

# Effect of Bank Innovations on Profitability and Return on Assets (ROA) of Commercial Banks in Lebanon

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Received: January 23, 2017

Accepted: February 14, 2017

Online Published: March 10, 2017

doi:10.5539/ijef.v9n4p35

URL: <https://doi.org/10.5539/ijef.v9n4p35>

## Abstract

The purpose of this research is to study bank innovations in the field of mobile banking, debit and credit cards, automated machines (ATM), internet banking, point of sale terminals (PST) and electronic funds transfer (EFT). It purposely looked into those innovations in relation to their influence on profitability and return on assets (ROA) of Lebanese commercial banks. Data was collected through a research questionnaire, and statistical analysis was done using the Package of Social Sciences Software (SPSS). The results revealed that there is a significant positive impact of bank innovations on profitability and return on assets of Lebanese commercial banks and significance tests also showed that the impact was statistically significant. Based on the results of the study, it can be concluded that bank innovations affect profitability and return on assets (ROA) of commercial banks in Lebanon positively.

**Keywords:** bank innovations, commercial banks, profitability, return on assets (ROA)

## 1. Introduction

Over the last two decades, the banking sector has been significantly affected by the rapid and strong developments in communication technology (ICT) and information. This situation could certainly change the way banks are organized their business strategies, customer relations, and all the specific functions.

Without a doubt the banking sector has benefited from the development of Information solution which formed the operation. Self-service technologies appeared after a heavy reliance on information technology, which have become a benchmark for successful banking institutions.

The entire banking creativity has made the processing and transmission of information much easier and faster. Banking products can be marketed easily, and also because of the networks on a larger scale, based on variety of regional and global communications. Moreover, it has been enhanced customer access and awareness. So it is clear that the development of information technology has transformed the diversity of products, product development, service channels, and the type of packing of banking services. This has led to significant efficiencies not only in all services related to the banks, but also in the banks themselves. Nevertheless, while technological advances are incredibly fast, there is not always a similar development in the operational process regarding its use.

Accordingly, there is a particular issue on how it affects the technological innovation process the operational results of banks, and how can a more positive relationship between innovation and return in the new situation can be generated through the banking system. By studying this fundamental issue, this study shows how, in the banking sector, the innovations of bank have contributed to the financial functioning of commercial banks in Lebanon; I mean pretax profit and return on assets.

This study focuses, in particular, on the bank innovations effects for model operating of banks. It begins by formulating research questions and hypotheses, and then it brings forward the debate by giving consideration of the sample, and measure. In the final section, explain the findings and conclusions, paving the way for future research.

## 2. Background

Innovation is widely defined as the process which gathered around technological change in organizations and

communities. Nevertheless, there is no large measure of agreement on the consequences of this process (Downs & Mohr, 1976). Innovation definitions ranging from “Treat innovation and invention synonymous with regard to any idea or practice, or product that is new for the enterprise user as innovation” (Cooper, 1998).

In the financial services sector, innovation is seen as “an act of innovation to create and deploy new financial tools, techniques, institutions and markets that facilitate access to information, and trade and means of payment” (Solans, 2003).

The financial services institutions are, among the industries, most affected by the technological revolution. The financial services industry relies on the exchange of information, which itself depends heavily on communications technology and information (ICT) in order to obtain, analyze and provide data for all users concerned. Financial institutions continuously update their marketing strategies in order to satisfy closely the desires and demands of their clients in a safe environment. These institutions should, on the one hand, equip themselves with the latest technologies for adaptation; on the other hand, bring future plans for relationship-oriented marketing strategy. The final result will be “to build a culture that gives priority to the customer, and generates a climate of confidence, and encourages increasing knowledge and customer loyalty. (ICT) helps financial institutions to improve the efficiency and effectiveness of their business process and improving their competitive situation” (Rust & Kannon, 2002).

Allen and Gale (1994) propose that the release of the financial innovation process followed by banks in the United States proved that there is a response to the intensification of competition within the financial markets. Innovation is necessary for competitiveness of all businesses, but particularly important for banking and finance companies. Innovation is a main engine of growth that surprises and delights the customer with new, differentiated and relevant benefits. A successful product innovation provides a variety of products and thus a product mix. A product mix in a firm is of particular importance in a competitive industry where there are several competitors competing for different customer segments, such as the banking sector where different banks aim at individual and corporate incomes.

In accordance with Nofie’s (2011) “innovation in the financial sector is the arrival of a new or better product and / or access to the process reduces the production cost of existing financial services”.

Another significant impact on the provision of financial services has been the massive progress in information technology and communication (Heikkinen & Korhonen, 2006). Hamilton, Adreian and Nigel (2007) confirm that the ability to assimilate data and make complex calculations has helped market experts to develop new financial products that disintegration and reassemble different elements of financial risk. These new products have the possibility of matching closely to the requests and risk preferences of both investors and borrowers, and therefore improve the interpolation of financial markets. The innovation operation has been enhanced by the widely and ready electronic access to information and news on economic and financial developments and on market reactions.

