

# The Determinants of Banks' Profitability under Basel Regulations: Evidence from Lebanon

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## Abstract

The purpose of this study is to shed some lights on the determinants of banks' profitability operating in Lebanon. Through applying Panel "EGLS period SUR" technique, for the period spans from 2000 to 2015. We have used a set of micro factors that might affect the banks' profitability such as; asset quality, liquidity, and capital adequacy, on a sample of twenty four banks operating in Lebanon. Net Interest Margin (NIM) has been used to measure the profitability. The results indicate that most positive powerful effects on NIM are Equity to Liability, and Interest rate on Deposits (on Average), and to a lower extent Loan Loss Reserve to Impairment Loans, the Impaired Loans to Equity, Liquid Assets to Total Deposits and Borrowings, whereas, Capital Funds to Liability, loan loss provision to net interest revenue, are the most significant but with a negative effect; and to lower extent Net charge Off to Average gross loans, Net loans to deposits and short term borrowing affect the NIM negatively. Our findings revealed that banks perform better when they maintain higher level of equity relative to their Liabilities, and then can achieve a higher level of profitability.

**Keywords:** banks' profitability, assets quality, liquidity, capital adequacy, and panel EGLS

## 1. Introduction

Depository banks are authorized and regulated by law. They play the intermediary role between borrowers and lenders, recognizing and realizing profit from the spread difference between interest revenues earned from loans and interest expenses paid to depositors. Achieving financial stability is a concern for most governments worldwide, since the financial markets have become the backbone of several economies. With new globalization trends, financial markets have led one of the main driving forces for change, growth, and development.

However, the risk-taking role in those financial institutions has put them in a critical situation especially in a rapid, ever changing, and uncertain economic environment. In other words, risk is the other flip of the coin of profitability; they move the same direction, either upward or downward.

The determinants of banks' profitability vary from country to country and from bank to bank due to rules and regulations where the banks are operating, and due to the strategies set by the managements for their operations, with the estimation of certain and reasonable level of risk, as well as a satisfactory and adequate level of capital.

In recent years, and due to rapid globalization, large corporations and international banks operate in global markets where the new definition of capital was an urgent need due to fundamental changes in the banking sector with the phenomenon of innovation and expansion in derivative markets, commodities, and the exchange of currencies, besides the diversification of their services provided and structured products, knowing that participation in these markets incurs risks that may lead to financial crises and then to collapse.

To address the market failures detected by the financial crisis (2008), when the market lost confidence in the

liquidity and solvency of many depository institutions; these weaknesses were transmitted to the remaining financial sector and economy. Basel committee on Banking Supervision (BCBS) introduced a set of fundamental regulatory reforms where the main goals of Basel III were first to promote resilient banks and to strengthen global capital and liquidity regulations, second to improve the banking sector's ability to absorb shocks arising from financial and economic stress, and third to improve risk management and Governance, as well as, to strengthen banks' transparencies and disclosures (Note 1)- assigned in Basel II.

Measuring a bank's profitability, Net Interest Margin (NIM) is the most commonly used efficiency measure in these studies, due to the importance of interest income and interest expense, since they are the main traditional function of banks' major operations, and for the substantial amount of their operating income. Gunter et al. (2013). A handful of the studies which detect the determinants of bank profitability have been made by Ho and Saunders (1981); Khdeiri et al. (2011); Hamadi and Awdeh (2012); Taha (2013); Nassar (2014); Gunes (2014); Ayaydin (2014); Ozili (2015). Some studies focused on cross-countries studies, whereas others focused on individual countries due to time period, laws and regulations differences, databases, economies, and variables. One common goal among these studies is to define the determinants of banks' profitability.

In many researches, variables such as asset quality, liquidity, capital adequacy, and others are used as internal specific variables that aim at finding the relationship between risk, bank capital, and their impact on banks' profitability, which has become bankers' great concern, Ayaydin and Karakaya. (2014).

Bankers' concern is the need to maintain higher capital requirements as per Basel III, more liquid assets that enforce banks to raise the cost of credit, and decrease the leverage ratio. As a result, these requirements will affect negatively the banks' profitability.

The Lebanese banking sector enjoys the benefits of a modern legal and regulatory environment, requesting that banks maintain a high capital adequacy ratio, which stood at 14.6% at the end of December 2014 (Note 2), whereas Basel Accord requires banks to operate with a minimum CAR of 8%.

The Central Bank of Lebanon (Note 3) and the Banking Control Commission of Lebanon (Note 4) are two independent authorities. There are no restrictions on inflows or outflows, building adequate provisions against Non-Performing loans (Note 5), allowing banks to carry out lending operations depending on their level of capital adequacy while adopting lending policies that balance between the commercial purpose of the loan and risk management.

The Lebanese economy is service-oriented; Lebanon has been intensively witnessing the repercussions of the Lebanese civil war from 1975 to 1990 (Note 6), and the consequences of July 2006 war, and lately, the consequences of the war in Syria. The Lebanese banking sector actually competes with a large number of 68 banks (Note 7). The Lebanese Gross Domestic Product (GDP) in 2015 was worth 47.1 Billion US dollars (Note 8), whereas its GDP value from the world economy represents only 0.08%, as reported by the World Bank in 2015 (Note 9) Furthermore, in 2015, Lebanon recorded a government debt to GDP ratio of 133.28%. In addition, Lebanon Capital Inflows & Remittances as a large percentage of GDP are among the highest ratio in the world. Finger and Hesse (2009).

Therefore, the analysis of Lebanese banks offers insight into the main determinants and key drivers of profitability.

