at time t

NIIOE is none interest income / Operating expenses at time t

BRPROFIT is profit per Branch calculated as logarithm of Total Net profit/total number of branches

CDBRANCH is customer deposit per branch calculated as log of Customer Deposit / Total number of branches.

LTCBRANCH is loan to customer per branch calculated as log loan to customer/Total number of branches and CTI is Cost to income ratio.

Table 1: Data definitions

This table presents a summary about all data used in this study, the source of this variables is BILANBANQUES and annual reports of banks.

Abbreviation	Definition
ROA	Return on Assets
ROE	Return on Equity
BRANCH	Number of Branches
LTC	Loan To Customer in Million USD
LTCBRANCH	Loan to Customer Per branch calculated as logarithm of loan to customer / number of branches
LTC/TA	Loan to Customers over Total Assets
CD	Customer Deposits in Million USD
CDBRANCH	Customer Deposit Per Branch calculated as logarithm of customer deposits / number of branches
CD/TA	Customer Deposits over Total Assets
STAFF	Number of Staff
ASPB	Average staff per Branch calculated as number of staff/number of branches
CTI	Cost to Income (%)
NETPROFIT	Net Profit in Million USD
BRPROFIT	Profit per Branch calculated as log of (Total Net profit/total of No. Branches)
OE	Operating Expenses in Million USD
TA	Total assets in Million USD
TII	Total interest income In Million USD
TII/TA	Total interest income to Total Assets
NII	None interest income Million USD
NII/OE	None interest income / Operating expenses
INTERNET ^j _{in}	j = type of IB i= bank n= previous year
CRISIS _{i,t}	i= bank t=year of crisis

3.8.1 Independent variables:

Based on the work of Hernando and Nieto (2007) and Onay and Ozsoz (2013) we define a matrix of dummy variables $INTERNET^i_{j,n}$, that are defined based on type and year of adoption of internet banking.

$INTERNET^1_{i,n}$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise .

$INTERNET^2_{i,n}$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours , SMS alerts , and an informational website in the previous year and 0 if otherwise . $INTERNET^3_{i,n}$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise.

$INTERNET^4_{i,n}$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if not. The coefficient of these dummies will reflect the link between online banking and overall bank performance.

We employ $CRISIS_{i,t}$ as dummy variable that is equal to 1 if there a systematic banking crisis at time t and 0 if not . We employ this variable as in Lebanon politics and the war in some Middle East country has an impact on the performance of the financial system.

3.8.2 Dependent variables:

The key determinants of profitability of commercial banks are various and numerous in nature. The deposits, Loans, assets, exchanges rates, liquidity, and inflation have a direct impact on the profitability and performance level. Two of the most common method to measure profitability are return on average assets and return on average equity. In our study, several financial performance measures are used in our study: profitability ratios, financial ratios, operational performance.

Profitability Ratios: Return on Average Assets (ROA) and Return on Average Equity (ROE).

ROA: Return on Average Assets: Net income / Average Assets. It gives a detailed idea of how a company uses its fixed assets to produce incomes. A measure above 1% is considered strong.

ROE: Return on Average Equity: $\text{Net income} / \text{Average Equity}$. It gives detailed information of how much income a company makes with the total shareholders' money invested. A measured above 10% is considered strong.

These ratios are used to evaluate the bank capability of meeting its short debts obligations. It gives us a clear view on organization performance and a clearer picture of organization health. When Profitability Ratio gives a higher value this imply that the bank is strong enough to clear its short-term debts it acquired.

Based on the based on study of Onay and Ozsoz (2013) and Hernando Nieto (2006) we use the following variables as dependent variables to measure bank Profitability

ROA: Return on Average Assets Calculated as $\text{Net Profit} / \text{Average Assets}$.

ROE: Return on average equity Calculated as $\text{Net Profit} / \text{Average Equity}$.

Based on study of Onay and Ozsoz (2013) we build our model and consider the following variables as performance ratios:

TIITA: Total interest income to Total Assets.

NIIOE: None interest income / Operating expenses.

BRPROFIT: Profit per Branch calculated as \log of Total Net profit/total of No. Branches

CDBRANCH: Customer Deposit per Branch Calculated as \log of Customer Deposit / Total number of branches.

ASPB: calculated as logarithm of total staff over number of branches

CTI: cost to income ratio calculated as none interest costs over total net revenues

3.8.3 Control variables

In this research, only online banking variables will be employed, but in order to make the results more accurate, a control variable will be used as well. Referring to a research conducted by Onay and Ozsoz (2013) we use the following variables as control variables:

CD/TA: Customer Deposit over Total Assets

LTC/TA: Loan to Customer to Total Assets

ASPB: Average staff per branch calculated as logarithm of total staff over number of branches

BRANCH: Number of Branches calculated as logarithm of total number of branches

3.9 Methodology used

3.9.1 Sample selection:

Our study focuses on 17 Lebanese commercial banks during 10 years from 2004 till 2013, a period in which Internet banking is relatively a new experience. According to Association of banks in Lebanon 2013 there were 32 Lebanese commercial banks as of 2013, we limit our study to the first top 17 commercial banks, 13 from alpha and 4 from beta group. We restrict our sample to Lebanese banks that offer Internet banking services.

The banks chosen stand as the biggest and most profitable banks in the banking Industry. The total assets size of banks in our sample represent 90% percent of the total Lebanese banking sector as of 2013. According to Moody's the 17 banks were rated as B, they have similar services and offer similar products so assets and liabilities composition will be homogenous. The total number of observation that will be utilized is 170. Table 2, list all the banks considered in this study with details on groups, size and years of first launching their online banking services.

The year of adoption of transactional website is mentioned in table 2 , Byblos bank , BLF , credit Libanais , Blom Bank and bank of Beirut have launched this website in 2008 while Bank Audi and Fransabank in 2009 , SGBL , BBAC, and BankMed in 2010 and all remaining banks in 2011. From this table we can identify value of INTERNET³ and INTERNET⁴. This table also includes the year of adoption of mobile application for Lebanese bank. We found that Bank Audi, Bank of Beirut, Blom Bank, BLF, Credit Libanais and Fransabank are the pioneers in launching the mobile application on Apple store and androids Play store. In 2012 SGBL and Creditbank launched mobile application in 2013 and all remaining banks in 2014.

Table 2: List of Banks, establishment dates, total asset size, classification and years of adoption of online banking services

This table shows the list of the seventeen banks that our study focuses on. In the first column the bank name, in the second their establishment dates, the third shows the classification group they belong to, the fourth column reveals the total assets as of 2013 in Million USD; the fifth column shows the adoption year of transactional Website and the last column, the adoption year of mobile banking, in the sixth column the year of launching mobile banking and in the last column, the number of mobile application downloaded.

Banks	Established in	Classification of Banks	Total assets (Million USD)	Year of adoption of Transactional Website	Year of launching Mobile banking	Estimated Number of apps downloaded
Bank Audi	1962	Alpha	36,191.283	2009	2012	20,000
Bank of Beirut	1963	Alpha	13,616.869	2008	2012	1000
Blom Bank	1951	Alpha	26,148.652	2008	2012	20,000
SGBL	1953	Alpha	13,010.956	2010	2013	20,000
BLF	1967	Alpha	11,031.692	2008	2012	20,000
Credit Libanais	1961	Alpha	8,359.701	2008	2012	10,000
BBAC	1956	Alpha	5,107.292	2010	2014	N/A
Fransabank	1921	Alpha	16,964.386	2009	2012	10,000
BankMed	1950	Alpha	13,790.395	2010	2014	2,000
Byblos Bank	1959	Alpha	18,485.087	2008	2013	20,000
Creditbank	1981	Alpha	2,643.200	2011	2013	2,000
IBL	1961	Alpha	4,747.714	2011	2014	2,000
FNB	1994	Beta	3,547.878	2011	2014	200
HSBC ME	1946	Beta	1,085.164	2011	2014	N/A
Lebanese swiss	1962	Beta	1,501.881	2011	2014	N/A
Federal Bank	1952	Beta	814.723	2011	2014	N/A
Al-Mawarid	1980	Beta	1,695.277	2012	2014	N/A

3.9.2 Sources of Data

Our dataset is drawn from “*Bilanbanques*” book that include the ranking of groups banks according to size , Market Shares, the consolidated balance sheet and income statement for all bank operating in Lebanon and from the annual reports of banks to derive value of dummy variables . Our data are considered as secondary data since they are financial data and we get them from banks’ financial statements and annual reports.

3.9.3 Data Analysis

A quantitative method of data analysis will be used in this research. This method involves descriptive statistics and multivariate regression analysis. An advanced statistical program “R” will be used to conduct all statistical analysis. “R” program is open source software, more elaborate and advanced then other commercial packages. It provides an implementation for a wide variety of statistical methods, linear and nonlinear techniques, classification, clustering, regression etc. Also, we used SPSS software will be used to conduct the stepwise regression.

To analyze the means, medians, standard deviations, skewness and kurtosis of the selected variables, descriptive statistics will be used. It's necessary to check for multicollinearity since INTERNET¹, INTERNET², INTERNET³, INTERNET⁴ are substitutes of online banking. When one or more exogenous variables are highly connected, multicollinearity takes place. Perfect multicollinearity shows that one independent variable is completely linear to any other independent variable while imperfect multicollinearity implies that the relation between two or more exogenous variables is very strong and can influence the coefficients' result of the model.

To be able to test for the multicollinearity between the independent variables in this study, it is necessary to study the Pearson correlation among INTERNET¹, INTERNET², INTERNET³, INTERNET⁴, CRISIS, CD/TA, LTC/TA, ASPB, and BRANCH. The Pearson correlation measured how strongly two variables are related to each other. It assumes that the relationship between two variables is linear it can range from -1 and 1. If the coefficient is -1 or 1 the two variables change jointly. Zero indicates that there is no relationship between two variables. Usually two variables that are correlated at more than 0.9 will create problem of multicollinearity but variables correlated at less than 0.8 will not pose a problem (Katz, 2006).

Many models for multivariate regressions between the dependent variable(s) and the independent variables will be assessed to check the effect of online banking on the profitability of Lebanese banks. It is necessary to determine the coefficient of determination (R^2) which is the ratio of the explained sum of squares to the total sum of squares while checking the fit of a regression model. R^2 have a value between 0 and 1, so the regression fits better the data when the value is closer to 1. R^2 also determine the percentage of the variation of the dependent variable that is clarified by the independent variables (Studenmund, 2011).