Financial innovations stand out for many reasons. Batiz-Lazo and Woldesenbet (2006) brevity the reasons for the growth of modern financial innovation as: tax benefits, reduced organization costs, decrease in bankruptcy costs, and decrease in moral hazard, transparency and conditioning. High degree of disturbing environment leads to successful innovation, creating a unique competitive situation and competitive advantages and lead to a high performance (Roberts & Amit, 2003). This can only keep the same by continuous innovation and improving of the product and the process (Porter, 2004).

The competition’s pressure that exists in the majority of industry sectors, the high cost of initiation of new products and services, the increase in failure rate of new products, and the necessity for better use of customer data have led companies to develop new products and services under their former brand names instead of releasing new products with new brand names, releasing new products or services under former brand names is called linear brand extensions.

In the study of the service sector (Pena et al., 2006), where market mechanisms are very different, it is somewhat unexpected that the linear service extensions are typically used only in hotels and the financial sector. Although the existing studies have analyzed the quality of trade names and its influence on purchase intentions (Qiu et al., 2002), few studies have tested these influence within the context of services.

Various challenges have been imposed by innovations to organizers and banks themselves while the drop off obstacles to the supply of financial products and the large size of risk pooling and transforming within and across the borders has led to increase network interactions within the international financial systems (Nigel, Penalver, & Nicolas, 2008). This aggravated to the system complexity and equivalent evolution of financial system risks,

adding big challenges for financial institutions and bodies responsible to maintain financial stability (Nigel, Penalver, & Nicolas, 2008). New tools in organizer finance develop so quickly that market infrastructure and systems are not prepared when those tools came under pressure.

Changes in monetary measures and financial innovation and control follow each other and main banks must therefore change their instruments, goals and operational procedures from time to time so as to keep up with innovation and ensure the continued of the financial system (Misat, Njoroge, Kamau, & Ouma, 2010).

### *2.1 The Spread of Technological Innovation*

The features of the spread of technological innovations are well recognized by Rogers “the process by which an innovation is transmitted through certain canals over time among the members of a social system” (Rogers, 1995, p. 10). Which means that there are four elements in the spreading of technological innovations. These elements are the innovation, time, communication channels, and the social system. By understanding the characteristics of an innovation, channels use the issue of time, and how the social system influences the spread of the comprehensive understanding of how technological innovation proliferation can be better.

According to Dillon the Moris (1996) and Rogers (1983, 2003) factors that affect the spread of heresy include: relative advantage (the extent to which technology is able to provide enhancements to the tools currently available), compatibility (alignment with the practices and social norms among users), complexity (ease of use or learning), the trial of the ability (a chance to try before creating the link to be used), and the observability (the extent to which the outputs of the technology and its advantages are clear to see). These elements are not mutually exclusive and therefore is not able to predict whether the level or prevalence rate of innovation.

Consequently, Rogers (1995) found that innovations that have been observed by members as having more comparative advantage, compatibility, trial- ability, observability and less complexity are supposed to be applied is more quickly than other innovations.

Besides the features of innovations, the deployment process is affected by the interdependence between innovations and spreading them at the same time (Rogers, 1995, p. 15). Rogers ends with the conclusion that the adapter’s experience with one innovation “obviously affects that individual’s perception of the next innovation to diffuse through the individual’s system.”

## **3. Literature Review**

The review of literature shows that only few studies were conducted in this field, effect of bank innovations on bank performance. Mabrouk and Mamoghli (2010) confirmed that if the process of innovation continues and new technologies are initiated over time, innovative banks continue to earn high profits on the various new or improved products. However, extraordinary profits would decline as the innovations adopted on a large scale (Berger the Mester, 2003).

Financial innovation is defined by Framework and White (2004) as excluding activity that reduces internally the costs and risks of the bank or externally better meets the needs and suitability of clients. Generally, they classify financial innovation into new services or /products (for example, debit and credit cards, ATM, etc.), new production process (for example, accessing information via computers and telecommunications, electronic payments and record-keeping, sale of financial services, securitization loans, etc.), and new organizational forms (such as online-only banks, and banks with diverse traditional and non- traditional financial services, etc.). The importance of these financial innovations referred to their contribution to economic growth through allocation of savings to investment (King & Levine, 1993). Many of these researches hold more or less a positive relationship between product innovations and firm performance. However, there are also some studies indicating a negative relationship or no relationship at all. There is no local study that has investigated the effects of bank innovation on commercial banks performance in Lebanon, hence the existence of the research gap.

## **4. The Banking Sector in Lebanon**

The banking sector in Lebanon is almost the leader in the Middle East and North Africa banking industry, and has a distinct role all over the world. The use of self-service banking technologies agrees to some extent with its leading role. The online banking services are practically provided by all Lebanese banks.

The Lebanese banking sector is sound and stable regarding the financial terms. It plays a major role in the Lebanese economy, where banks control the financial system of the country and are the main source of credit to businesses and individuals.

