

Credit Risk Management in the Banking Sector during Low-Growth Periods: Evidence from Lebanon

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Credit risk management is considered one of the more difficult activities in the banking industry especially during periods of low growth. It is during those periods that default risk rises, and a large proportion of the banking industry's loan portfolio becomes at risk of default. Consequently, it is the aim of this paper to investigate how the banking systems in the Middle East manage their asset quality during periods of low growth. This study examines a sample of Lebanese banks during a 6-year period of low economic growth to see how the Lebanese banking industry, an advanced and profitable economic sector, addresses asset quality issues. A variety of statistical tests were performed such as t-tests and regression analysis with SPSS. In periods of low growth, increasing the proportions of investments in portfolio securities (rather than increase their loan portfolio) is positively related to better asset quality and lower credit risk. Moreover, a higher percentage of non-interest-income is positively related to higher profitability as it provides income diversification while reducing market risk. This study was able to fill a gap in the literature by offering a deep understanding of how Lebanese banks manage the quality of their assets during unfavorable economic conditions.

Keywords: Credit risk, low-growth periods, banking sector

1. Introduction

In 2008, almost all financial institutions in advanced countries faced havoc. The worldwide financial system was about to collapse under the weight of what is now called the global financial crisis. Numerous studies have been done on the factors that led to that crisis, and most of those studies have pointed the finger at bad credit. Back then, banks gave easy credit to subprime borrowers who would normally be denied credit because of their low credit profile. When one bank gives easy credit, it jeopardizes its own asset quality and ranking. But when the entire financial system gives easy credit, which is credit at low interest rates and with lenient requirements (Cooper, 2009), it leads to a global financial crisis, and to the downfall of gigantic financial institutions. In 2008, 26 U.S. financial institutions failed and/or had to be acquired, followed by 140 in 2009, and 157 institutions in 2010. Big names withered away like Lehman Brothers, Bank-United, Colonial bank, IndyMac, Washington Mutual, among others.

The financial crisis acted as a severe shock to the global banking system and prompted the Basel III accord in which the regulators introduced a set of reforms aiming at improving risk management practices in the financial sectors worldwide. The accord tightened capital requirements and leverage ratios, which impacted how banks did business, and how they managed their asset quality.

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In Lebanon, the banking system was comprised of about 50 banking institutions divided by size into 4 bank categories. These banks are a mix of consumer, commercial, investment, and development banks operating in a relatively small market. Throughout the financial crisis in 2008, the Lebanese banking system remained healthy and strong despite the predicament of world renowned banks in advanced nations. One of the main justifications offered was that the quality of assets in the Lebanese banking sector was high, mainly due to Central Bank regulations. This confirmed the asset-quality criterion as an important determinant of financial stability and placed it under scrutiny of the regulatory authorities.

Today, over nine years after the crisis, financial institutions in Lebanon are facing difficulty in maintaining a healthy asset-quality portfolio. Many of the banking institutions are beginning to charge off an increasing number of loans, indicating a growing problem of credit risk. Studies suggest that during periods of low economic growth, asset quality deteriorates due to borrowers' inability to service their loans (Alhassan et al., 2014). As the quality of banking assets begins to decline, the profitability of the banking sector is challenged. Counterparty risk becomes particularly challenging in a financial system that faces economic downturn, as is the case of the Lebanese economy. Therefore, knowing that banks' performance partly depends on asset quality and the proper management of credit risk, it seems appropriate to place the construct of Asset Quality under the lens.

Unfortunately, the literature on credit risk management during periods of low growth in developing nations is rather limited. Yüksel (2017) recently studied the determinants of credit risk after – *not during* – economic crisis in Turkey, thus indicating a gap in the literature. Another recent study by Benbouzid et al. (2017) showed that an improvement of the quality of economic and legal institutions can help reduce CDS spread and improve credit quality, but the study did not investigate the credit quality issue *during* periods of low-growth, hence the continued gap in the literature. Other studies investigated the effect of credit risk on bank performance in general (Aspal & Dhawan, 2016) or studied credit risk in emerging economies (Nyambuu & Bernard, 2015) – *not developing economies* – thus underscoring the need for a deep understanding of the managing practices of credit risk in *developing* nations during periods of low-growth.