3.10 General and moral concerns

Ethical issues within businesses have raised concern and showed an important and attractive flow of management studies in recent years (Crane, 1999).

Ethical means the right manners affecting the rights of those who are the focus of your work, or influenced by it. It is expected that this research, using a quantitative method, includes some ethical concerns in contrast with qualitative studies (Saunders, Lewis, & Thornhill, 2009).

While conducting a research, many ethical concerns are present such as data collection, reciprocity and reliance, processing and safety, affiliation and inconsistency of concern (Bell, 2011).

Certainly, the only purpose of the data is to be used moderately and legitimately for the project. These data are completely and exactly gathered in a way to avoid subjective selectivity and without omitting any figures. Moreover, the data can be checked online and therefore they are transparent. Honesty is an important characteristic used to report and analyze the results in order to maintain objectivity. However, there are no subjects in this research so there won't be dishonesty and reciprocity problems. Eventually, inconsistency of concern and the problem of affiliation don't exist since no endowment will be obtained.

3.11 Conclusion

This research is quantitative based on positivism with a standing point of objectivity. Since this study starts with a description of online banking and profitability of banks and move to the Lebanese market, therefore it will follow a deductive approach. The research design will be in form of explanatory study since it take into consideration

the effect of online banking on Lebanese banks' profitability. The data collected for both online banking and profitability proxies were gathered from *Bilanbanques* and annual reports; hence, the research is based on archival strategy. It was obvious that the study respected all the ethical and moral concerns by ensuring that there is no harm to applicants, lack of informed consent, offense of confidentiality and dishonesty. To study the impact of online banking on Lebanese banks' profitability, regression models were built and will be tested in the coming chapter.

Chapter 4

4 FINDINGS AND DISCUSSION OF THE RESULTS

4.1 Introduction

This chapter will discuss the results of the regression and analyze its findings. In order to analyze the data and get answers to the hypotheses mentioned above, multiple regression analysis is used as well as descriptive statistics to find normality. As for evaluating the presence of multicollinearity in the models, we will run a Pearson correlation test and the findings of the regression models will be shown below. Moreover, a discussion of the results and the verification of hypotheses will be carried out.

4.2 Descriptive Statistics

Table 1 below shows the results of the descriptive statistics that are applied to check for normality. Total number of observations is 170. Of all 17 banks the mean ROA has been 0.8% less than 1% as opposed to 4 and 5 % for their European peers. ROE was at 13%. The maximum and minimum of ROE and ROA for each bank has been listed in appendix A and in appendix B. Additionally the mean ROA and ROE before and after usage of internet banking for some banks is reported in appendix C. ROA has a minimum value of -6.79% in 2005 for AL-Mawarid bank while ROE in 2010 with was -50.40%. The Maximum ROA was 2.2% in 2007 for Bank Audi with ROE at 64.5% in 2011. Furthermore, this sample data has an average Loan-to-Assets ratio of 27.9 % and an average of Customer Deposit to Total Assets of 82.8%. The average profit per branch is 66.610 Million USD. The average staff per branch is 23.12. The average Cost-to-Income is 57.9%. The average of Non-Interest-Income is 57.3%. Additionally, we find the standard deviation for majority of variables to be fairly small. ROA, CDTA, TIITA have lowest standard deviation 0.009, 0.060 and 0.009. Data is therefore well clustered around the mean.

The small variability seen in the data, is actually a characteristic of Lebanese banks and their relatively close performance due to their high dependence on Lebanese government securities.

The average staff per branch (ASPB) and number of branches (BRANCH) has their highest values at 10.050 and 3.123; this explains the differential across bank sizes.

The Skewness measures the level of non-symmetry. If the Skewness is close to zero, the distribution of data is symmetric. A negative value indicates that the tail of distribution is skew to left side while a positive value indicates that the tail of distribution is skew to the right side.

In our results the Skewness of LTCTA and LTCBRANCH is 0.255 and 0.741 so the distribution of data is fairly symmetric and the tail is skewed to the right side. The distribution of data is highly skewed for ROA, ASPB, BRANCH, NIOE, all absolute value are greater than 1, -4.769, 2.963, -3.123, 2.659 respectively.

Table 3: Descriptive Statistics

This table presents the descriptive statistics of the study sample organized in one panel. ROA is the return on assets. ROE is Return on equity, LTC is Loan to customer per Branch in Million USD, LTC/TA is ratio of Loan to Customer to Total Assets, CD is customer deposits per branch in Million USD, CD/TA is ratio of Customer deposits to total assets. BRANCH is log of total number of branches, ASPB is log of average number of staff per branch, PROFIT is net profit per branch in Million USD, TII/TA is ratio of Total interest income to Total Assets, and NII/OE is ratio of none interest income to operating expenses.

Panel A: Descriptive Statistics of Selected Variables							
Variables	Mean	Median	Max	Min	STD	Skewness	kurtosis
ROA	0.82%	0.98%	2.19%	-6.79%	0.009	-4.769	31.240
ROE	13.04%	12.24%	64.50%	-50.40%	0.119	-0.907	11.134
LTC/TA	0.279	0.257	0.542	0.102	0.103	0.741	-0.164
CD/TA	0.828	0.838	0.987	0.658	0.060	-0.572	0.445
BRANCH	52.441	41	189	3	43.666	0.982	0.185
ASPB	23.124	20.850	74	11.700	10.050	2.963	9.521
CTI	0.579	0.561	4.098	-3.512	0.522	-1.009	36.697
PROFIT	66.610	30.133	383.608	-35.171	86.786	1.917	3.404
TII/TA	0.018	0.018	0.071	-0.006	0.009	1.584	8.771
NII/OE	0.573	0.557	2.532	-0.276	0.269	2.659	17.906

The existence of the problem of multicollinearity was tested using Pearson Correlation Coefficient test, Variance Inflation Factor (VIF) and Tolerance test (TV). Table 4 shows the results of Pearson correlation coefficient test. There are signs of significance between independent variable as marked in bold. Hence, we add new the tolerance test and variance inflation factor test these results are shown in the section of stepwise regression.

The values on the diagonal are all 1, signifying that every variable is perfectly correlated with itself. The correlations among the independent variables are positive with the exception of correlations that exist between INTERNET¹ and ASP, INTERNET¹ and CRISIS, INTERNET³ and CRISIS, INTERNET⁴ and CRISIS,

4.3 Main results

4.3.1 Results of cross section analysis of the regression models using *IVREG* statistical method

In the below table 5, we run the regression model in R program through using *IVREG* statistical method, we found that the effect of phone banking (*INTERNET*²) on ROA is positive and significant to a 1% significance level. The control variables *CD/TA*, *BRANCH*, *ASPB* have a significant positive effect on the profitability of Lebanese banks and the loan to customers *LTC/TA* has a negative and significant impact on ROA with a 1 % confidence interval. We find a positive association between *CD/TA* and ROA and *TII/TA*. This suggests profitability and interest income of banks increase as deposit decrease. This finding is opposite of study of Hernado and Nieto (2006) since they report a negative effect of deposit growth on ROA for Spanish bank.

Also, there is no effect of online banking on ROE, only *ASPB*, *CD/TA* and *BRANCH* are positively significant at 1% while *LTC/TA* is negatively significant at 1 %.

Furthermore, while looking at the effect of online banking on performance of Lebanese bank we found that phone banking (*INTERNET*²) has a positive significant effect on branch profit (*BRPROFIT*) and a negative significant effect cost to income (*CTI*). The transactional website (*INTERNET*³) has a positive significant impact on *BRPROFIT*, *CDBRANCH* and *LTCBRANCH* but a negative significant impact on *CTI* and *TIITA*. These results are similar to study of Onay and Ozsoz (2013) since also they found that internet adoption has a positive impact on per branch profitability and deposits.

The number of branches (*BRANCH*) has a significant positive impact on ROA, *BRPROFIT*, *CDBRANCH* and *LTCBRANCH*. The *ASPB* has also a positive significant impact on all dependent variables except *NIIOE*.

Table 5 : Results of the instrumental variable estimation *IVREG* for the impact of online banking on profitability and performance

ROA is the return on assets; ROE is the return on equity; BRPROFIT is logarithm of profit over number of branches; CDBRANCH is logarithm of customer deposits over number of branches; LTCBRANCH is logarithm of loan to customers over number of branches; TIITA is total interest income over total assets; NIOE none interest income over operating expenses; CTI is cost to income. *INTERNET*¹ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise it is used in model 1 and 2, *INTERNET*² is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours, SMS alerts, and an informational website in the previous year and 0 if otherwise it is used in model 1 and 2, *INTERNET*³ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise it is used in model 1 and 2, *INTERNET*⁴_{*j,n*} is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if, Crisis is a dummy variable that is equal to 1 if there was a crisis during the year it is used in model 1 and 2; the following variables are used in model 2 as control variables, CD/TA is the logarithm of customer deposits over total assets, LTC/TA is the logarithm of loan to customers over total assets, BRANCH is log of number of branches, ASPB is log of average staff per branch, α_0 is an intercept term. First row reports the estimated coefficients; second row reports the P-values in parentheses. Significant results are marked in bold. ***, **, * denote two-tailed significance at 1%, 5%, and 10% level respectively.