The Key Features of the banking sector in Lebanon are:

- A huge number of banks of various sizes, nature, and the capital structure;

- Significance openness to the outside;
- Qualified human resources;
- Provider of modern and traditional services:
  - On-line services, automated teller machine, and card services;
  - Private, commercial, Islamic and corporate banking;
  - Financial mediation, consulting, and insurance services.
- Commitment to international standards and codes;
- Largely integrated in Lebanese economy;
- Sustainability and favorability in terms of growth and performance;
- Solid ability to face and overcome shocks and crisis.

Lebanese banks have grown significantly since the beginning of the 90s. The growth has resulted from the efforts made by the Lebanese banks to change and persist in consistent with global developments. Furthermore, the banking sector in Lebanon is a valuable tool for the advancement and establishing of the national economy. This is because enhancement and growth in the banks will eventually lead to lower interest rates cost and thus to encourage more investment in the nation. National banks similarly form as a mean whereby the nation was able to get foreign revenue. This is because if these banks are able to modernize their services and extent their businesses internationally this would be an occasion for the nation to produce additional income. Lebanese banks must also improve their services to compete easily with more resourcefulness foreign banks that operating in Lebanese market.

#### *4.1 The Current Situation of the Banking Sector*

Statistics in 2014 shows that there are 70 commercial banks, 1041 branches that are spread through Lebanon, and 55 banking institutions operating in Lebanon. Certain key regulations and policies have constituted the main buffer that protected Lebanese banking sector from the damages of the global financial crisis. Thus, The Lebanese banks attracted investors who intend to protect their money.

#### *4.2 Strengths of Banking Sector*

The Lebanese banking system has a good banking reputation. One major advantage is the Lebanese liberal economic system, taking into account the conventional Nature of other Middle East economies. The banks in Lebanon are also looking to create a balance between Islamic banks and commercial banks. Central bank of Lebanon (BDL), which has performed relatively well since it was founded, controls the banking sector in Lebanon. The (BDL)'s ability to formulate and implement good policies has enhanced investors' confidence; both locally and abroad.

The Lebanese banking sector is based on the bank secrecy laws that allow banks to obtain confidence of investors and avoid illegal activities such as money laundering.

An additional main strength of the Lebanese banking sector is the capability to manage and alleviate risks. Furthermore, bank innovations are better opportunities for interaction between the client and the bank. That is why customer relationships via the internet are encouraged. This is because clients interact with their banks via the internet five times more, than they would visit their local branch. This means that bank innovations provide better means for banks to market their services and attend to the needs of their clients via internet compared to conservative banking.

### **5. Problem Statement**

It seems clear that bank innovation not only allows the bank to reduce costs, but also opens up a range of new opportunities that will allow banks to improve their performance in different ways. In particular, reducing the cost alone does not give a competitive advantage and the focus has shifted to the revenue growth. From this evidence, and analysis dedicated to the major effects of bank innovation on the performance of Lebanese commercial banks seems to be of great relevance.

However, existing literature on Lebanese banking efficient performance focus on system efficiency in the delivery system. Other aspects such as tangible value creation, the amount of profit gained or costs reduction received little attention. This is the knowledge gap that the present study is trying to access.

A new dimension was not investigated by any previous literature that created and necessitated the need to conduct a study from the Lebanese context to analyze the effects of bank innovations on the performance of

commercial banks.

## 6. Scope of the Study

The main objective of this study is to focus on the direct impacts of bank innovation on financial performance of Lebanese commercial banks and help in the developing of an integrated plan based on the technological innovation that is more adopted for the successful of commercial banks, who are interested in long-term strategies for profitability. Thus, this interest in development will help banks use the technological innovations in the proper way to increase profitability.

## 7. Objectives of the Study

The specific objectives of the study could be stated under the following:

- 1) To establish the effects that bank innovations have on the profitability in Lebanese commercial banks;
- 2) To assess the effects that bank innovations have on return on total assets (ROA) in Lebanese commercial banks.

## 8. Research Questions

A set of questions was posed to guide this study. The questions are as follows:

- 1) To what extent do bank innovations affect return on assets (ROA) of Lebanese commercial banks?
- 2) To what extent do Lebanese commercial banks depend on the adoption of bank innovations in their profitability?
- 3) Determine the relative importance of variables explaining the incremental revenue because of adopting technological innovations.

## 9. Research Hypotheses

It has been known throughout centuries of research that the term “research” is mainly characterized as the assumption or preliminary statement about the relationship between two or more variables to be examined.

### 9.1 First Research Hypothesis

Adoption of bank innovations has a positive effect on profitability of Lebanese commercial banks.

### 9.2 Second Research Hypothesis

Adoption of bank innovation has a positive effect on return on total assets (ROA) of Lebanese commercial banks.

## 10. Statistical Hypothesis

In order to estimate the true impacts of bank innovations on the Lebanese commercial banks, the null and alternate hypotheses have been framed. The null hypothesis states that the coefficient  $\beta_j$  is equal to zero, and the alternative hypothesis is simply at least one where coefficient  $\beta_j$  is not equal to zero.