## 2. Literature Review

In theory, a bank is considered to be "profitable" if it can earn financial income from the invested capital in operating the bank's activities. Virtually a bank's success is determined by its ability to generate profits in a certain elapsed period. Thus, the net interest margin is the crucial profitability and efficiency measure, indicating how well the management and the employees have been able to keep the growth of earnings, which primarily come from loans and investments. Rose and Hudgins (2014). To be considered as a profitable bank, the management should estimate a certain and reasonable level of risk. Banks among the financial institutions face many types of risks which adversely affect their profitability. However, these risks arise evidently in the form of liquidity risk, credit risk, funding risk, and others.

Thousands of papers had been conducted to examine and analyze the variables to detect the determinants of banks profitability. Interestingly, Net Interest Margin (NIM) as a measure of banks profitability has the bigger space in these studies, and it cannot be neglected due to the largest sources of interest income and interest expense, as the main traditional function of banks' major operations, and for its substantial amount of their operating income. Gunter et al. (2013); Ho and Saunders (1981); Berger (1995); Anghbazzo (1997); Dermirguc-kunt and Huizinga (1998); Levine (2004); Claey's et al. (2008).

Among the studies that detect the determinants of bank profitability are those presented by Vong and Chan (2006), Fadzlan and Royfaizal (2008), Masood et al. (2009); Rasiah (2010); Hamadi and Awdeh (2012), besides others who used the determinants of Net Interest Margin; knowing that Ho and Saunders in 1981 proposed the dealership approach to examine the factors affecting NIM. They also considered that the banks are dynamic dealers to set interest rate on loans and on deposits to keep in equilibrium the asymmetric entrance of demands for loans and supplies of credit - Nguyen (2007) - which was adopted, developed and improved by many researchers like by Maudos and Guervera (2004). Moreover, Monti-Klein model (1972) based the micro model of the banking sector and considered the micro model as a constant model, and thereafter Zarruck (1989) and Allen (1988) improved it by considering the demand and supply of lending and borrowing clear both markets. Nguyen (2007).

### *2.1 Credit Risk or Asset Quality*

Banks with no expertise operate with risky loan operations; they will increase the bad debt provision and reduce profits (Vong & Chan, 2009; Nassar et al., 2014). This has been consistent from the previous study by Vong and Chan (2009) and Fadzlan (2008) who found that the loan loss provision and the number of loans have a significant correlation to profitability and they affect it negatively. However, the study by Shahida et al. (2006) found that the provision for bad debts positively related to bank net interest margin which indicates that the more bad debt provisions made by banks, the more secure the bank margin facing external shocks. The findings by Alkassim (2005) state that the ratio of bad debt provision is of a low effect on banks' profit.

Another study was conducted by Panayiotis et al. (2005) for Greek banks using panel data analysis for the period 1985-2001 while using bank-specific variables: Credit risk, capital, productivity growth, operating expenses, management and size, and using for the macroeconomic variables: inflation, consumer prices or a 10-year government bond yield, which affect the profitability measures Return On Assets and Return On Equity. They find out that capital and labor productivity growth had a positive and significant impact on profitability, while operating expenses are negatively and strongly linked to it, showing that cost decisions of bank management are instrumental in influencing bank performance.

### *2.2 Liquidity Risk*

Liquidity Risk arises from the inability of a bank to meet its customers' sudden increase in withdrawals and other cash outflows obligations, which may require the financial institutions to seek to liquidate its assets in a very short period of time. (Tehrani et al., 2006).

Khdeiri et al. (2011) examined the determinants of Net Interest Margin in Tunisia using a sample of 10 banks from 1996 to 2005, and tested some of the banks' characteristics that are derived from the dealership Model as per Ho and Saunders (1981): they concluded that Operating costs and Bank Capital, opportunity costs of bank Reserves, Implicit Interest Payments had a positive relationship to Net Interest Margin, whereas, Quality Management had a negative impact on Net Interest Margin, but Credit Risk was not significant.

Moreover, Awdeh (2005) examined the Return On Asset and Return On Equity of domestic and foreign banks operating in Lebanon for the period between 1993 and 2003, using panel data analysis model for macro and micro variables which showed on the one side that the micro variables growth rate of deposits, foreign control over bank, bank size, and the liquid assets to total assets affect positively the profitability measures. However, on the other side, the volume of off-balance sheet transactions, the ratio of equity to total assets, reserves allocated for loans, the ratio of expenses to revenues, the ratio of expenses to total assets affect the profitability negatively.

A study to detect the determinants of Banks Net Interest Margin in Handouras by Nassar et al. (2014) from 1998 to 2013 for foreign banks, using the cost function model developed by Klein (1971) and Monti (1972), has unveiled the following: Operating costs are the most important drivers of banks' Net Interest Margin, and the competition among banks led to higher concentration. However, contrary to prior studies of the model, concentration variable is negative and statistically significant indicating that tougher competition has resulted in higher concentration and lower Net Interest Margin, Parent Banks, Credit to Deposit ratio positively affect the Net Interest Margin. Nonetheless, high provision, non-performing loans, Liquidity ratio, low and stable Inflation, all lead to higher Net Interest Margin. GDP growth does not maintain a statistically significant impact.

Another study was conducted by using panel data analysis to determine profitability in the Turkish banking sector (ROA) Nizamulmulk GUNES (2014) using internal, external and sectorial factors for the period between 1990 and 1999. The independent bank specific variables used, such as size, capital, risk management, expense management, non-performing loans, liquidity, and macroeconomic variables are GDP growth, Inflation, sectorial

variables, and concentration. The results of this analysis indicate that capital and liquidity are the most important variables for ROA. In addition to that, it is ensuring that the efficiency in cost management for the 1990-1999 period generate a positive impact on profitability.

Also, Taha (2013), by using panel data analysis analyzed the relationship between the profitability of banks and macroeconomic factors in Jordan banking sector considering 7 banks within the period of 7 years from 2005 until 2011, by measuring capital adequacy, asset quality, management efficiency and liquidity ratios affecting the ROA & ROE. He found out that the bank's specific factors have more impact on the profitability of banks in Jordan as compared with the macroeconomic factors. With respect to the results, the inflation rate turned out to be insignificant for the return on assets, but it has a significant effect on the equity return in the long run.