	ROA	ROE	BRPROFIT	CDBRANCH	LTCBRANCH	TIITA	NIOE	CTI
Intercept	-0.594	-16.46	4.756	7.451	7.039	-0.002	0.255	82.216
	(-0.113)	(-0.003)	(0.000)	(0.000)	(0.000)	(-0.699)	(-0.43)	(0.000)
INTERNET1	-0.06	-0.005	0.026	0.043	0.033	0.000	-0.056	-1.323
	(-0.653)	(-0.998)	(-0.811)	(-0.487)	(-0.6)	(-0.998)	(-0.627)	(-0.713)
INTERNET2	0.232***	0.965	0.267***	0.058	0.066	0.001	0.093	-10.749***
	(-0.009)	(-0.451)	(0.000)	(-0.155)	(-0.108)	(-0.601)	(-0.219)	(0.000)
INTERNET3	0.061	0.464	0.187***	0.143***	0.150***	-0.002*	0.049	-6.139***
	(-0.477)	(-0.709)	(-0.009)	(0.000)	(0.000)	(-0.058)	(-0.505)	(-0.008)
INTERNET4	-0.004	-0.759	0.05	0.031	0.033	0	0.032	-2.012
	(-0.967)	(-0.589)	(-0.533)	(-0.491)	(-0.463)	(-0.887)	(-0.699)	(-0.439)
CRISIS	0.052	-0.32	0	-0.015	-0.015	0.002**	-0.02	0.165
	(-0.39)	(-0.715)	(-0.995)	(-0.599)	(-0.584)	(-0.029)	(-0.703)	(-0.919)
CD/TA	1.302***	30.320***	0.835**	0.333*	-0.327	0.010*	0.361	-32.727***
	(-0.003)	(0.000)	(-0.021)	(-0.099)	(-0.1070)	(-0.065)	(-0.336)	(-0.006)
LTC/TA	-1.172***	-24.520***	-1.671***	-1.012***	0.614***	0.003	-0.613*	91.522***
	(-0.002)	(0.000)	(0.000)	(0.000)	(-0.001)	(-0.488)	(-0.065)	(0.000)
BRANCH	0.001**	-0.014	0.001**	0.001**	0.001**	0	0.001	-0.042**
	(-0.027)	(0.131)	(-0.016)	(-0.023)	(-0.003)	(-0.803)	(-0.107)	(-0.015)
ASPB	0.022***	0.498***	0.024***	0.015***	0.014***	0.000***	0.002	-0.386***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(-0.413)	(0.000)
No. of obs.	170	170	170	170	170	170	170	170
Adj.R ²	0.382	0.251	0.539	0.56	0.734	0.655	0.043	0.516

4.3.2 Cross section analysis firm level clustering

The below shows the results of OLS with cross section firm level clustering, for the impact of online banking on profitability and performance of Lebanese banks .

Table 6: Results of OLS cross section firm level clustering for the impact of online banking on profitability and performance

ROA is the return on assets; ROE is the return on equity; BRPROFIT is logarithm of profit over number of branches; CDBRANCH is logarithm of customer deposits over number of branches; LTCBRANCH is logarithm of loan to customers over number of branches; TIITA is total interest income over total assets; NIOE none interest income over operating expenses; CTI is cost to income. $INTERNET^1$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise it is used in model 1 and 2 , $INTERNET^2$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours , SMS alerts , and an informational website in the previous year and 0 if otherwise it is used in model 1 and 2 , $INTERNET^3$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise it is used in model 1 and 2 it is used in model 1 and 2 , $INTERNET^4_{j,n}$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if , Crisis is a dummy variable that is equal to 1 if there was a crisis during the year it is used in model 1 and 2 ; the following variables are used in model 2 as control variables , CD/TA is the logarithm of customer deposits over total assets , LTC/TA is the logarithm of loan to customers over total assets , BRANCH is logarithm of total number of branches , ASPB is the logarithm of average staff per branch , α_0 is an intercept term . First row reports the estimated coefficients; second row reports the P-values. Significant results are marked in bold. ***, **, * denote two-tailed significance at 1%, 5%, and 10% level respectively.

	ROA	ROE	TIITA	NIOE	BRPROFIT	CDBRANCH	LTCBRANCH	CTI
Intercept	-0.007	-10.373	0.000	0.109	4.469	7.197	6.731	87.498
	1.046	10.808	0.012	0.513	0.950	0.381	0.393	27.352
BRANCH	0.090	-2.614	-0.000	0.087	0.151	0.113	0.139	-3.573
	0.222	2.389	0.003	0.178	0.140	0.110	0.115	6.613
CRISIS	0.058	-0.214	0.000***	-0.018	-0.000	-0.018	-0.019	0.050
	0.042	0.572	0.001	0.026	0.025	0.013	0.015	0.774
ASPB	0.023*	0.464*	0.000	0.003	0.026*	0.016*	0.016	-0.4311
	0.011	0.189	0.000	0.007	0.010	0.007	0.008	0.348
CDTA	1.302	27.864*	0.009	0.404	0.934	0.433	-0.206	-34.021
	1.049	13.245	0.012	0.716	1.007	0.454	0.450	32.037
LTCTA	-1.236	-24.79**	0.003	-0.637	-1.693*	-1.006	0.617	92.944***
	0.638	8.001	0.008	0.585	0.825	0.530	0.526	23.522
INTERNET 1	-0.025	0.013	0.000	-0.041	0.043	0.044	0.037	-2.165
	0.082	1.033	NA	NA	0.057	0.033	0.031	1.794
INTERNET 2	0.234***	0.988	0.000	0.094	0.267**	0.057*	0.065*	-10.809***
	0.059	1.205	0.000	0.042	0.086	0.027	0.029	2.426
INTERNET 3	0.075	0.724	-0.002	0.051	0.184***	0.133***	0.140***	-6.347**
	0.064	0.713	0.001	0.051	0.051	0.034	0.033	1.928
INTERNET 4	0.011	-0.587	0.000	0.036	0.051	0.025	0.027	-2.280
	0.064	0.875	0.000	0.048	0.058	0.023	0.027	1.653

4.3.3 Results of impact of online banking on ROA

Table 7 below presents the cross section analysis of the regression models related to the impact of online banking (mobile banking, Transactional Website, phone banking) on ROA. Using the stepwise method, the final regression model includes three significant independent variables LTC/TA, ASPB, INTERNET³. The Tolerance statistics and variance inflation factors (VIF) calculated for these remaining variables indicate the no existence of multicollinearity since the value of tolerance statistics is above 0.2 and the value of VIF is below 10. (Neter, 1989)

The value of the adjusted R² is 0.409; this indicates that the percentage variation in ROA is 40.9 % explained by the independent variables (INTERNET¹, INTERNET², INTERNET³, INTERNET⁴, CD/TA, LTC/TA, ASPB, BRANCH and CRISIS).

Table 7, indicates a significant positive associations between ROA and the two variables ASPB and INTERNET³. The loan to customers over total assets (LTC/TA) is negatively related to ROA consistent with the results of Onay and Ozsoz (2013).

From the results, LTC/TA has the highest negative effect on profitability with a beta value of -0.639. In quantitative terms, it implies that a 1% increase in CD/TA causes a 63.9% decrease in ROA.

Table 7 : Results of the stepwise multivariate regression and Collinearity diagnostics for the impact of online banking on return on assets

The following table presents the results of stepwise multivariate regression for the impact of Online banking proxies on ROA.

$$ROA_{i,t} = \alpha_0 + \beta_1 INTERNET_{in}^1 + \beta_2 INTERNET_{in}^2 + \beta_3 INTERNET_{in}^3 + \beta_4 INTERNET_{im}^4 + \beta_5 Crisis_{it} + \beta_6 CD/TA_{it} + \beta_7 LTC/TA_{it} + \beta_8 BRANCH_{it} + \beta_9 ASPB_{it} + \varepsilon_{it}$$

Where ROA is the return on assets, $INTERNET^1$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise, $INTERNET^2$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours, SMS alerts, and an informational website in the previous year and 0 if otherwise, $INTERNET^3$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise, $INTERNET^4$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if otherwise, Crisis is a dummy variable that is equal to 1 if there was a crisis during the year, the following variables are used as control variables, CD/TA is the logarithm of customer deposits over total assets, LTC/TA is the logarithm of loan to customers over total assets, BRANCH is number of branches, ASPB is the average staff per branch, α_0 is an intercept term.

The below table reports the three significant variables; first column reports their estimated coefficients, second column gives their standard error, the third column reports their P-value, fourth column the tolerance test and the last column the variance inflation factor (VIF). Significant results are on 95% confidence interval.

Table 7: Results of the stepwise multivariate regression and Collinearity diagnostics for the impact of online banking on return on assets

Panel A-Dependent variable: ROA (all banks; N=170) R ² =0.419, adjusted R ² =0.409, F-test=39.922, P-value= (0.000)					
	Coefficient estimate	Standard error	p-value	Tolerance	VIF
Intercept	.012	.002	.000		
LTCTA	-.649	.006	.000	.783	1.277
ASPB	.536	.000	.000	.792	1.263
INTERNET3	.212	.001	.001	.980	1.020

The excluded variables from the above regression model are shown in below Table 8. The customer deposit over total assets (CD/TA) is significant at 90 % confidence interval. The tolerance ranges from 0.393 to 0.969, which suggests the existence of non-multicollinearity since the value of tolerance is above 0.2. The VIF is below 10, it ranges from 1.032 to 2.542 this implies that there is no occurrence for multicollinearity in this analysis.

Table 8 : Excluded variables of multivariate regression for the impact of online banking on return on assets

	Coefficient		Collinearity Statistics	
	estimate	p-value	Tolerance	VIF
CDTA	-0.117	.052	.969	1.032
BRANCH	0.107	.111	.778	1.286
CRISIS	-0.007	.916	.908	1.102
INTERNET1	0.036	.556	.922	1.084
INTERNET2	0.035	.573	.939	1.065
INTERNET4	0.063	.506	.393	2.542

4.3.4 Results of the impact of online banking on ROE

Table 9 below presents the cross section analysis of the regression models related to the impact of online banking (mobile banking, Transactional Website, phone banking) on ROE. Using the stepwise method, the final regression model includes three significant independent variables: ASPB, CD/TA and LTC/TA. The value of the adjusted R^2 is 0.268.

Table 9: Results of the stepwise multivariate regression and Collinearity diagnostics for the impact of online banking on return on equity

The following table presents the results of ordinary least squares regressions for the impact of Online banking proxies on ROE.

$$ROE_{it} = \alpha_0 + \beta_1 INTERNET_{it}^1 + \beta_2 INTERNET_{it}^2 + \beta_3 INTERNET_{it}^3 + \beta_4 INTERNET_{it}^4 + \beta_5 Crisis_{it} + \beta_6 CD/TA_{it} + \beta_7 LTC/TA_{it} + \beta_8 BRANCH_{it} + \beta_9 ASPB_{it} + \varepsilon_{it}$$

Where ROE is the return on equity, $INTERNET^1$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise, $INTERNET^2$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours, SMS alerts, and an informational website in the previous year and 0 if otherwise, $INTERNET^3$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise, $INTERNET^4$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if, Crisis is a dummy variable that is equal to 1 if there was a crisis during the year, the following variables are used as control variables, CD/TA is the logarithm of customer deposits over total assets, LTC/TA is the logarithm of loan to customers over total assets, BRANCH is number of branches, ASPB is the average staff per branch, α_0 is an intercept term.