## 11. Methodology

This section presented the data collection and analysis approaches used in the study. Specifically, the section described the research design, study population, size of sample, collection methods of data and research techniques, data analysis and presentation of the results techniques, among others.

Descriptive survey research design was used in this study to collect data from various resources. To fulfill the purposes of the study the following tasks were undertaken:

- Based on the purpose of the study which is to evaluate the impacts of bank innovations on the performance of Lebanese commercial banks, a thorough review of latest available literature regarding the evaluation of bank innovations effects on banking sector's performance was carried out.
- Identify the combination of those procedures or practices which would be most appropriate for this study.
- A pilot survey was conducted.

### 11.1 Sample Selection

The sample of the study consists of senior management employees in commercial banks that work and adopt bank innovations in Lebanon. Since the researchers in this study were unable to have access, for reasons related to some banks, to all population adopting bank innovations and, therefore, were unable to randomly select a representative sample of the actual number of banks adopting bank innovation in Lebanon, they decided to use a

judgmental sample which consisted of a large sample size 200.

### 11.2 Instrumentation

The researchers conducted a pilot instrument to test the validity and reliability of the questionnaire in the collection of data for the objectives of the study. Through review of literature, informal discussions with five selected experts in this field were valued and combined to enhance the content and ensure the validity of the questionnaire.

Reliability was tested using the 20 questionnaires that have been tried with bank employees who were randomly selected and were not included in the final study sample. The aim is to avoid bias answer in the event to complete the questionnaire themselves twice. The rule of thumb suggests that 5% to 10% of the sample selected should represent the pilot test (Cooper & Schindler, 2011). Experimental test sample was within the recommendation. Cronbach's alpha is the most common measure of internal consistency (reliability). It is used to test the reliability of questionnaire using Statistical Package for Social Sciences (SPSS) software. It produced a reliability test result and Cronbach's alfa overall correlation coefficient of 0.837, which indicates a high level of reliability for the scale we have with this sample.

Different groups from different commercial banks in Lebanon were asked to respond to attitude items related to *Effects of bank innovations on return on assets (ROA) and profitability of Lebanese commercial banks* using Likert-five-point scale format whereby 1 means strongly agree (SA); 2 means agree (A); 3 means neutral (N); 4 means disagree (D); and 5 means strongly disagree (SD). Three hundred (300) questionnaires were distributed to bank senior managers who randomly selected from commercial banks. Only 207 questionnaires were returned and which form a 69% response rate that is regarded as highly accepted by researchers.

Due to missing data, the questionnaire revealed that six cases should be neglected in the analysis, and this was because some respondents skipped some questions. Thus, we end up with 201 significant questionnaires; however, we have analyzed 200 questionnaires.

The questionnaire was divided into four parts;

#### Part I: introduction.

**Part II: General Information** consisting of three questions: (1) name of bank, (2) age of respondent, and (3) experience level of respondent in the Banking sector.

**Part III:** Consists of Q1 through Q18 measuring the *effects of bank innovations on return on assets of Lebanese commercial banks* requesting answers on five point scales.

**Part IV:** Consists of Q1 through Q18 measuring the *effects of bank innovations on profitability of Lebanese commercial banks* requesting answers on five point scales.

## 12. Findings and Analysis

### 12.1 Sample Demographics

This paragraph formulates the general characteristics of the individuals of the sample in terms of age, and the departments in which they work, and the number of years of experience in the bank.

#### 12.2 Age Groups

The table shows (1) that a majority of respondents were over the age of 40 years with most of them (44%) were between 41 to 50 years old. And the rest of the respondents (31%) were between 20 and 40 years old. On the other hand, it was only few over fifty years old which is in line with the labor force in many banks that at the age of basically below the fifty-year-old is due to the re-arrangements of periodic employee, which usually witness exit of older employees either through voluntary exit or employer began early time retirement.

Table 1. Age of Respondents

Age	21-30	31-40	41-50	Over 50	Total
Frequency	10	52	88	50	200
Percent	5	26	44	25	100

#### 12.3 Distribution by Departments

Table 2 that the majority of respondents (78%) working within the financial departments, credit and information system departments, while the rest (22%) working within audit, operation and human resource departments. It is

evidence from this distribution that the finance, information system (IS) and credit departments generate more interest with this study as they are the departments with high utilization of innovation and which support innovations in the bank set up.

Table 2. Distribution by departments

Department	Credit	Finance	IS	Operation	Audit	HR	Total
Frequency	36	70	50	20	10	14	200
Percent	18	35	25	10	5	7	100

#### 12.4 Experience in Banks

The Table 3 shows that 97% of respondents work in the banking industry for more than 5 years. (50%) work for less than 10 years. This finding suggests that most of the respondents have worked in the bank after 2005, which is in line with the high growth experienced in the last decade in the banking sector and with prevalence idea in Lebanon that banking jobs are more secure by comparison with other industries. It also reflects the fact that the Lebanese banking sector has a distinguished role internationally.