### 2.3 Capital Adequacy

Recently, Peterson Ozili (2015) has examined the determinants of banks profitability measuring Net Interest Margin and ROA and shown that Basel Capital had no significant effect on banks' profitability. He has found that the determinants of banks' profitability and its significance depend on the profitability metric employed. However, Net Interest Margin is significantly correlated with Asset quality and GDP Rate and is consistent with appropriate expectations. Relative to ROA, Capital Regulation is not significant, but is negative for Net Interest Margin and positive for ROA. ROA reports a significant relationship with Banks' size make them more profitable. Finally, GDP and CI coefficients show a significant negative.

The determinants of bank Net Interest Margin evidence from the Lebanese banking sector were conducted by Hamadi and Awdeh (2012). They analyzed the determinants of commercial bank NIM, using four factors that could affect the Lebanese Bank's Net Interest Margin for the period between 1996 and 2009. The authors showed that interest rate margins are shaped differently between domestic and foreign banks. For Domestic banks: size, liquidity, efficiency, and Credit Risk, concentration, dollarization (loans, and Deposits), and to a lower extent capitalization, and economic growth have a negative impact on interest margins. Conversely, the growth rate of deposits, lending, inflation, central bank discount rate, national saving, domestic investment, and to a lower degree, the interbank rate boost the domestic banks' Net Interest Margin.

## 3. Selection of Variables

The financial information of Bank Scope is provided by Fitch Ratings and compiled predominantly from the filed balance sheet and income statement as well as from notes produced in the audited annual reports (Note 10).

*Net Interest Margin (NIM) is the primary measure of banks' profitability; it is measured by the net interest income excluding the related insurance when it is disclosed separately and divided by total earning assets. This ratio measures the efficiency of management to control their interest expense in order to increase banks' profitability.*

*Preferred dividends received are considered as the regular coupon on bonds, or interest income on loans, and are added to interest income; however, the preferred dividends paid are classified as interest expense, knowing that these dividends are generated from tier 2 capital (T2C). On the other hand, the dividends on perpetual non-cumulative preferred shares are considered as distribution because they are classified as regulatory additional tier 1 capital (AT1C) as per Basel III.*

### 3.1 Asset Quality

#### 3.1.1 Loan Loss Reserve (LLR)/Impaired Loans (AQ1)

$$AQ1 = \frac{\text{Loan Loss Reserve}}{\text{Impaired Loans}} \times 100 \quad (1)$$

The total Loan Loss Reserves (LLR) are non-cash charge, gradually allocated over time from income statement. It is worth to analyze this LLR over the impaired loans, knowing that both accounts (LLR and the Impaired Loans) are contra Gross Loans (asset account). This ratio could be interpreted as the decrease in this ratio, the better the bank is, the higher assets quality the bank maintains.

The impaired loans, or non-performing loans, as per Banque Du Liban; with a payment default ranging between 31 days and 180 days should allocate provisions for risks and charges (Note 11).

#### 3.1.2 Loan Loss Provision (LLP)/Net Interest Revenue (AQ2)

$$AQ2 = \frac{\text{Loan Loss Provision}}{\text{Net Interest Revenue}} \times 100 \quad (2)$$

Loan loss provision over net interest revenue presents the relationship between provisions in the profit and loss account and the net interest income over the same period.

This is a second ratio to evaluate the asset loans quality of the bank. Net Interest Revenue is the largest source of income. Ideally, this ratio should be as low as possible. In a well-run bank, if the lending book is higher in risk, this would be reflected by higher interest margins. If the ratio deteriorates, this means that risk is not being properly remunerated by margins. Notice that dividend income is included as interest income. The poorer the quality of the loan portfolio, the higher the amount of the provision needed.

This ratio indicates how much of the total interest revenue minus interest expenses has been provided for but not charged; it is an estimated provision for losses expressed as percentage of net interest revenue. The lower the ratio, the higher the bank's profitability.

### 3.1.3 Net Charge-Off (NCO)/Average Gross Loans (AQ3)

$$AQ3 = \frac{\text{Net Charge Off}}{\text{Average Gross Loans}} \times 100 \quad (3)$$

Net charge offs refer to a loan owed to a customer that is unlikely to be recovered by that customer. NCO are loans that have been declared worthless and written-off from the bank's books. As this ratio rises, exposure to credit risk grows.

### 3.1.4 Impaired Loans / Equity (AQ4)

$$AQ4 = \frac{\text{Impaired Loans}}{\text{Equity}} \times 100 \quad (4)$$

The trend of this ratio is important to evaluate the effectiveness of management in identifying specific impaired loans or non-performing loans as a percentage of equity that should be available to absorb losses. These impaired loans generate revenues, and are counted as Tier 2 Capital up to 1.25% of Risk Weighted Assets (RWA) of the concerned bank, after the approval of the Central Council of Banque Du Liban. (BDL) (Note 12).

### 3.1.5 Unreserved Impaired Loans / Equity (AQ5)

$$AQ5 = \frac{\text{Unreserved Impaired Loans}}{\text{Equity}} \times 100 \quad (5)$$

These are loans that may not be recovered and are not covered by reserves. They show what percentage of the bank capital would be written off if the accumulated impairment reserves were 100% of impaired loans, and how exposed a bank's capital ratio would be as a result. This indicates the weakness of the loan portfolio relative to the bank's capital.

## 3.2 Liquidity Ratios

### 3.2.1 Net Loans/Deposits & Short Term Funding (L1)

$$L1 = \frac{\text{Net Loans}}{\text{customers+short term funding}} \times 100 \quad (6)$$

The first proxy used for liquidity, financially called Loans to Deposits or LTD, shows the percentage of net loans that are financed by deposits and short term funding. In this ratio, all loans are considered equally illiquid (which is clearly a strong assumption). The higher ratio the less liquidity the bank possesses, and the less likely it would be able to meet sudden withdrawals by depositors.