The below table reports the three significant variables; first column reports their estimated coefficients, second column gives their standard error, the third column reports their P-value, fourth column the tolerance test and the last column the variance inflation factor. Significant results are on 95% confidence interval.

Panel A-Dependent variable : ROE (all banks; N=170)					
R ² =0.281, adjusted R ² =0.268, F-test=21.669, P-value=(0.000)					
	Coefficient estimate	Standard error	p-value	Tolerance	Variance inflation factor
Intercept	-.399	.109	.000		
ASPB	.469	.001	.000	.784	1.276
CDTA	.286	.133	.000	.973	1.028
LTCTA	-.223	.086	.003	.789	1.267

The excluded variables from the above regression model are shown in = Table 10. The proxies of online banking ($INTERNET^1$, $INTERNET^2$, $INTERNET^3$ and $INTERNET^4$) have no impact on ROE. All the values of tolerance are above 0.2 and all the values of VIF are below 10 this implies the nonoccurrence of multicollinearity.

Table 10: Excluded variables of multivariate regression for the impact of online banking on return on equity

	Coefficient estimate	p-value	Collinearity Statistics	
			Tolerance	VIF
BRANCH	-0.117	.918	.763	1.052
INTERNET1	0.107	.820	.782	1.007
INTERNET2	-0.007	.513	.781	1.018
INTERNET3	0.036	.825	.781	1.024
INTERNET4	0.035	.936	.782	1.015
CRISIS	0.063	.331	.783	1.004

While comparing the two model , we find that ROA is a better indicator than ROE when it comes to profitability since adjusted R^2 of ROA is higher than adjusted R^2 of ROE respectively 0.419 and 0.268 . The validity of the two models is represented in the F-test value. The higher the F-test, the better the overall fit of the regression line through the actual data. The F-test of ROA is higher than the F-test of ROE respectively 39.922 and 21.699. Moreover, online banking has a positive impact on ROA. Transactional website has a positive and significant impact on ROA consistent with the results of Hernado and Nieto (2006). By plotting unstandardized residual we can see that both models are normally distributed. (Appendix D)

4.3.5 Results of the impact of online banking on branch profit

Table 11 presents the cross section analysis of the regression models related to the impact of online banking (mobile banking, Transactional Website, phone banking) on branch profit. Using the stepwise method, the final regression model includes three significant independent variables LTCTA, ASP, BRANCH. The Tolerance statistics and variance inflation factors (VIF) calculated for these variables indicate low level of multicollinearity, since the value of tolerance statistics is above 0.2 and the value of VIF is below 10. (Neter, 1989)

The value of the adjusted R^2 is 0.320; this indicates that the percentage variation in ROA is 32 % explained by the independent variables (INTERNET¹, INTERNET², INTERNET³, INTERNET⁴, CD/TA, LTC/TA, ASPB, BRANCH and CRISIS).

There is a significant positive association between branch profit and the two variables ASP and BRANCH. The ratio of loan to customers over total assets and branch profit (LTC/TA) has the highest negative effect on branch profit with a beta

value of -.540. In quantitative terms, it implies that a 1% increase in LTC/TA causes a 54% decrease in BRPROFIT.

Table 11: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on branch profit

The following table presents the results of ordinary least squares regressions for the impact of Online banking proxies on Banks Profit.

$$BRPROFIT_{i,t} = \alpha_0 + \beta_1 INTERNET_{in}^1 + \beta_2 INTERNET_{in}^2 + \beta_3 INTERNET_{in}^3 + \beta_4 INTERNET_{in}^4 + \beta_5 Crisis_{it} + \beta_6 CD/TA_{it} + \beta_7 LTC/TA_{it} + \beta_8 BRANCH_{it} + \beta_9 ASPB_{it} + \varepsilon_{it}$$

Where BRPROFIT is the logarithm of net profits over number of branches, $INTERNET^1$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise, $INTERNET^2$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours, SMS alerts, and an informational website in the previous year and 0 if otherwise, $INTERNET^3$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise, $INTERNET^4$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if otherwise, Crisis is a dummy variable that is equal to 1 if there was a crisis during the year, the following variables are used as control variables, CD/TA is the logarithm of customer deposits over total assets, LTC/TA is the logarithm of loan to customers over total assets, BRANCH is number of branches, ASPB is the average staff per branch, α_0 is an intercept term.

The below table reports the three significant variables; first column reports their estimated coefficients, second column gives their standard error, the third column reports their P-value, fourth column the tolerance test and the last column the variance inflation factor. Significant results are on 95% confidence interval.

Panel A-Dependent variable : BRPROFIT (all banks; N=170) R ² =0.333, adjusted R ² =0.320, F-test=27.570, P-value= (0.000)					
	Coefficient estimate	Standard error	p-value	Tolerance	VIF
Intercept	6.190	.715	.000		
LTCTA	-.540	2.208	.000	.765	1.307
ASPB	.358	.022	.000	.793	1.262
BRANCH	.229	.005	.001	.958	1.044

The excluded variables from the above regression model are shown in Table 12. The proxies of online banking ($INTERNET^1$, $INTERNET^2$, $INTERNET^3$ and $INTERNET^4$) have no impact on branch profit. All the values of tolerance are above 0.2 and all the values of VIF are below 10 this implies the nonoccurrence of multicollinearity.

Table 12: Excluded variables of multivariate regression for the impact of online banking on branch profit

	Coefficient		Collinearity Statistics	
	estimate	p-value	Tolerance	VIF
CDTA	-0.07	.279	.763	1.035
CRISIS	0.01	.873	.762	1.006
INTERNET1	0.047	.484	.750	1.115
INTERNET2	-0.003	.965	.760	1.035
INTERNET3	0.029	.682	.733	1.256
INTERNET4	0.062	.388	.736	1.253

4.3.6 Results of the impact of online banking on CDBRANCH

Table 13 below presents the cross section analysis of the regression models related to the impact of online banking (mobile banking, Transactional Website, phone banking) on customer deposits. Using the stepwise method, the final regression model includes four significant independent variables LTCTA, ASP, BRANCH and INTERNET³. The Tolerance statistics and variance inflation factors (VIF) calculated for these variables indicate low level of multi-collinearity, since the value of tolerance statistics is above 0.2 and the value of VIF is below 10. (Neter, 1989)

The value of the adjusted R² is 0.638; this indicates that the percentage variation in ROA is 63.8 % explained by the independent variables (INTERNET¹, INTERNET², INTERNET³, INTERNET⁴, CD/TA, LTC/TA, ASPB, BRANCH and CRISIS).

There is a significant positive relation between transactional website on performance of banks measured by customer deposits. Also, there is positive significant association between customer deposits and the two variables ASP and BRANCH but a negative significant relation between loan to customers and customer deposits.

The validity of the models is represented in the F-test value. The higher the F-test, the better the overall fit of the regression line through the actual data. This model has the highest value for F-test; therefore this model is well specified.

Table 13: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on customer deposits

The following table presents the results of ordinary least squares regressions for the impact of Online banking proxies on customer deposits.

$$CDBRANCH_{i,t} = \alpha_0 + \beta_1 INTERNET_{in}^1 + \beta_2 INTERNET_{in}^2 + \beta_3 INTERNET_{in}^3 + \beta_4 INTERNET_{in}^4 + \beta_5 Crisis_{it} + \beta_6 CD/TA_{it} + \beta_7 LTC/TA_{it} + \beta_8 BRANCH_{it} + \beta_9 ASPB_{it} + \varepsilon_{it}$$

Where CDBRANCH is the logarithm of Customer deposits over number of branches , $INTERNET^1$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise , $INTERNET^2$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours , SMS alerts , and an informational website in the previous year and 0 if otherwise , $INTERNET^3$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise , $INTERNET^4$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if , Crisis is a dummy variable that is equal to 1 if there was a crisis during the year , the following variables are used as control variables , CD/TA is the logarithm of customer deposits over total assets , LTC/TA is the logarithm of loan to customers over total assets , BRANCH is number of branches , ASPB is the average staff per branch , α_0 is an intercept term .

The below table reports the three significant variables; first column reports their estimated coefficients, second column gives their standard error, the third column reports their P-value, fourth column the tolerance test and the last column the variance inflation factor. Significant results are on 95% confidence interval.

Panel A-Dependent variable : CDBRANCH (all banks; N=170) R ² =0.647, adjusted R ² =0.638, F-test=75.518, P-value= (0.000)					
	Coefficient estimate	Standard error	p-value	Tolerance	VIF
Intercept	7.760	.037	.000		
ASPB	.699	.001	.000	.792	1.263
INTERNET3	.400	.024	.000	.796	1.256
LTCTA	-.477	.115	.000	.733	1.364
BRANCH	.143	.000	.007	.778	1.286

The excluded variables from the above regression model are shown in Table 14. The proxies of online banking ($INTERNET^1$, $INTERNET^2$, and $INTERNET^4$) have no impact on customer deposits as well as crisis. The ratio of customer deposits over assets has a p- value of 0.096 this implies that the impact of CD/TA on customer deposits is positive and significant with a 10% significance level. All the values of tolerance are above 0.2 and all the values of VIF are below 10 this implies the nonoccurrence of multicollinearity.

Table 14: Excluded variables of multivariate regression for the impact of online banking on customer deposits

	Coefficient estimate	p-value	Collinearity Statistics	
			Tolerance	VIF
CDTA	0.079	.096	.733	1.048
CRISIS	-0.018	.721	.720	1.113
INTERNET1	0.05	.318	.724	1.143
INTERNET2	0.074	.121	.732	1.069
INTERNET4	0.082	.275	.380	2.626

4.3.7 Results of the impact of online banking on LTCBRANCH

Table 15 below presents the cross section analysis of the regression models related to the impact of online banking (mobile banking, Transactional Website, phone banking) on loan to customers. Using the stepwise method, the final regression model includes five significant independent variables LTCTA, ASP, BRANCH, CD/TA and INTERNET³. The Tolerance statistics and variance inflation factors (VIF) calculated for these variables indicate low level of multicollinearity, since the value of tolerance statistics is above 0.2 and the value of VIF is below 10. (Neter, 1989)

The value of the adjusted R² is 0.727; this indicates that the percentage variation in LTCBRANCH is 72.7 % explained by the independent variables (INTERNET¹, INTERNET², INTERNET³, INTERNET⁴, CD/TA, LTC/TA, ASPB, BRANCH and CRISIS).