Table 3. Respondents banking sector experience

Years	1-5	5-10	Over 10	Total
Frequency	6	94	100	200
Percent	3	47	50	100

#### 12.5 Interpretation

This paragraph provides the results and discussion of the two main objectives of the study.

##### 12.5.1 Effect of Bank Innovations on Profitability of Lebanese Commercial Banks (First Objective of the Study)

Determining the Relative Importance of Variables Explaining the Effect That Bank Innovations Have on Profitability of Lebanese Commercial Banks:

##### 1) Correlations between Bank Innovations and Profitability

Table 4 presents the correlation coefficients between bank innovations and bank profitability. Electronic funds transfer has the highest correlation between profitability and bank innovations of 0.231, and the lowest correlation with debit and credit cards of 0.000. Mobile banking has a high linear relationship with internet banking (0.772) and electronic funds transfer (0.732). This indicates the presence of multiple overlapping linear relationships arising from mobile banking and can lead to unstable regression, and therefore mobile banking has been excluded in the regression analysis.

Table 4. Pearson correlation between bank innovations and profit

Variable	Coefficient Type	Profi.	ATM	Credit and Debit Cards	POS	Mobile banking	Internet banking	EFT
Profi.	Pearson correla Sig.	1						
ATM	Pearson correla Sig.	-0.073 0.439	1					
Credit and Debit Card	Pearson correla Sig.	0.000 0.997	-0.097 0.353	1				
POS	Pearson correla Sig.	-0.123 0.238	0.345 0.002	-0.154 0.138	1			
Mobile Banking	Pearson correla Sig.	0.079 0.448	0.368 0.000	0.419 0.000	0.049 0.592	1		
Internet Banking	Pearson correla Sig.	0.093 0.366	-0.123 0.235	0.822 0.000	-0.179 0.090	0.772 0.000	1	
Electronic Funds Transfer	Pearson correla Sig.	0.231 0.034	-0.113 0.275	0.645 0.000	-0.356 0.002	0.732 0.000	0.886 0.000	1

## 2) Regression Analysis – Profitability and Bank Innovations

The researchers decided to use Multiple Regression analysis to examine the effect of the following independent variables: ATM, point of sale terminals, internet banking, debit and credit cards, and electronic funds transfer on the dependent variable (Y), (profitability of commercial banks in Lebanon). According to IBM, “linear multiple regression is useful in situations where there are more than two independent variables and/or dependent variables”.

The calculations are easily accomplished using SPSS. The general form of the multiple regression equation is:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_p x_p + U$$

The fitted values  $b_0, b_1 [ \dots ] b_p$  will be used as estimates of the parameters 0, 1, etc., having “p” represent the population regression line.

Table 5 through Table 7 shows the SPSS output:

Table 5. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.770 <sup>a</sup>	.593	.535	.45754

a. Predictors: (Constant), ATM, point of sale terminals, internet banking, debit and credit cards, and electronic funds transfer

Table 6. ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.635	12	2.136	10.205	.000 <sup>b</sup>
	Residual	17.585	84	.209		
	Total	43.220	96			

a. Dependent Variable: Profitability of bank.

b. Predictors: (Constant), ATM, point of sale terminals, internet banking, debit and credit cards, and electronic funds transfer.

Table 7. Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.521	.383		1.361	.177
	Electronic funds transfer	.473	.153	.270	3.099	.003
	Automated teller machines	-.003	.007	-.053	-.438	.662
	Point of sale terminals,	-.010	.050	-.015	-.199	.842
	Internet banking	-.186	.114	-.130	-1.629	.107
	Debit and credit cards	-.085	.115	-.057	-.735	.464

a. Dependent Variable: Profitability of bank.

The statistical relationship between one or more predictor variables and the response variable (regression analysis).

**R-squared and Adjusted R-squared:** The R-squared value means that **59.3%** of the variation in the commercial bank profitability can be explained by the effective bank innovations. R- Squared is highly significant, as shown in the ANOVA table, in explaining the relationship between bank innovations and profitability. **F= 10.205** that significant at **0.0** level of significant. The p-value for each variable tests the null hypothesis that the coefficient is equal to zero (no effect). A low p-value (< **0.05**) indicates that you can reject the null hypothesis. In other words, a predictor that has a low p-value is likely to be a meaningful addition to your model because changes in the predictor’s value are related to changes in the dependent variable. Conversely, a larger (insignificant) p-value suggests that changes in the predictor are not associated with changes in the response. As R-squared values increase as we add more variables to the model, the adjusted R-squared is often used to summarize the fit as it takes into account the number of variables in the model.

Adjusted R-squared = **1** (Mean Square Error /Total Mean Square)

The Adjusted R-squared = **0.553**.

The intercept (Constant) in this multiple regression model is the mean for the response when all of the explanatory variables take on the value **0**.