Studying credit risk and asset-quality management during periods of low-growth constitutes an important area in the field of banking and finance, as any empirical conclusions in this regard would represent guidelines for the policy and practice of banking institutions, hence the motivation of this study.

To that end, this study seeks to investigate the determinants of asset quality in the Lebanese banking sector during periods of low growth. The purpose of this paper is to investigate the factors that may influence asset quality which are considered to be a major determinant of credit risk. The main research questions in this study are: What are the factors that affect the asset quality of the banking system? How does the Lebanese banking industry address challenges in asset quality management? And what conclusions are drawn about asset quality management by different size-categories of banks (Alpha, Beta, Gamma, and Delta)?

This study offers significant contributions to the body of literature therefore filling an important gap in this area of research. First, this study suggests that banks operating in developing

countries during periods of low-growth should aim to increase the proportions of non-interest income and portfolio-securities investments rather than increase their loan portfolio, thereby ensuring income diversification while reducing market risk. Second, this study identifies significant differences between Alpha and Beta banks especially in the way they deal with non-interest income, portfolio securities, cost to income, their risk appetite and how this affects their profitability. The above findings offer a new perspective to credit risk management in banks operating within two contextual factors that have *not* been previously addressed in the literature: Low-growth periods and developing economies.

The rest of this paper is organized as follows: The next section will cover the literature review from which we will derive our hypotheses. The methodology section will explain the research methods that were used in the study, followed by the findings section where the results are reported. Finally, the findings are discussed leading to the implications, conclusion and limitations of the study.

2. Literature Review

The collapse of the financial markets and institutions in the US caused a shock to the world financial system, leading to an increase in the overall level of stress in the banking sectors worldwide. Basel III came as a response to that crisis and its repercussions, aiming at tightening capital requirements and leverage ratios in an effort to tighten credit in the market and reduce credit risk.

Referring to the Lebanese Banking Regulations Guide, risk is related to uncertainties which could result in critical losses or fluctuations in profitability. However, certain risks are an essential part of banking activities. Usually banks have an expected business risk which falls within their normal course of operations. Since risks could negatively affect the performance of banks and prevent them from achieving their strategic objectives, risk management, is considered to be a very important function in the banking sector. Risk management is defined as a comprehensive set of policies and procedures that aim to identify and forecast risk, which could be one of four types: credit risk, liquidity risk, market risk, and operational risk. Our main concern in this research paper is to study credit risk as it is one of the most difficult types of risk to manage, and differs according to the culture and country of operation. According to Boffey & Robson (1995), credit risk is often identified as the main risk in terms of its influence on bank performance and failure.

Credit risk is clearly defined as the current and future risk which could result from the counterparty failing to fulfill its obligations towards the bank in a timely manner. Each bank could be exposed to this type of risk which they address by meeting the minimum capital requirements as stipulated by Basel III, in providing sufficient capital outlays to cover the possibility of a default. Further, banking institutions draw a credit policy which they perceive will satisfy the risk appetite of investors while minimizing credit risk.

In a landmark study by Espinoza and Prasad (2010) in the GCC, both macro-factors and bank-specific characteristics were shown to determine the level of nonperforming loans, representing credit risk and asset quality. In their study, the authors suggest that regulators and central banks in the GCC have to be cautious about increasing NPLs during periods of low growth, as

the former is likely to jeopardize bank profitability. Credit risk has also been linked to profitability, but positively this time, as empirically demonstrated by a study of selected banks in Ghana (Boahene et al., 2012).

Previous studies have investigated various determinants of asset quality in a variety of contexts. For example, Bhattacharya & Roy (2008) studied the macroeconomic determinants of asset quality of Indian public sector banks in which they found that shocks to exchange rate and monetary policy significantly affect bank asset quality. A more recent study by De Bock & Demyanets (2012) examined bank asset quality in emerging markets, and found that there were significant links between banks' asset quality, credit and macroeconomic aggregates. Their study confirmed a significant influence of low economic growth on a deteriorating asset quality.