INTERNET³ has a positive significant impact on the performance of Lebanese banks as measured by loan to customers per branch. In addition, there is a significant positive association between loan to customers and the three variables ASP, LTCTA, and BRANCH. On the other hand the ratio of customer deposits over total assets has a negative significant effect on loan to customers.

Table 15: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on loan to customers

The following table presents the results of ordinary least squares regressions for the impact of Online banking proxies on loan to customers.

$$LTCBRANCH_{i,t} = \alpha_0 + \beta_1 INTERNET_{in}^1 + \beta_2 INTERNET_{in}^2 + \beta_3 INTERNET_{in}^3 + \beta_4 INTERNET_{in}^4 + \beta_5 Crisis_{it} + \beta_6 CD/TA_{it} + \beta_7 LTC/TA_{it} + \beta_8 BRANCH_{it} + \beta_9 ASPB_{it} + \varepsilon_{it}$$

Where LTCBRANCH is the logarithm of loan to customers over number of branches, $INTERNET^1$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise, $INTERNET^2$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours, SMS alerts, and an informational website in the previous year and 0 if otherwise, $INTERNET^3$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise, $INTERNET^4$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if, Crisis is a dummy variable that is equal to 1 if there was a crisis during the year, the following variables are used as control variables, CD/TA is the logarithm of customer deposits over total assets, LTC/TA is the logarithm of loan to customers over total assets, BRANCH is number of branches, ASPB is the average staff per branch, α_0 is an intercept term.

The below table reports the three significant variables; first column reports their estimated coefficients, second column gives their standard error, the third column reports their P-value, fourth column the tolerance test and the last column the variance inflation factor. Significant results are on 95% confidence interval.

Panel A-Dependent variable : CDBRANCH (all banks; N=170) R ² =0.647, adjusted R ² =0.638, F-test=75.518, P-value= (0.000)					
	Coefficient estimate	Standard error	p-value	Tolerance	VIF
Intercept	7.173	.147	.000		
ASPB	.601	.001	.000	.783	1.277
INTERNET3	.367	.024	.000	.786	1.272
LTCTA	.202	.116	.000	.733	1.365
BRANCH	.166	.000	.000	.766	1.306
CDTA	-.100	.175	.017	.954	1.048

The excluded variables from the above regression model are shown in below Table 16. The proxies of online banking ($INTERNET^1$, $INTERNET^2$, and $INTERNET^4$) have no impact on loan to customers as well as crisis. The phone banking ($INTERNET^2$) has a p-value of 0.084 this implies that the impact of $INTERNET^2$ is positive and significant within a 10% significance level. There is a nonexistence of multicollinearity since all the values of tolerance are above 0.2 and all the values of VIF are below 10.

Table 16: Excluded variables of multivariate regression for the impact of online banking on loan to customers

	Coefficient estimate	p-value	Collinearity Statistics	
			Tolerance	VIF
CRISIS	-0.017	.689	.897	1.114
INTERNET1	0.036	.402	.874	1.145
INTERNET2	0.072	.084	.931	1.074
INTERNET4	0.071	.276	.381	2.627

4.3.8 Results of the impact of online banking on TII/TA

Table 17 presents the cross section analysis of the regression models related to the impact of online banking (mobile banking, Transactional Website, phone banking) on total interest income over total assets . Using the stepwise method, the results suggest that there is only one significant independent variables “ASPB” in the final regression model. The percentage variation in TIITA is 28.7 % explained by the independent variables since the adjusted R^2 is 0.287.

Table 17: Results of the stepwise multivariate regression and collinearity diagnostics for the impact of online banking on total interest income over total assets

Panel A-Dependent variable : TIITA (all banks; N=170) $R^2=0.291$, adjusted $R^2=0.287$, F-test=68.949, P-value= (0.000)					
	Coefficient estimate	Standard error	p-value	Tolerance	VIF
(Constant)	.007	.001	.000		
ASPB	.539	.000	.000	1.000	1.000

The excluded variables from the above regression model are shown in below Table 18. The proxies of online banking (INTERNET¹, INTERNET², INTERNET³, INTERNET⁴, CD/TA, LTC/TA, BRANCH and CRISIS) have no impact on total interest income.

Table 18: Excluded variables of multivariate regression for the impact of online banking on total interest income over total assets

	Coefficient estimate	p-value	Collinearity Statistics	
			Tolerance	VIF
LTCTA	-0.129	.076	.793	1.262
CDTA	-0.067	.312	.977	1.024
BRANCH	0.029	.659	.992	1.008
CRISIS	0.104	.110	1.000	1.000
INTERNET1	-0.014	.831	1.000	1.000
INTERNET2	0.039	.556	.991	1.009
INTERNET3	-0.098	.133	.992	1.008
INTERNET4	-.070	.284	.997	1.003

4.3.9 Results of the impact of online banking on NII/OE

Table 19 below presents the cross section analysis of the regression models related to the impact of online banking (mobile banking, Transactional Website, phone banking) on none interest income over operating expense . Under the stepwise method, the final regression model includes only a significant independent variable BRANCH. The Tolerance statistics and variance inflation factors (VIF) calculated for this variable indicate low level of multicollinearity, since the value of tolerance statistics is above 0.2 and the value of VIF is below 10. (Neter, 1989)

The value of the adjusted R^2 is 0.066; this indicates that this model is weak and the percentage variation NIIOE is 0.6% explained by the independent variables (INTERNET¹, INTERNET², INTERNET³, INTERNET⁴, CD/TA, LTC/TA, ASPB, BRANCH and CRISIS).

Table 19: Results of the stepwise Using the multivariate regression and collinearity diagnostics for the impact of online banking on none interest income over operating

The following table presents the results of ordinary least squares regressions for the impact of Online banking proxies on none interest income to operating expenses.

$$NII/OE_{it} = \alpha_0 + \beta_1 INTERNET_{in}^1 + \beta_2 INTERNET_{in}^2 + \beta_3 INTERNET_{in}^3 + \beta_4 INTERNET_{in}^4 + \beta_5 Crisis_{it} + \beta_6 CD/TA_{it} + \beta_7 LTC/TA_{it} + \beta_8 BRANCH_{it} + \beta_9 ASPB_{it} + \varepsilon_{it}$$

Where NII/OE is the none interest income over operating expenses , $INTERNET^1$ is a dummy variable that is equal to 1 if the bank has a Mobile application in the previous year and 0 if otherwise , $INTERNET^2$ is a dummy variable that is equal to 1 if the bank has adopted phone banking for 24-hours , SMS alerts , and an informational website in the previous year and 0 if otherwise , $INTERNET^3$ is a dummy variable that is equal to 1 if the bank has adopted a transactional web site in the previous year and 0 if otherwise , $INTERNET^4$ is a dummy variable that is equal to 1 if the bank has introduced a transactional web site during the previous 2 years (during the past 24 months) and 0 if , Crisis is a dummy variable that is equal to 1 if there was a crisis during the year , the following variables are used as control variables , CD/TA is the logarithm of customer deposits over total assets , LTC/TA is the logarithm of loan to customers over total assets , BRANCH is number of branches , ASPB is the average staff per branch , α_0 is an intercept term .

The below table reports the three significant variables; first column reports their estimated coefficients, second column gives their standard error, the third column reports their P-value, fourth column the tolerance test and the last column the variance inflation factor. Significant results are on 95% confidence interval.

Panel A-Dependent variable : NIIOE (all banks; N=170) R ² =0.072, adjusted R ² =0.066, test=12.960, P-value= (0.000)					
	Coefficient estimate	Standard error	p-value	Tolerance	Variance inflation factor
Intercept	.486	.031	.000		
BRANCH	.268	.000	.000	1.000	1.000

The excluded variables from the above regression model are shown in below Table 20. The proxies of online banking ($INTERNET^1$, $INTERNET^2$, $INTERNET^3$, $INTERNET^4$, CD/TA, LTC/TA, ASPB and CRISIS) have no impact on total interest income.

Table 20: Excluded variables of multivariate regression for the impact of online banking on total interest income over total assets

	Coefficient estimate	p-value	Collinearity Statistics	
			Tolerance	VIF
LTCTA	-0.147	.053	.958	1.044
CDTA	0.067	.371	.989	1.012
ASPB	-0.021	.781	.992	1.008
CRISIS	-0.046	.541	.999	1.001
INTERNET1	-0.032	.678	.916	1.092
INTERNET2	0.052	.489	.985	1.016
INTERNET3	0.081	.315	.846	1.181
INTERNET4	0.077	.344	.837	1.195

4.4 Discussion of the Findings and Hypotheses

After running our regression models on collected data, we found that online banking as measured by INTERNET², INTERNET³ has a significant impact on ROA and a lesser impact on ROE (*Tables 5, 8, 9*). Therefore, the findings support the hypothesis that there is an impact of on the profitability of Lebanese banks as measured by ROA. The results are consistent with that of Hernado and Nieto 2006 study done in Spain.

The impact of internet banking is more significant on the Customer deposits per branch as well as Loan to Customer per branch. Branches today focus less on operational activities such as bill payment, wire, checkbook request and cards. They concentrate more on their core function such as deposit collection and lending activity. For this reason in the above all regression tables CD/TA have a positive sign in estimations.

Banks in Lebanon rely heavily on the flow and growth of deposits. They report this growth to the Lebanese central bank (BDL) on a daily basis. BDL in return, publishes total deposits every month and reports it to the International Monetary Fund (IMF) on a weekly basis. Our results, supports this fact. Lebanese bank profitability as reflected by the ROE is tantamount to Improvement in their deposit base. More importantly this effect can be shown effectively on the main performance measures related to branch performance (*BRPROFIT, CDBRANCH LTCBRANCH*). Our findings, in this thesis, confirm data in the descriptive statistics above in table 3 and show that online banking drives higher deposits in the physical branches.