**The Regression Coefficients:** Typically the coefficient of a variable is interpreted as the change in the dependent variable, Y based on a 1-unit change in the corresponding explanatory variable keeping all other variables held constant. The results suggest that the electronic funds transfer is significant in explaining the profitability of commercial banks with the significance of 0.03 which is lower than the p-value 0.05. As a result of this finding we reject the null hypothesis and conclude that the electronic funds transfer has a significant impact on the profitability of Lebanese commercial banks. However, we accept the null hypothesis and conclude that ATM, point of sale terminals, debit cards, and Internet banking do not have any significant impact on the profitability of Lebanese commercial banks.

Transfer of money to or from one of the banks generates fees income and when the other bank receives the money there are many transactions that may arise from those funds. For example, a deposit can be invested by the client, thus providing an opportunity for the bank to lend the money, and thus earn interest income during the period of the deposit. This means that electronic funds transfer (EFT) has direct and indirect means to improve the bank’s profitability.

Since the t-test for the regression coefficients of the other independent variables are not statistically significant, it is not appropriate to interpret their own coefficients. It may be the best alternative to say, "No statistically significant linear dependence of the mean of Y on Xs was detected”.

12.5.2 Effects of Bank Innovations on Return on Assets of Lebanese Commercial Banks (Second Objective of the Study)

1) Determining the Relative Importance of Variables Explaining the Effects that Bank Innovations Have on Return on Assets of Lebanese Commercial Banks

Table 8 shows the correlation coefficients between bank innovations and returns on assets on one side and between the bank innovations with each other on the other side. The results indicate the highest correlation between debit and credit cards and return on assets (ROA) of 0.23; whereas negative correlations can be seen between return on assets and Automated Teller Machines (-0.068), Mobile Banking (-0.089), Internet Banking (-0.03), Point of Sale Terminals (-0.079) and Electronic Funds Transfer (-0.113). This indicates that with one unit change of each of the above mentioned bank innovations there is a subsequent negative unit change in return on assets (ROA). In addition, there is high collinearity arising from Automated Teller Machines to Mobile Banking and Point of Sale Terminals and therefore Automated Teller Machines variable have been excluded in the regression analysis to control for multi-collinearity.

Table 8. Pearson’s correlation between bank innovations and return on assets

Variable	Coefficient Type	Return on ossets	ATM	Credit and Debit Cards	POS	Mobile banking	Internet banking	EFT
Return on assets	Pearson correlaSig.	1						
ATM	Pearson correlaSig.	-0.068	1					
Credit and Debit Card	Pearson correlaSig.	0.230	0.058	1				
POS	Pearson correlaSig.	-0.079	0.699	-0.324	1			
Mobile Banking	Pearson correlaSig.	-0.089	0.771	-0.362	0.916	1		
Internet Banking	Pearson correlaSig.	-0.03	0.023	0.009	0.425	0.42	1	
Electronic Funds Transfer	Pearson correlaSig.	-0.113	-0.147	0.219	0.083	0.098	0.679	1
		0.323	0.16	0.036	0.431	0.352	0.000	

Table 9 through Table 11 shows the SPSS output:

Table 9. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.989 <sup>a</sup>	.977	.977	.183

a. Predictors: (Constant); Debit and credit cards, Point of sale terminals, internet banking, Mobil banking and Electronic Funds Transfer (EFT).

Table 10. ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.356	19	14.5915	34.974	.000 <sup>b</sup>
	Residual	39.948	18	0.4172		
	Total	88.304	37			

a. Dependent Variable: Return on Assets in Bank.

b. Predictors: (Constant), Point of sale terminals, debit and credit cards, Mobil banking, internet banking and Electronic Funds Transfer.

Table 11. Coefficients<sup>a</sup>

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	.659	.301		2.191	.031
	Debit and credit cards	.239	.066	.338	3.614	.000
	Mobil Banking	-.061	.132	-.042	-.464	.644
	Point of sale terminals	.074	.136	.049	.545	.587
	Internet banking	.165	.159	.098	1.040	.301
	Electronic Funds Transfer	-.245	.122	0.17	-1.44	.154

a. Dependent Variable: Return on assets in bank.

**R-squared and Adjusted R-squared:**  $R^2 = 97.7\%$  indicating that 97.7% of the variations in return on assets of Lebanese commercial banks can be explained by bank innovations holding other factors constant. R-Squared is highly significant in clarifying the relationship between return on assets (ROA) in Lebanese commercial banks and bank innovations as shown in the ANOVA table (10),  $F = 34.974$  that significant at **0.0** level of significant and we reject the null hypothesis and conclude that bank innovations have a positive effect on return on assets (ROA) of Lebanese commercial banks.

### **The Regression Coefficients**

The results indicate that debit and credit cards are significant in explaining the return on assets of Lebanese commercial banks with a level of significance of 0.00 which is less than the p-value 0.05. As a result of this discovery, we reject the null hypothesis and conclude that the debit and credit cards have a significant impact on the return on assets of Lebanese commercial banks. However, the other innovations of the bank are not significant, and therefore we accept the null hypothesis and conclude that the debit and credit cards, internet banking, mobile banking, and electronic funds transfer do not have any significant impact on the return on assets (ROA) of Lebanese commercial banks. Thus, debit and credit cards do not need a lot of primary investment expenditure, and therefore this explains why they are significant in contributing to the return on assets (ROA). the profit margin from commercial banks' cards is high; Whereas the POS, internet banking and mobile banking need large primary investment expenses and therefore, they initially have low-income margins and thus lesser contribution to return on assets (ROA).