However, it was evident that previous studies on credit risk management during periods of low growth in developing nations were scarce. A study by Yüksel (2017) investigated the determinants of credit risk in the period after – *not during* – economic crisis in Turkey. As important as it is, Yüksel's study does not guide banks in managing credit risk *during* periods of low-growth. Similarly, Benbouzid et al. (2017) empirically demonstrated that an improvement of the quality of economic and legal institutions could improve banks' credit quality; however, their study did not address bank credit-risk management practices *during* low growth periods, hence the continued gap in the literature. Though there is an abundance of studies that investigated credit risk in advanced countries (Saunders & Allen, 2010; Caouette et al., 1998; Altman & Saunders, 1997), few are the studies that were conducted in developing nations (Waemustafa & Sukri, 2015; Abiola & Olausi, 2014; Mengze & Wei, 2015) during periods of low-growth, thereby highlighting the importance of this current study which aims to address credit risk management during those periods.

As the influence of unfavorable economic conditions on banks' asset quality has been largely established, the question becomes how to mitigate this impact through bank-specific factors. Hence, the focus of this study turns to bank-specific factors and their impact on asset quality, during periods of low economic growth.

The literature has identified key bank-specific factors which if properly managed could serve to mitigate unfavorable economic conditions. These factors include capital adequacy, liquidity, profitability, management efficiency, and sensitivity to market risk. Each of these factors is customarily measured through specific bank ratios, and will be discussed in detail below.

2.1 Capital Adequacy

CAR is the ratio of a bank's capital to its risk-weighted assets, and it is an indicator of a bank's strength and ability to cover realistic default loss. Lower capitalization (higher leverage) is known to correlate positively with default risk. So it is expected that the higher the bank's capitalization, the lower its default risk. Though some studies show that holding a relatively high proportion of capital may have a negative influence on the bank's profitability, they have also shown that it reduces the bank's exposure to risk (Goddard et al., 2004). An interesting study by Agoraki et al. (2011) found that increasing bank capital will likely reduce bank risk, though this effect is questioned in banks with strong market power. A study by Bostandzic et

al. (2017) on the European banking sector suggests that increasing capital requirements has a minimal effect on decreasing systemic fragility, thus questioning the impact of capital adequacy requirements on credit risk.

As every region has its peculiarities, it is important to measure the relationship, if it exists, between capital adequacy and credit risk, in local Lebanese banks. Therefore, our first hypothesis in this study stems from the limitations of previous research which did not assess the relationship between credit risk and capital adequacy during periods of low growth. The hypothesis is that there is a significant relationship between capital adequacy ratio and asset quality as indicated by a measure of doubtful loans.

H₁: There is a statistically significant relationship between CAR and asset quality, as represented by a measure of net doubtful loans.

2.2 Profitability

The literature is rich with previous research that suggests a significant influence of asset quality on the profitability of banking institutions. Studies show that maintaining an effective system of credit risk management has an impact on bank profitability (Ayaydin & Karakaya, 2014), specifically on its risk adjusted rate of return (Kargi, 2011). Epure (2012) tested bank performance in Costa-Rican banking industry throughout 1998–2007. The results of the study showed that non-performing loans have a negative effect on ROA, as an indicator of profitability. Another study of Pakistani banks showed a negative relationship between the ratio of non-performing-loans-to-total-loans on one hand and profitability on the other hand (Abbas, Zaidi, Ahmad, Ashraf, 2014). In a study of commercial banks in Europe (Li & Zou, 2014), it was found that credit risk management has a significant and positive impact on the profitability of those banks. A similar study in KSA by Saif-Alyousfi et al. (2017) confirmed that higher credit risk, as measured by non-performing loans, adversely affected bank profitability.

Therefore, in this study, we hypothesize that there is a significant relationship between the asset quality of a bank's portfolio and its profitability during periods of low-growth, something that was not assessed by previous research.

H₂: There is a significant relationship between a bank's asset quality and its profitability.