### 3.2.2 Net Loans Tot Deposits & Borrowing (L2)

$$L2 = \frac{\text{Net Loans}}{\text{Deposits+short \& long term funding+Subordinate debt}} \times 100 \quad (7)$$

Like (L1) ratio, LTD with some difference shown in comparing net loans to total deposits and borrowing, most bank regulators assign a certain limit to this ratio and put mandatory reserve for deposits. The higher this ratio the more the bank is exposed to liquidity risk, and will thus be unable to meet short term obligations.

### 3.2.3 Liquid Assets/Tot Dep & Bor (L3)

$$L3 = \frac{\text{Liquid Assets}}{\text{Deposits+short \& long term funding+Subordinate debt}} \times 100 \quad (8)$$

Liquid Assets consist of Cash and Balances with Central Bank, Due from Other Financial Institutions, Trading securities, Available-for-Sale Securities, Other Securities with a maturity of less than three months, and Unearned Income from Securities.

This liquidity ratio aims to ensure that when a bank maintains an adequate level of high quality liquid assets that can be converted into cash, it is more important than any single liquidity ratio, and shows the amount of liquid assets available to borrowers as well as depositors. The higher this ratio the more liquid and robust the bank is.

### 3.3 Capital Adequacy Ratios

#### 3.3.1 Equity/Liabilities (C1)

$$C1 = \frac{\text{Equity}}{\text{Liabilities}} \quad (9)$$

This leverage ratio is simply another way of looking at the equity funding, and is an alternative measure of capital adequacy. It also ensures that an individual bank remains solvent during a period of stress; therefore, the higher this ratio, the safer, more solvent and profitable the bank is.

#### 3.3.2 Cap Funds/Liabilities (C2)

Cap Funds = Equity + Hybrid Capital + Subordinated Debt

$$C2 = \frac{\text{Capital Fund}}{\text{Liabilities}} \quad (10)$$

Hybrid capital is a form of debt that has been substituted for equity. This type of capital has both debt and equity features such as preferred shares and subordinated debt. This ratio indicates what percentage of total Liabilities are provided in the form of capital funds. This is the least permanent form of capital that absorbs losses when they incur. The higher this ratio, the better solvent the bank is, and the higher the cost of capital will incur.

#### 3.3.3 Equity/Total Assets (C3)

$$C3 = \frac{\text{Equity}}{\text{Total Assets}} \quad (11)$$

*This is the leverage ratio proposed by Basel III*, and is another form of leverage, as Equity is a cushion against asset malfunction, this ratio measures the amount of protection afforded to the bank by the Equity they invested in it. The higher this figure the more protection there is. Owners' capital is the last line of defense against failure.

#### 3.3.4 Capital Adequacy Ratio (CAR) (C4)

$$C4 = \text{CAR} = \frac{\text{Tier 1 capital} + \text{Tier 2 capital}}{\text{Risk Weighted Assets}} \quad (12)$$

$$\geq 8\% + \text{CCB } 2.5\%, \text{ As by Basel III.}$$

$$\text{CAR} \geq 12\% \text{ in Lebanon as by BDL by the end of 2015 (Note 13)}$$

Capital Adequacy Ratio (CAR) as by Basel I, II, and Basel III becomes a **global standard**, issued for the first time in 1988 by the Basel Committee for Banking Supervision (BCBS) in the Bank for International settlements (BIS) in Basel City in Switzerland. This standard has been amended in 1992 and substituted by Basel II in 2006, and has witnessed many changes until 2010 (Basel III) with the challenges after the financial crisis in 2008. The is the big question that occupies the major space worldwide: "What is the adequate level of capital for a bank that should be in place through the link between the capital and the incurred risks?" A deep vision was needed to define and determine the types of risks, either Generic (i.e. credit, market, and operational risks), or specific (Concentration, Compliance, Business, Reputation, Strategy, etc.) to be able to measure and quantify them. Where the first type is the bank's responsibilities, the second is for the supervisory authorities.

The measurement of capital adequacy ratio *changed* from Basel I to Basel III. All the fundamentals and foundations of Basel I and Basel II are still applicable in Basel III; the capital adequacy ratio should be greater than or equal to 8%, with an additional capital conservation buffer of 2.5% on Common Equity Tier 1 (CET1), to absorb losses when they incur. Note that, by the end of 2015, the Central Bank of Lebanon (BDL) imposed an additional 1% due to the Lebanon Risk (Country risk) on the banks operating in Lebanon.

The capital adequacy ratio measures a bank's capital in relation to its risk-weighted assets. The capital to risk-weighted assets (RWA) ratio promotes financial stability and seeks to measure whether the pool of permanent funds available to the bank is sufficient to offset the incurred risks. It is worth mentioning that risk weighted assets measure has been witnessing many changes over time.

## 4. Method

We performed the analysis using Panel data, which refers to the combination of the common cross-section and

time series analysis of the observations, the data of each bank over a sample period from 2000 to 2015 constitutes time series data of sixteen observations, and twenty four observations for cross-section data, the sample of 24 banks represent approximately 82% of the total banking sector in Lebanon with a total matrix of 384 observations. The term panel data is used for wide variety of situation in econometrics. When we combine a class of data set at firm level panels, which are based on bank balance sheet and income statement, these are usually refers to “micro-panels”. Bank level data set may overcome aggregation problems in identifying individual agents’ rule of behavior (Gujarati, 2012). Moreover, panel data may provide the exogenous variation that is required for the identification of structural parameters through banks across periods. What is specific about panel data is the possibility of following the same individuals over time, which facilitates the analysis of dynamic responses and the control of unobserved heterogeneity (Arellano, 2003).