## **13. Conclusions and Recommendations**

### *13.1 Conclusions*

This study investigates the relationship between bank innovations and profitability on one side and between bank innovations and return on assets (ROA) of Lebanese commercial banks on the other side. Thus, two hypotheses were formulated to study the significance of bank innovations (independent variables) in affecting both the profitability and return on assets of those banks.

In conclusion, bank innovations affect the financial performance of Lebanese commercial banks. Particularly, bank innovations affect profitability and return on assets of commercial banks positively. It can be concluded that bank innovations potentially leads to higher profitability and higher return on assets of commercial banks.

Commercial banks in Lebanon continue the good performance although the other sectors of the economy show low performance. The use of bank innovations has enabled banks to make additional profit away from traditional sources such as commissions from transactions done through bank innovations like debit and credit cards and electronic funds transfer.

### *13.2 Recommendations*

It seems more common to depict bank innovations in banking sector as a process of better financial performance. Remarkably, this process of performance should be seen as a continuous process that satisfies both banks and

customers.

A further more detailed study is recommended to include all bank innovations and their impacts on the financial performance of Lebanese commercial. A detailed study can be carried out to determine whether the adoption of bank innovations contributed to financial development or not.

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## Appendix

### Questionnaire

This questionnaire is a meant to collect data regarding the *effect of bank innovations on financial performance of commercial banks in LEBANON*.

#### Section A: General Information

##### 1: Bank Particulars

Name of the Bank (Optional) .....

##### 2: Respondent Particulars

Gender: Male  Female

#### Age Bracket (tick as appropriate)

No	Age Bracket	Tick as Appropriate
i.	10-20	
ii.	21-30	
iii.	31-40	
iv.	41-50	
v.	Over 50	

#### How long have you worked in the Banking Sector (tick as appropriate)

No	Period	Tick as appropriate
i.	Less than 1 yr	
ii.	Btw 1-5 yrs	
iii.	Btw 5-10 yrs	
iv.	Over 10 yrs	

#### Section B: Effect of bank innovations on total income

This section has statements regarding the effect of bank innovations on incomes of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5

##### Automated Teller Machines (ATMs)

- ATMs have had a positive effect of increasing commission fee based income
- ATMs have influenced positively the increase of interest based income
- ATMs have expanded the income generating potential of the bank

##### Debit & Credit Cards

- 
4. Debit & credit cards have had a positive effect of increasing commission fee based income
  5. Debit & credit cards have influenced positively the increase of interest based income
  6. Debit & credit cards have expanded the income generating potential of the bank

**Point of Sale (POS) Terminals**

7. POS terminals have had a positive effect of increasing commission fee based income
8. POS terminals have influenced positively the increase of interest based income
9. POS terminals have expanded the income generating potential of the bank

**Mobile Banking**

10. Mobile banking has had a positive effect of increasing commission fee based income
11. Mobile banking has influenced positively the increase of interest based income
12. Mobile banking has expanded the income generating potential of the bank

**Internet Banking**

13. Internet banking has had a positive effect of increasing commission fee based income
14. Internet banking has influenced positively the increase of interest based income
15. Internet banking has expanded the income generating potential of the bank

**Electronic Funds Transfer**

16. Electronic funds transfer has had a positive effect of increasing commission fee based income
  17. Electronic funds transfer has influenced positively the increase of interest based income
  18. Electronic funds transfer has expanded the income generating potential of the bank
- 

**Section C: Effect of bank innovations on return on assets**

This section has statements regarding the effect of bank innovations on return on assets of the bank. Kindly respond with the response that matches your opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
<b>Automated Teller Machines (ATMs)</b>						
1.	ATMs influence reduction of operational costs and hence better return on assets for the bank					
2.	ATMs investments have payback period of less than 3 years and hence good return on assets					
3.	Incomes from ATMs have had positive impact on bank income margins					
<b>Debit &amp; Credit Cards</b>						
4.	Debit & credit cards influence reduction of operational costs and hence better return on assets for the bank					
5.	Debit & credit cards investments have payback period of less than 3 years and hence good return on assets					
6.	Incomes from debit & credit cards have had positive impact on bank income margins					
<b>Point of Sale (POS) Terminals</b>						

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7. POS terminals influence reduction of operational costs and hence better return on assets for the bank
  8. POS terminals investments have payback period of less than 3 years and hence good return on assets
  9. Incomes from POS terminals have had positive impact on bank income margins

**Mobile Banking**

10. Mobile banking influence reduction of operational costs and hence better return on assets for the bank
11. Mobile banking investments have payback period of less than 3 years and hence good return on assets
12. Incomes from mobile banking have had positive impact on bank income margins