Consequently, online banking stands as to complement branches rather than compete with them. The coefficients of *INTERNET*² and *INTERNET*³ have a positive impact on the branch performance, in a clearer way than on the ROE or ROA themselves.

What is more surprising is the persistent negative impact of Loan to customers (*LTCTA*) on almost all performance measures except on Loan-to-customer per branch (*LTCBRANCH*) and Cost-to-income (CTI), with a relatively sizable coefficient. This is perhaps due to the fact that given the Lebanese interest rate environment; loan portfolio of banks does not yield much in term of returns, and seems to be a drag on profits (the higher the loans, the lower the returns).

Consequently, that is linked to the nature of the investment strategy in Lebanon. Ever since the central bank took reins of managing the countries monetary policy and debt in 1990, concurrently with the ministry of Finance, it has oriented the strategy for investment undertaken by bank executive strategist. Most of bank assets are invested in long term debt instruments rather than in loan portfolios. Government debt is driving profits of the bank, hence why most of the performance coefficient related to LTCs are negative.

Total interest income and Net interest income as measures of performance failed to yield any conservative results. This also was reflected in the literature, mainly in online banking research reported in turkey and Spain. While one would fairly rely on interest income.

It is quite striking to see the similarities between the Lebanese and the Turkish banks in terms of impact of online banking. This study stands as a novel insight within the Lebanese market and the region in particular, on the impact of technology on the banking sector. Yet, we differ from our peers in turkey and the region in the fact that the impact as revealed, is not as considerable as we would have expected; And that banks are still expanding their branch base and pouring considerable money and resources to support them. This is surely contrasts with what would have been expected where online banking is in direct competition with bricks-and-mortar branches. It has expanded the old models used and added more performance measures as well as more variables in a bid to better fit the Lebanese environment.

In fact, online banking is lending support to branches (as seen with impact of *INTERNET 2 and INTERNET3*) on branch performance (*CDBRANCH, BRPROFIT, LTCBRANCH*). The more branches the better with online performance. That is a major finding: Online Banking and bricks-and-mortar Branches are more

complementary than substitute. Branches expand, first, because the Lebanese population is not yet ready to fully ditch the branch. Second, because they're probably used as a marketing tool, until online platforms gains more steam.

Finally, in contrast with previous work on the topic, the two-year lags (*INTERNET4*) seem to have no impact on performance measure beyond what *INTERNET3* has offered. Tending to the conclusion where: had there been any behavior to adopt online banking, this takes place very quickly with almost no lag.

4.5 Conclusion

This thesis studied the impact of online banking bank and Branch profitability. It has tailored previous research and applied it on the Lebanese market and shown the impact that online banking has had in pushing for more returns and seeking the behavior of branch expansion in an ever changing technological environment.

We have shown that online banking has had a positive effect on returns, albeit very minimal, but a more substantial effect on the existing branch performances boosting it considerably.

Online services seemed to have operated in parallel with other main determinants banks returns, more considerably the growth in deposits.

Chapter 5

5 Conclusion and Further Research

5.1 Introduction

The purpose of this chapter is to summarize the study that was conducted and its main results. It also provides the limitations of study as well as it presents some implications. Furthermore some recommendations for Lebanese banks will be proposed to increase the use of online banking services. At the end of this chapter some suggestions for further research are made.

5.2 Summary of the Research

In the last few decades, the banking sector has witnessed some dramatic changes due to modern technology and the unstoppable forces leading globalization which create continuously more growing opportunities as well as challenges for bank managers in order to get profits in a highly competitive environment.

Nowadays, many approaches find in technology the solution to all problems. Undoubtedly, technology plays a crucial role in offering suitable solutions for internet banking. The implementation of Internet banking has increased the interaction between banks and their stakeholders which enhanced the communication with remote customers, raised the market share and decreased the demand for bank branches. Nevertheless, the general influence of Internet banking on bank performance relies on the extent of operation and the bank's size. Banks adopting Internet banking as a delivery channel in addition to their traditional services benefited from the reduction in overhead cost. This reduction is really important for big banks and will certainly enable the banks to improve their performance. However, the Internet-only banks will suffer to get more profits because they are unable to compete with traditional banks that offer physical interaction with customers. That's why the bank performance will improve if Internet banking is adopted as a complement not as a substitute for physical bank branches.

This study was conducted to assess the effect of online banking on the profitability of Lebanese banks. We collect data from annual reports and bilanbanques for 17 Lebanese banks that have available and complete information for a period of 10 years from 2004 to 2013.

In order to assess the effect of online banking on Lebanese banks' profitability, three hypotheses and eight regression models were built. ROE and ROA were chosen as the proxies of banks profitability. The following variables were chosen as the proxies of banks performance: branch profit, Customer deposits, loan to customers, net interest income over operating expenses, total interest income and CTI, while mobile banking, phone banking, transactional website were selected based on previous studies to represent the determinants of online banking. Moreover, this study employed the ratio of customer deposit over total assets, loan to customers over total assets to evaluate whether the size of banks affect when added to the regression models. The number of branches is used to estimate whether internet banking complements bricks and mortar branches.

After running the regression models, it was evident that the variables are normally distributed and that no issues of multicollinearity exist. The first hypothesis was supported showing that transactional website and phone banking has a positive impact on ROA of Lebanese banks and the result is consistent with that of Nieto (2006). On the other hand, online banking has no impact on ROE. We found that ROA is a better indicator than ROE when it comes to profitability since it has higher adjusted R^2 and higher F-test.

In addition, hypothesis two was supported and indicates that online banking as measured by transactional website and phone banking has significant effect on the overall performance profitability of Lebanese banks as measured by its customer deposits and loan to customers. This is in accordance with studies done by Onay and Ozsoz (2013).

Moreover, the third hypothesis was supported and shows that there is no evidence that banks were using the Internet as a substitute for expensive physical branch delivery. Our results imply a complementarity between the two channels since there is an unexpected expansion of the number of bank branches. The fundamental strategy of Lebanese banks is to expand their branches as a marketing tool for their image.

5.3 Limitations of study

Several limitations were encountered due to the small Lebanese banking sector and the lack of reliable data. The study focuses only on the top Lebanese banks and did not take into consideration the perceived risk of online banking, the ease of use and awareness of this new technology by customers.

5.4 Implications of study

This study fills the gap of the research about the impact of online banking on Lebanese banks' profitability. It provides guidance to bank managers and executives in understanding the impact that online banking can have on their strategies. It sheds the light on aspects of commercial branch profitability that is rarely considered in their choices of future expansion. This thesis provides important information for banks manager to cut off costs and to improve this new service.

Another contribution of this research is that we must discover the reasons that pushed banks to implement the usage of internet as well as understand its real objective. Is it regarded as an extra channel or as the end of branch banking?

Major changes are likely to happen in the banking industry in Lebanon due to fast technological advances which will somehow influence all local banks. Not only banks but also people in Lebanon will be facing high e-challenges in this global environment. All this will lead commercial banks in Lebanon to acquire the methods that will help them to respond to the instructional challenges caused by the Internet.

In fact, Internet banking will not put an end to branch banking; it only explains the need to train employees continuously. Since e-training is a new experience that employees in the Lebanese market don't perfectly understand. Therefore, it is a must to learn and understand the future language related to the banking sector in Lebanon.

5.5 Suggestions for Further Research

The success of online banking relies on how much the internet is capable of penetrating in a country. In developed countries, where there is very good infrastructure and more income per capita, the possession of a computer and internet access is available for many customers. On the other hand, in the developing

countries the poor infrastructure and the low internet penetration are very inconvenient. That's why the internet suppliers as well as banks should motivate and promote the surfing cost. Consequently, consumers can benefit a lot if banks and internet providers offer demonstrations and free training sessions related to the usage of internet. Many facilities providing internet access such as mobile phones, telephone, internet and ATMs may encourage consumers to rely on online banking and use it. In addition, banks should provide necessary validation facilities and ensure the customers' confidentiality and identity to motivate more consumers to use internet banking. It's very imperative that in Lebanon government should work alongside with the banks to enhance infrastructure facilities, legalize and control the economic policies occasionally. The interference of the government sometimes leads to optimistic attitudes and encourages customers to use online banking. Not only governments but also insistent marketing programs can motivate a larger number of consumers to exploit e-banking. Therefore, these programs can be an efficient means and banks should use convenient marketing techniques in order to get in touch with a great number of customers. Moreover, marketing communications must develop an accurate plan that can promote a strategic delivery channel for e-banking services. Several suggestions for further research can be drawn based on the findings. For instance, including more indicators of online banking could improve the models such number of ATMs, number of POS and number of active user for mobile banking those are important determinant of online banking but due to lack of data availability they were missed in this study. Despite a lot of research in finance and management, there is a lack of practical studies about the reaction of consumers in Lebanon towards internet banking, the number of people using it or the way they feel about internet banking and risk-taking. It would be very interesting to study behavior and awareness of customers while using online banking. In addition, here are some new venues of research that Future work will be directed towards:

- 1- Seeking the effects of online banking while considering movements in interest rates, bank size, bank and economic impact on the banking sector.
- 2- Look into the evolution of profitability and *bricks-and-mortar* branches with the introduction of new electronic platforms currently being put in place by the Lebanese central bank.
- 3- Tailor the same study to banks in the region and other countries in the middle east, while changing variables to tailor the current market

- 4- Introduce new measure of online banking and consider added-value performance measures to improve and make results attainable for executives in the industry.

Finally, more work should be lent to understanding the interest and non-interest income performance measures as well as the variables that affect them. This requires more insight and data that is directly linked to monetary policies in Lebanon and the way the central bank has driven return strategies of Major Lebanese's banks.