In the econometrics of panel data there tends to be an emphasis in the modeling and implication of heterogeneity, which is not surprising since we are dealing with different units. In this research, in order to estimate the developed model linear panel data estimation techniques were utilized. In the literature, it can be seen that the OLS, Fixed Effect Model (FEM) or Random Effect Model (REM) is applied for the estimation of linear panel equations. In order to estimate the appropriate model among the mentioned ones, in this research empirically we test its appropriateness.

In order to compare between fixed effect model and pooled OLS model, we estimate linear regression when the effect of omitted individual-specific variable ( $\alpha_i$ ) are treated as fixed constant over time and cross-section against the pooled OLS (Hsiao, 2003). To decide whether fixed effect model or pool the Chow F-test should be perform. On the other hand, we estimate linear regression, when the effects of omitted individual-specific variables ( $\alpha_i$ ) are treated as random over time and cross-section against the pool. To decide whether random effect model or pool BP-LM test should be performed (Note 14).

After conducting the model, choosing between the Random Effect (RE) and the Fixed Effect (FE) technique is a matter of paying attention. One common method for testing this assumption is to employ a Hausman (1978) test to compare the fixed effect and the random effects estimation of coefficients. For this, a Hausman test is carried out. Hausman test basically test whether the unique error ( $U_i$ ) are correlated with the independent variables. The null hypothesis is that they are not correlated with the independent variables. If the P-value for the Hausman test turn out to be less than 0.05, it is significant in which the null hypothesis is rejected and fixed estimate is used.

$$Y_{it} = \varphi_i + x'_{it}\beta_i + \varepsilon_{it}, \quad i = 1, \dots, N$$

Where, assumed that  $\varepsilon_{it} \sim IID(0, \sigma_{\varepsilon,i}^2)$ . In order to pool the data or not depend on if can be imposed the homogeneity of slope coefficients; if  $\beta_i = \beta$  and  $\sigma_{\varepsilon,i}^2 = \sigma_{\varepsilon}^2$  for all  $i$ , upon assuming  $\varepsilon_{it}$  and  $\varphi_i$  are independent across units. Therefore, the model reduces to the fixed or random effects model. In order to determine the model specification, if the fixed effects model outperforms the pooled OLS by using F-test and Pagan Lagrange multiplier (LM) test to determine the random effect model out performs the pooled OLS. Hausman test is used to contrast the random effects model compare with fixed effects model. For diagnostic purposes by applying Baltagi LM-test for autocorrelation and Erhat LM-test for heteroskedasticity.

Primly, according to the diagnostic results of autocorrelation and heteroskedasticity as shown in Table 1 indicate that the model has autocorrelation and heteroskedasticity problem. EGLS specification shows the presence of cross-section heteroskedasticity and autocorrelation. Therefore, the select period SUR estimates the Generalized Least Square (EGLS) specification correcting for both cross-section heteroskedasticity and contemporaneous correlation. Similarly, Period weights allows for period heteroskedasticity, while Period SUR corrects for both period heteroskedasticity and general correlation of observations within a given cross-section. Note that the SUR specifications are each examples of what is sometimes referred to as the Parks estimator, the model were estimated as follow.

$$y_{ir} = x_{ir}^T \beta_i + \varepsilon_{ir}, \quad i = 1, \dots, m$$

Here  $i$  represent the equation number,  $r = 1, \dots, r$  is the time period and we are taking the transpose of  $x_{ir}$  the column vector. The number of observations  $R$  is assumed to be large, so that in the analysis we take  $r \rightarrow \infty$ , whereas the number of equations  $m$  remains fixed, were estimated as follow.

$$\begin{aligned} NIM_{it} = & \beta_0 + \beta_1 AQ1_{it1} + \beta_2 AQ2_{it1} + \beta_3 AQ3_{it1} + \beta_4 AQ4_{it1} + \beta_5 AQ5_{it1} + \beta_6 L1_{it1} + \beta_7 L2_{it1} \\ & + \beta_8 L3_{it1} + \beta_9 C1_{it1} + \beta_{10} C2_{it1} + \beta_{11} C3_{it1} + \beta_{12} C4_{it1} + \beta_{13} INT_{t1} + \alpha_i + u_{it} \end{aligned}$$

Where:

$NIM$ : indicates the dependent variable.

$\beta$ : indicates the parameters to be estimated.

$X$ : indicates the independent variable.

$\alpha$ : bank- specific fixed effect which control for time-invariant. Bank specific omitted variables.

$u$ : indicates unobserved errors that change over time.

The subscripts  $i$  represent the individual cross-sectional unit used in the study, in this case, banks.

The subscripts  $t$  represents the time period.

## 5. Empirical Results

Table 1. Dependent NIM/panel EGLS (panel-period SUR)