**Internet Banking**

13. Internet banking influence reduction of operational costs and hence better return on assets for the bank
14. Internet banking investments have payback period of less than 3 years and hence good return on assets
15. Incomes from internet banking have had positive impact on bank income margins

**Electronic Funds Transfer**

16. Electronic funds transfer influence reduction of operational costs and hence better return on assets for the bank
  17. Electronic funds transfer investments have payback period of less than 3 years and hence good return on assets
  18. Incomes from electronic funds transfer have had positive impact on bank income margins
- 

**Section D: Effect of bank innovations on bank profitability**

This section has statements regarding the effect of bank innovations on profitability of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
	1	2	3	4	5
<b>Automated Teller Machines (ATMs)</b>					
1. Income from ATMs has high margin hence contributing positively to bank annual profitability					
2. ATMs have low maintenance costs leading to high levels of profitability over their economic lifetime					
3. Investment in ATMs is mostly motivated by profits to the bank					
<b>Debit &amp; Credit Cards</b>					
4. Income from debit and credit cards has high margin hence contributing positively to bank annual profitability					
5. Debit and credit cards have low maintenance costs leading to high levels of profitability over their economic lifetime					
6. Investment in debit and credit cards is mostly motivated by profits to the bank					
<b>Point of Sale (POS) Terminals</b>					
7. Income from POS terminals has high margin hence contributing positively to bank annual profitability					
8. POS terminals have low maintenance costs leading to high levels of profitability over their economic lifetime					
9. Investment in POS terminals is mostly motivated by profits to the bank					
<b>Mobile Banking</b>					

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- 
10. Income from mobile banking has high margin hence contributing positively to bank annual profitability
  11. Mobile banking has low maintenance costs leading to high levels of profitability over their economic lifetime
  12. Investment in mobile banking is mostly motivated by profits to the bank

#### **Internet Banking**

13. Income from internet banking has high margin hence contributing positively to bank annual profitability
14. Internet banking has low maintenance costs leading to high levels of profitability over their economic lifetime
15. Investment in internet banking is mostly motivated by profits to the bank

#### **Electronic Funds Transfer**

16. Income from electronic funds transfer has high margin hence contributing positively to bank annual profitability
  17. Electronic funds transfer have low maintenance costs leading to high levels of profitability over their economic lifetime
  18. Investment in electronic funds transfer is mostly motivated by profits to the bank
- 

### **Section E: Effect of bank innovations on customer deposits**

This section has statements regarding the effect of bank innovations on deposits of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
<b>Automated Teller Machines (ATMs)</b>						
1.	ATM services have attracted more retail depositors for the bank					
2.	ATMs have enabled customers to access their deposits with ease for withdrawal					
3.	ATMs have attracted corporate depositors and deposits					
<b>Debit &amp; Credit Cards</b>						
4.	Debit & credit cards services have attracted more retail depositors for the bank					
5.	Debit & credit cards services have enabled customers to access their deposits with ease for withdrawal					
6.	Debit & credit cards services have attracted corporate depositors and deposits					
<b>Point of Sale (POS) Terminals</b>						
7.	POS terminal services have attracted more retail depositors for the bank					
8.	POS terminal services have enabled customers to access their deposits with ease for withdrawal					
9.	POS terminal services have attracted corporate depositors and deposits					
<b>Mobile Banking</b>						
10.	Mobile banking services have attracted more retail depositors for the bank					
11.	Mobile banking services have enabled customers to access their deposits with ease for withdrawal					
12.	Mobile banking services have attracted corporate depositors and deposits					
<b>Internet Banking</b>						
13.	Internet banking services have attracted more retail depositors for the bank					
14.	Internet banking services have enabled customers to access their deposits with ease for withdrawal					
15.	Internet banking services have attracted corporate depositors and deposits					
<b>Electronic Funds Transfer</b>						
16.	Electronic funds transfer services have attracted more retail depositors for the bank					
17.	Electronic funds transfer have enabled customers to access their deposits with ease for withdrawal					
18.	Electronic funds transfer have attracted corporate depositors and deposits					

### **Section F: Effect of mobile phones and internet services on bank performance**

This section has statements regarding the effect of mobile phones and internet services on bank performance. Kindly respond with the response that matches your opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
<b>Mobile Phones</b>						
1.	Use of mobile phones has increased customer access to bank services					
2.	Use of mobile phones has added to more profitable business avenues to the bank					
3.	The use of mobile phones has improved the level of deposits for the bank					
4.	Use of mobile phones has led to more bank innovations					
5.	Mobile phones have led to more retail customers than corporate customers to the bank					
<b>Internet Services</b>						
6.	Use of internet services has increased customer access to bank services					
7.	Use of internet services has added to more profitable business avenues to the bank					
8.	The use of internet services has improved the level of deposits for the bank					
9.	Use of internet services has led to more bank innovations					
10.	Internet services have led to more retail customers than corporate customers to the bank					

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