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Appendix A – Minimum value for selected banks

Minimum value of selected variables for a 10 years period from 2004-2013

	ROA	ROE	LTCBRANCH	CDBRANCH	BRANCH	ASPB	CTI	BRPROFIT	TIITA	NIIOE
Bank Audi	2004	2007	2004	2006	2004	2004	2011	2004	2004	2007
Bank of Beirut	2004	2005	2004	2005	2004	2004	2010	2004	2012	2006
Blom Bank	2004	2004	2005	2008	2004	2004	2012	2004	2004	2004
SGBL	2004	2004	2007	2004	2004	2004	2013	2004	2011	2004
BLF	2004	2004	2005	2004	2004	2013	2012	2004	2011	2004
Credit Libanais	2004	2007	2004	2004	2004	2004	2010	2004	2012	2004
BBAC	2006	2006	2004	2004	2004	2005	2012	2004	2005	2006
Fransabank	2004	2013	2004	2007	2004	2004	2010	2007	2007	2006
BankMed	2006	2006	2004	2004	2010	2005	2011	2006	2005	2004
Byblos Bank	2004	2013	2004	2005	2004	2004	2011	2004	2013	2006
Creditbank	2005	2005	2004	2004	2004	2005	2010	2005	2005	2005
IBL	2004	2009	2004	2006	2004	2012	2010	2004	2011	2007
FNB	2004	2009	2004	2004	2004	2005	2010	2004	2011	2011
HSBC ME	2009	2009	2006	2004	2012	2010	2012	2009	2011	2009
Lebanese Swiss	2004	2004	2006	2005	2004	2013	2010	2004	2013	2006
Federal Bank of Lebanon	2012	2012	2004	2004	2004	2004	2006	2012	2010	2013

Appendix B- Maximum value

Date of Maximum value of selected variables for a 10 years period from 2004-2013

	ROA	ROE	LTCBRANCH	CDBRANCH	BRANCH	ASPB	CTI	BRPROFIT	TIITA	NIIOE
Bank Audi	2006	2011	2013	2012	2013	2009	2004	2012	2008	2012
Bank of Beirut	2010	2008	2013	2013	2013	2009	2004	2010	2009	2009
Blom Bank	2010	2009	2013	2004	2013	2009	2004	2010	2008	2012
SGBL	2009	2010	2013	2013	2011	2009	2004	2013	2008	2010
BLF	2008	2008	2011	2011	2013	2008	2004	2008	2005	2013
Credit Libanais	2010	2010	2013	2013	2013	2013	2004	2010	2006	2010
BBAC	2009	2009	2013	2012	2013	2013	2004	2012	2012	2009
Fransabank	2010	2008	2013	2013	2013	2010	2009	2010	2008	2010
BankMed	2012	2011	2011	2013	2013	2011	2004	2012	2011	2013
Byblos Bank	2010	2007	2013	2013	2013	2008	2004	2012	2008	2013
Creditbank	2011	2011	2013	2013	2013	2010	2005	2011	2010	2011
IBL	2008	2004	2012	2013	2013	2009	2004	2013	2008	2009
FNB	2013	2005	2012	2012	2013	2011	2004	2013	2012	2005
HSBC ME	2007	2007	2013	2012	2009	2012	2009	2012	2006	2012
Lebanese Swiss	2009	2009	2013	2013	2013	2010	2004	2009	2006	2010
Federal Bank of Lebanon	2013	2004	2011	2011	2010	2011	2013	2004	2006	2004

Appendix C – Mean of dependent and independent variables

**Mean of selected variables before and after adoption of internet banking for a
10 years period from 2004-2013**

	Bank Audi		Blom Bank		SGBL	
	Mean before adoption of IB	Mean after adoption of IB	Mean before adoption of IB	Mean after adoption of IB	Mean before adoption of IB	Mean after adoption of IB
ROA	0.011	0.012	0.012	0.015	0.007	0.012
ROE	0.123	0.140	0.154	0.172	0.107	0.184
LTCBRANCH	7.507	7.765	7.376	7.550	7.210	7.465
LTCTA	0.249	0.318	0.143	0.224	0.296	0.261
CDBRANCH	8.042	8.202	8.144	8.140	7.633	7.950
CDTA	0.843	0.862	0.834	0.867	0.785	0.797
BRANCH	2.040	2.212	1.898	2.148	1.768	1.927
ASPB	24.340	28.040	23.025	26.767	18.183	18.950
CTI	0.568	0.487	0.396	0.382	0.712	0.505
BRPROFIT	6.115	6.315	6.268	6.349	5.329	6.047
TIITA	0.019	0.017	0.017	0.021	0.020	0.018
NIIOE	0.670	0.886	0.620	0.730	0.519	0.651

Appendix D- Histogram of unstandardized residual

Figure 3-D , Histogram of the effect of online banking on ROA

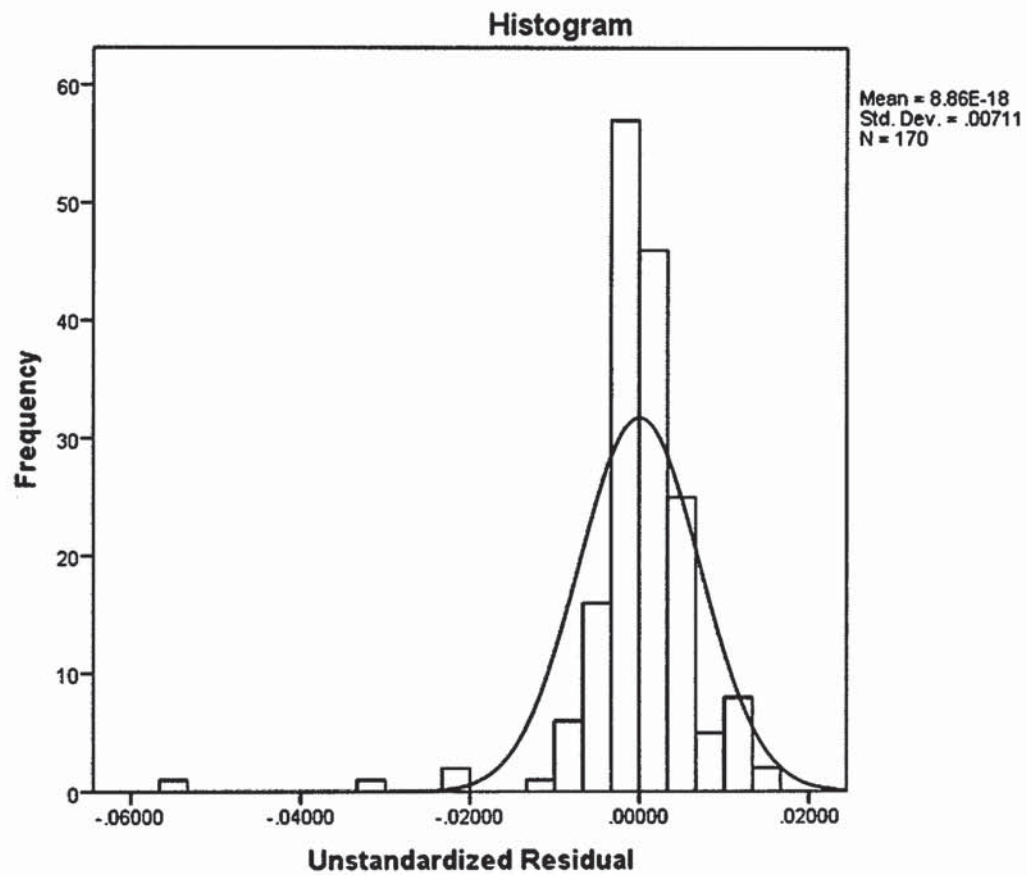


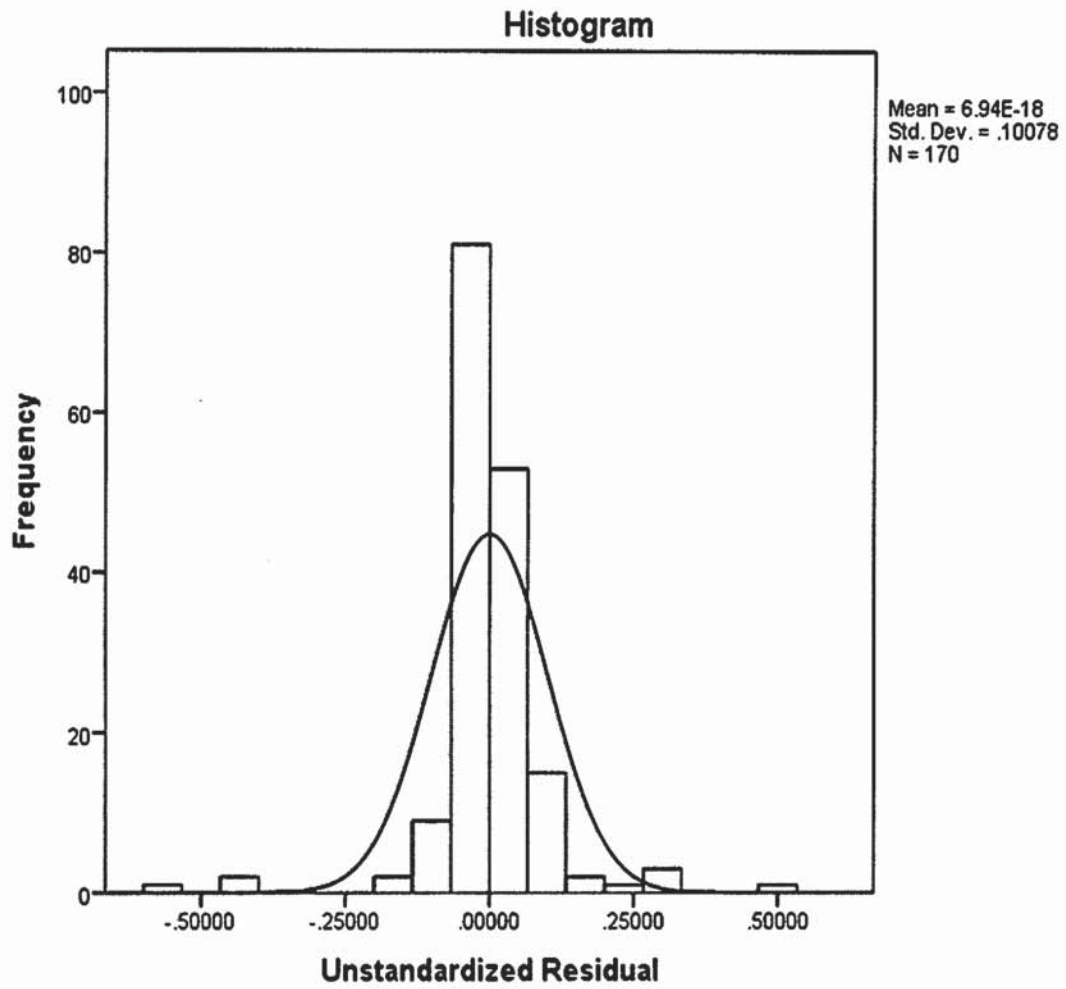
Figure 4, Histogram of the effect of online banking on ROE