Variables	Fixed Effects		Random Effects		EGLS period SUR	
	Coefficient	Std.Error	Coefficient	Std.Error	Coefficient	Std.Error
$\beta_0$	1.614	(0.318)	1.214	(0.303)***	0.656	(0.164)***
AQ1	-0.00056	(0.0006)	-0.00016	(0.0006)	-0.0002	(0.0002)
AQ2	-0.0031	(0.0021)***	-0.0057	(0.002)***	-0.006	(0.0008)***
AQ3	-0.0087	(0.0091)	-0.0012	(0.0083)	-0.002	(0.002)
AQ4	0.00064	(0.0008)***	0.0012	(0.0007)***	0.0014	(0.0001)***
AQ5	-0.00065	(0.0008)**	-0.00074	(0.0008)**	-0.00067	(0.0003)**
L1	-0.0082	(0.005)***	-0.0028	(0.0005)***	-0.0075	(0.002)***
L2	0.00076	(0.0059)	0.0028	(0.0005)	0.0027	(0.002)
L3	0.0079	(0.0029)***	0.0041	(0.002)***	0.0032	(0.001)***
C1	0.0287	(0.021)***	0.113	(0.018)***	0.1554	(0.006)***
C2	-0.0167	(0.0186)***	-0.040	(0.017)***	-0.0363	(0.007)***
C3	0.0096	(0.021)***	0.019	(0.021)***	0.022	(0.006)***
C4	-0.0026	(0.0068)***	-0.0082	(0.0065)***	-0.012	(0.002)***
INT	0.0675	(0.026)***	0.101	(0.025)***	0.134	(0.014)***
R-Squared	0.572		0.152		0.786	
Adjusted R. Squared	0.527		0.122		0.779	
D-W	1.410		1.045		1.939	
F-Stat	12.893***		5.117***		1.049184***	
Hausman Test Random Effect	0.3513**					
Autocorrelation: Baltagi LM-test	$\chi^2$ : 0.75**		$\chi^2$ : 0.85**		$\chi^2$ : 34.12	
Heteroskedasticity: Erhat LM-Test	$\chi^2$ : 34.18**		$\chi^2$ : 32.18**		$\chi^2$ : 24.02	

\*, \*\* and \*\*\* denotes significant level at 10%, 5% and 1% respectively. The significance is based on Standard errors which are in parentheses.

Note. the Null hypotheses of residuals tests are that the residuals don't display any Serial correlation, and are homoscedastic.

The empirical result of this study under the asset quality factor shows that the Impaired Loans to Equity ratio (AQ4) have the most powerful positive effect on (NIM). For every 1% increase in this ratio of Impaired Loans to Equity, there is an estimated rise of 0.14 % on Net Interest Margin. This result is assured by the basic circulars issued by the Central Bank of Lebanon, which stipulates that there is no distribution of income earned from Impaired Loans as a result of provisioning, and customized to increase the core capital (Tier 2 Capital) of the concerned bank. After ensuring provisions had been allocated to debt provisioning required by the Banking Control Commission of Lebanon (Note 15). This concept is assured in Memo No 5/2016 issued by the Banking Control Commission which stipulates; after obtaining prior approval of the Central Council of Banque Du Liban. In order to get benefit of the General Provisions that calculated within Tier 2 Capital, which should not exceed, the rate of 1.25% which is the Risk Weighted Assets in the calculation of solvency ratios (Note 16).

Under IFRS, "Impaired Loans" are considered to be the best measure of doubtful loans. The evaluation of this ratio is important to estimate the effectiveness of management in identifying specific impaired loans; the most significant risk faced by banks. The management has to reevaluate carefully and periodically the factors within its own control. This result is consistent with empirical studies like evaluating the asset quality, depending on the ratios utilized to assess the effectiveness of management to control and mitigate the risks that encounter the banking activities. The finding of AQ4 in line with, Ben Khediri et al. (2011) found out that credit risk was not significant, but had a positive effect on NIM. Shahida et al. (2005) explained banks with more provision will be



more secured; Awdeh (2005) found that higher provision, non-performing loans led to higher NIM, Ozili (2015) detected a significant correlation between the asset quality and NIM.

The Loan Loss Provision to Net Interest Revenue (AQ2) shows significant negative impact at 1% level, which means that every 1% increase in (AQ2) ratio drops down the net interest margin by a decline of 0.6 %. The possible reason behind this result is that the higher amount of provision, the lower net interest margin earned, since the provision is a haircut from NIM, and it will considerably affect and reduce the core capital to risk weighted assets under Basel III. This is consistent with Hamadi and Awdeh (2012) using the provision for loan losses to gross loans as credit risk negatively affect the NIM. The composition of these two ratios differs in the denominator, but the concept is singular and consistent. Also, Vong and Chan (2009), and Gunter et al. (2013) advocate the same negative correlation to profitability.

The result shows that Unreserved Impaired Loans to Equity (AQ5) is negatively significant at 5 % level on NIM. This ratio shows the percentage of the bank capital that would be written off, or as Equity. This considered as a cushion to absorb losses, which is important to manage the trend and the level of this ratio. The remaining indicators loan loss reserve to impairment loans and net charge off to average gross loans do not show significant impact on net interest margin.

Regarding the liquidity proxies Two out of three examined variables were highly significant, and they detected the effect of liquidity ratios on the profitability of Lebanese banks; (L1, L3), where the net Loans to Total Deposits and Borrowing (L2) was not significant in our model. Liquidity measures the ability and readily finds the cash to meet the depositors' withdrawals or the urgent needs. The finding reveals that Net Loans to Deposits and Short-Term Borrowings (L1) is statistically significant and has a negative effect on NIM at 1% level. Hence, banks with high liquid assets, are more resilient and robust they are against shocks and unexpected circumstances. Furthermore, the two factors that are assigned by BDL are compulsory to all banks to respond to. Lebanese banking sector reflects fiscal resilience and a strong liquidity position. This robust situation, due to the Lebanese minimum regulatory liquidity ratio requirements set by BDL. Through basic circular number 72 where the net liquidity to total liabilities should be greater or equal to 10%. Furthermore, this strong position of liquidity is due to high central bank reserve requirements, which are set for domestic currency sight deposits are 25%, whereas, on all other deposits and foreign deposits are 15%.

The finding shows that Liquid Assets to total Deposits and borrowings (L3) ratio have the highly positive and significance effect on NIM at 1% level, by 0.3% annual increase. This result is consistent with Nassar et al. (2014) Liquidity leads to higher NIM and significant positively, also Bourke (1989); Awdeh (2005); Güneş Nizamülmülk (2014) whom advocate that liquidity has a positive relationship with profitability.

The capital adequacy ratio is another story. A stream of studies has been conducted on Regulatory capital adequacy and its impact on banks profitability, in addition to the impact of leverage on NIM and other profitability indicators. Well capitalized banks are considered less risky.

Our finding is a bit of a merger of these types of findings. There is no one single definition of capital adequacy ratio; many ratios are considered to examine the effect of capital adequacy on profitability, where some researchers have considered the leverage ratio as of capital adequacy ratio. Since the globalization and the accessibility of borders among countries, banks around the world tend to minimize their capital levels to increase the earnings, and thus earning per share. BCBS introduced Basel I, II, and III that define the Capital Adequacy Ratio (CAR); the regulatory capital that is composed of Tier 1 capital + Tier 2 Capital divided by the Risk Weighted Assets (RWA) should be greater or equal to 8%. The dilemmas and the challenges were to find the fundamental calculation of these risk weighted Assets. It is not a secret that the calculation of (RWA) has been changed over time, from Basel I to Basel II and recently Basel III.

Our estimation model considers four explanatory variables to detect the impact of Capital Adequacy Ratio on profitability. We have found out that Equity to Liability (C1) and Equity to Total assets (C3) are positively related to profitability. Equity to Liability (C1) ratio is positively and statistically significant at 1% level which affects the NIM positively. The results show us that for every 1% increase in shareholders' Equity to Liability (C1) ratio, the net interest margin will increase positively by 15.5% annually. Also, the leverage ratio as per Basel III, Equity to Assets (C3) ratio statistically detects a strong positive effect on net interest margin at 1% level, which means that every 1% increase in the Equity to Assets (C3) ratio will affect a positive increase in banks' NIM by 2.2 % annually. While, Capital Fund to Total Liabilities (C2) and Total Capital Ratio to Risk Weighted Assets (C4) found to be negatively significant. Our findings is in line with; Van den Heuvel (2002); Berger (1995) detected a strong, positive correlation between capital and earnings. However, Molyneux and Thorton (1992) examined European banks and found out that there is a positive correlation between banks capital and profitability. Ozili (2015), Ben

Khediri et al. (2011) detected that the capital is consistent with the theory and correlated positively to NIM. The same finding was with Gunes (2014).

A negative significant effect was found in Capital Funds to Liabilities (C2). The finding shows that for every 1% increase in (C2) ratio, a decline incur of 3.6 %. For the last explanatory variable of capital adequacy ratio is the CAR (C4) in our model, which is the total Equity Capital to Risk Weighted Assets (RWA), which we call the famous Regulatory Capital. This result detects a statistically strong relationship of C4 and profitability and influences it negatively; in other words, for every 1% increase in capital funds to liabilities ratio, the NIM is affected negatively by 1.2%. The finding here is consistent with; Ayayadin and Karakaya (2014) have detected an ambiguous double effect model; positive and negative, whereas Bourke (1989) spotted a significant relationship between capital adequacy and profitability. Awdeh (2005); Hamadi and Awdeh (2012); Naceur (2003); and others have found a negative impact of Regulatory capital adequacy ratio on banks' profitability.

Analyzing the components of the crucial two ratios where the denominator is the same "Liabilities", the Capital Fund to liabilities (C2) and the Equity to Liabilities (C1), the first has a significant, negative effect on NIM and the second has a robust positive one. This breeds an answer to what extent the profitability is affected by Equity Capital or the hybrid capital. On one hand, this analysis leads us to differentiate between both of them, knowing that the dividends on all preferred shares, as well as on any instrument classified as "hybrid security" are classified as interest expense (Fitch format, 2009), noting that this classification is not regulatory. On the other hand, Capital Funds include the hybrid instruments in addition to the Equity Capital, besides the subordinated (loan and debt), other funding sources funding that bear interest, hence, decreasing the cost of funds. From this formula we conclude that the higher this ratio, the more risky the capital, which will negatively affect the net interest margin. By reflecting the hypothesis, if we decrease the cap funds to liabilities by 1%, we can increase the NIM by a positive 3.6%.

The average interest rate on deposits (weighted average) as listed in BDL website since 2000, had been decreased from 10.68% reaching 7.48% in 2007 and 5.58% in 2015. The decrease in interest rate on deposits related to the sound Lebanese system and its strong liquidity position during the financial crisis, and due to the investment portfolios of banks in sovereign bonds, CD's, and Eurobonds, as a result. The Lebanese system limited the leverage ratios in the banking sector and became the lowest in the world. Moreover, the Central Bank of Lebanon in 2004 prohibited the Lebanese banks from conducting operations in Lebanese Pounds with non-resident financial sector (Note 17), structured products, especially the Subprime, without the consent of The Central Bank.

## 6. Conclusion and Policy Implication

In this study, three sets of variables Asset quality, liquidity and capital adequacy ratio factors are tested against banks profitability. Firstly, the empirical result of this study under the asset quality factor shows that Loan Loss Provision to Net Interest Revenue (AQ2) and Unreserved Impaired Loan to Equity (AQ5) have a negative effect on Net Interest Margin (NIM). However, the Impaired Loans to Equity (AQ4) has a positive effect on Net Interest Margin. Secondly, under the liquidity ratios factor it shows that the Liquid Assets to total liabilities (L2) and Total Loans to Total Deposits and Borrowings (L3), have a positive effect on NIM, whereas the Net Loans to Deposits and Short Term Borrowings (L1) has a negative effect on NIM.