Figure 5, Histogram of the effect of online banking on BRPROFIT

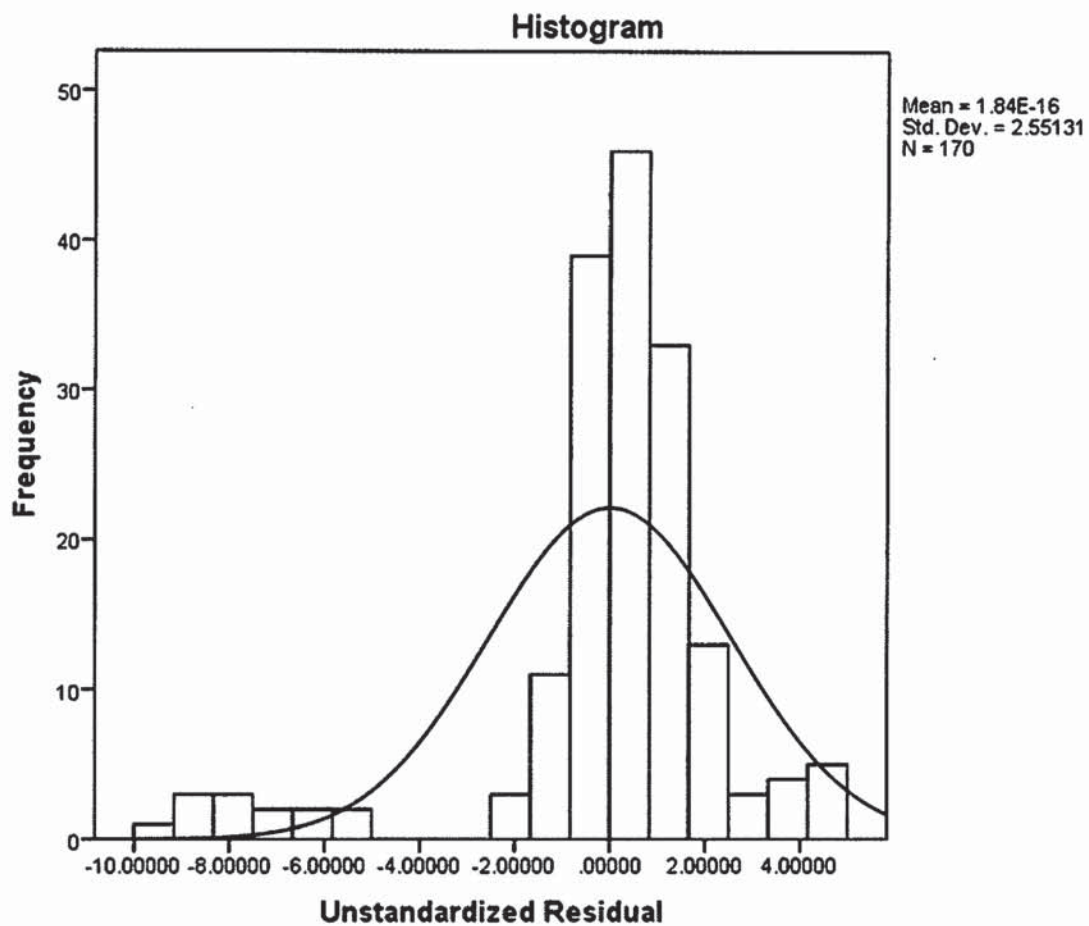


Figure 6, Histogram of the effect of online banking on CDBRANCH

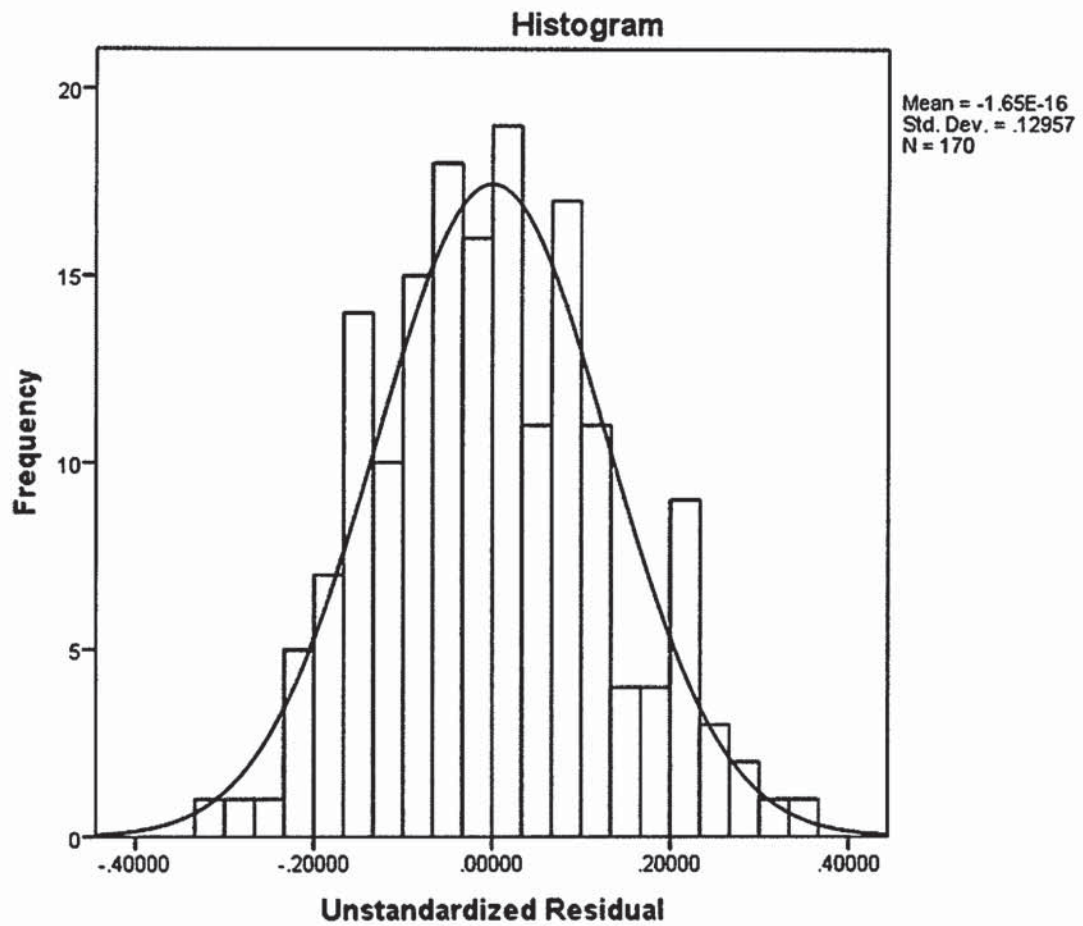


Figure 7, Histogram of the effect of online banking on LTCBRANCH

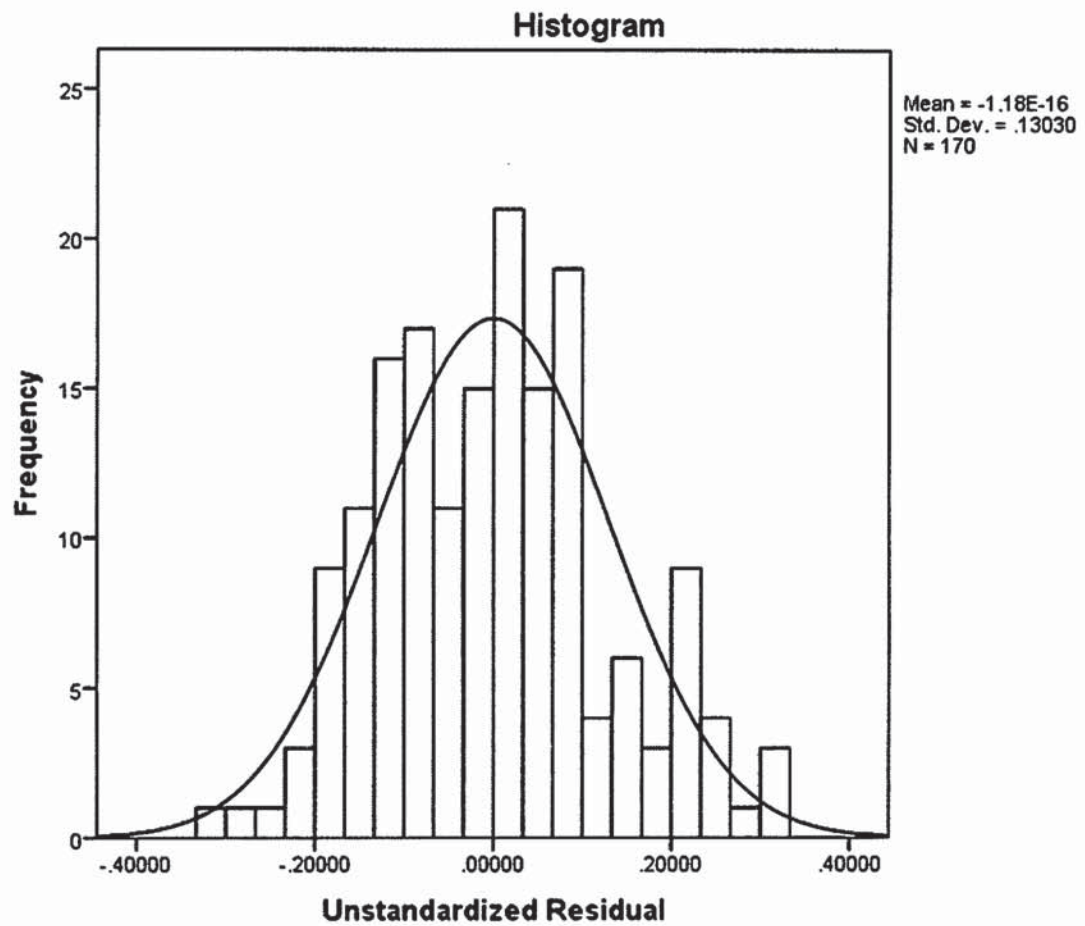


Figure 8, Histogram of the effect of online banking on TII/TA