Under the capital adequacy ratios factor it shows that Equity to Liabilities ratio (C1) and Equity to Assets ratio (C3) have a positive effect on Net Interest Margin. This can be explained in two phases, because the banks continue to increase their wealth by increasing the value of their core equities, and the number of shareholders remains the same, since most of the Lebanese banks are privately held. From the other, the board of directors is obliged to distribute a lower number of dividends, and to maintain its profits in the banks which are classified in the Tier 1 capital, as recommended by Basel III, and this provides more protection for the stakeholders operating under the going concern concept, and for the survival of the Lebanese banks in the long run. However, the Capital Funds to Liabilities (C2), and (C4) has a negative effect on Net Interest Margin, that obviously clarifies Basel recommendations by increasing the capital adequacy ratio and lowering the leverage ratio; therefore, the debate is for the risk weighted assets, which has been recently lowering. Besides the lowering of Interest on deposit has positive effect on Net Interest Margin. Our findings shows that increase in Loan Losses or Unreserved Impairment Loans relative to Earning Assets leads banks to drop interest income earned. As a result, this provides evidence that the higher the Provision for Loan Losses to Net Interest Revenue, the higher the bank's risk, and the lower the banks' profit earned. These doubtful loans may not be improved or recovered, which implies the poor quality of the loan portfolio relative to the bank's Equity; consequently, the increase in this ratio worsens the bank's position.

Measuring credit risk is more subjective, quantifying the uncertainty, monitoring and controlling credit risk, in parallel with expert personnel, taking into consideration strict evaluation the character of the borrower of the loan.

The adoption of Basic circular number 58 issued by the Central bank of Lebanon about the Loan grading system is important to manage loan portfolios, by increasing the numbers of grades to more than 10. In parallel with expert personnel in evaluating the 6 C's of Loans, and gathering adequate persistent updated information of the obligor, not only the collateral. The last financial crisis in 2008 clearly revealed how severely liquid assets evaporate. We suggest that the banks should maintain high liquid assets without falling under the concentration risk; the diversification of loans portfolio will minimize the risk. A higher percentage of net income before distribution will enhance the quality of capital adequacy. Our suggestion is that banks with higher level of Equity relative to Liabilities are performing better and more profitably.

Finally, since the Loan Loss Provision to Net Interest Revenue (AQ2) and the Impaired Loans to Equity (AQ4) are key determinants of bank profitability, it is worth mentioning that the implementation of IFRS 9 by the beginning of 2018 will affect the provisioning model. Currently, International Accounting Standard 39 (IAS 39) incurred loss model (IL) as currently applied where the vision on the future is to measure the Expected Credit Loss (ECL). IFRS 9, in accordance with Basel III, promote stronger provisioning practices through advocating changes in the accounting standards towards the expected losses (EL) models (Note 18). Therefore, the expected loss impairment model of IFRS 9 will have significant effect on regulatory capital by increasing the allowances for loss on the financial instruments in the balance sheet which, in turn, reduces the retained earnings and decreases the core capital to Risk Weighted Assets. These challenges will face bankers, regulators, and investors, regarding the liquidity, governance and provisioning when achieving the profitability target. This model could be a new window to new studies to detect the impact of IFRS on the performance of banks, and banks' profitability.

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## Notes

- Note 1. Basel III: A global regulatory framework for more resilient banks and banking systems - revised version June 2011
- Note 2. <http://www.bankaudigroup.com>.
- Note 3. The Lebanese Code of Money and Credit, Art 13. For Banque Du Liban.
- Note 4. Law nb 28/67, amended by law No 4/85, Art 8. For Banking Control Commission of Lebanon.
- Note 5. Banque Du Liban, Basic circular No 81 and basic circular number 73.
- Note 6. Economics, Business, and the Environment — GDP: GDP per capita, current US dollars". Earth Trends. Archived from the original on 2008-01-31. Retrieved 2008-12-31.
- Note 7. As of 9/6/2016 at Banque Du Liban. The twenty four active banks have been chosen among many categories alpha beta gamma and delta groups, and they form approximately 82% of market capitalization of the Lebanese banking sector.
- Note 8. As reported by the World Bank.
- Note 9. <http://www.tradingeconomics.com/lebanon/gdp>
- Note 10. <http://www.library.fa.ru/files/Bankscope.pdf>
- Note 11. Banque Du Liban, 1 - Basic Circular No 76 December 2, 2000 2 - Intermediate circular No 384, dated December 24, 2014.
- Note 12. Banking Control Commission Of Lebanon, Memo No 5/2016: "The Banks concerned have to obtain prior approval of the central council of the bank of Lebanon in order to benefit of the "General Provisions" calculated within the core capital of the concerned bank, which should not exceed, in any case, the rate of 1.25% of the value of Risk Weighted Assets in the calculation of solvency ratios.
- Note 13. Banque Du Liban, Basic Circular No 44, dated March 25, 1998.
- Note 14. For further discussion on the Chow F-test and BP-LM test (pool or panel) see Baltagi (2005) and Hsiao (2003).
- Note 15. Banque Du Liban, Basic Circular No 72.
- Note 16. Banque Du Liban, Basic Circulars No 73 and 76.
- Note 17. BDL, Intermediate Circular No 61 dated 24/7/2004.
- Note 18. Basel III: A global regulatory framework for more resilient banks and banking systems, December 2010 (Rev June 2011).

## Appendix

### Appendix 1

#### Calculations Used for the Ratio Analysis by Bankscope Fitch and Moody's

**NIM** [(interest income + dividend income) - (interest expense + dividend payment on limited Life preferred shares)] ÷ (Total Earnings Assets)

**AQ1** Loan loss Res ÷ Impairment loans × 100

**AQ2** Loan Loss Prov. ÷ Net Int. Rev. × 100

**AQ3** NCO ÷ Average Gross Loans × 100

**AQ4** Impaired Loans ÷ Equity × 100

**AQ5** Unreserved Impaired Loans ÷ Equity × 100

**L1** Net Loans ÷ Dep. & ST Funding × 100

**L2** Net Loans ÷ Total Dep. & Bor. × 100

**L3** Liquid Assets ÷ Total Dep. & Bor. × 100

**C1** Equity ÷ Liability × 100

**C2** Cap. Fund ÷ Liabilities × 100

**C3** Equity ÷ Total Assets × 100

**C4** Total Equity Capital ÷ Risk Weighted Assets × 100

**INT** Interest on Deposits (on average) by the central bank

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