2.3 Management Efficiency

Previous research suggests that there is a relationship between how well a bank's assets and operations are managed and that bank's asset quality. The more effective and efficient the bank's policies and processes regarding the granting of credit and the collection of debt service, the lower the probability of default and hence the better the asset quality. Kwan & Eisenbeis (1994) found a significant and negative relationship between efficiency and non-performing loans. In another study by Epure (2012) tested bank performance in Costa-Rican banking industry throughout 1998–2007, and also found that non-performing loans and bank efficiency are negatively related. In the Malaysian banking industry, Ab-Rahim et al. (2012) depicted a negative relationship between the management efficiency of banks and the quality of their assets. Along the same lines, a study by Shammass et al. (2017) depicted a significant impact

of staff efficiency and the performance of the respective banks. More specifically, operating efficiency was found to be significantly affected by asset quality such that the better the asset quality, the higher the operating efficiency (Eldomiaty et al., 2015). Therefore, it is expected to find a statistically significant relationship between indicators of efficiency and indicators of asset quality in the Lebanese banking industry as well. Hence, the third hypothesis in this study is: H₃: There is a statistically significant relationship between efficiency indicators on one hand, and asset quality indicators on the other hand.

2.4 Liquidity

Liquid assets are the ones which are easily and quickly transformed into cash to meet short term financial duties and obligations. Cash, central bank reserves and government debt securities are examples of liquid assets in the banking sector. Bank for International Settlements/BIS (2008) describes liquidity as the capacity of the bank to meet obligations to maturity dates, without acquiring undue losses. Consequently, liquidity risk emerges from the primary bank activity of converting short-term deposits into long-term loans and advances. In this manner, banks need to hold the ideal level of liquidity that can increase their benefit and allow them to meet their obligation.

Liquidity becomes a pertinent notion in periods of low growth. When the economy enters into a low growth or recession, borrowers will face a problem in repaying the loans, and so non-performing loans will increase. Therefore, banks become trapped between the illiquidity of their assets (loans) and the liquidity of their liabilities (deposits) thus damaging their asset quality. In fact, a recent previous study by Byun (2017) suggests that, for Chinese banks, the loan-deposit ratio increases banks' risk. Another study by Vasiliki et al. (2014) suggests that liquidity and credit risk are inversely related, such that the higher the credit risk, the lower the liquidity (Vasiliki et.al, 2014).

Previous research also shows that high cash holding can reduce liquidity risk for banks (Berger and Bouwman, 2013) and could help them survive high risk of default in periods of low growth. The more the demand liabilities of the bank are backed up by liquid assets, the lower the liquidity risk of the bank (Fungacova and Poghosyan, 2011). In another study, Mansur et al. (1993) find a negative relationship between the ratio of liquid assets to total assets and risk. However, the downside of holding a high level of liquid assets is the possibility of a decline in profitability. Fungacova and Poghosyan (2011) find a negative relationship between the ratio of liquid assets to total assets and profitability in Russia. Nonetheless, as the banks' loan portfolios get bigger, their portion of illiquid assets relative to deposits increases, thereby rendering liquidity a most pertinent determinant of asset quality which was not previously assessed during periods of low-growth. Therefore, the fourth hypothesis in this study is:

H₄: There is a statistically significant relationship between banks' liquidity and the quality of their assets.

2.5 Sensitivity to Market Risk

In the banking industry, sensitivity to market risk is another facet of risk for financial institutions. According to Karas et al. (2010), depositors require a higher premium for agreeing to deposit

their savings in riskier banks (Karas et al., 2010) thus suggesting a positive relationship between high bank-risk and higher interest rates offered to depositors, thus raising the banks' cost of funds. Cost of funds is used as a proxy for interest rate risk and is measured as the ratio of interest expense to total liabilities. Banks which maintain a lower cost of funds are usually less sensitive to changes in market interest rates (Hasan et al, 2014). On the other hand, a growing cost of funds shows that a bank is keen on paying additional premium for funds. It does so usually in order to manage problems in short term liquidity. In other words, a higher cost of funds may indicate that a bank has problems in maintaining a satisfactory liquidity position, and will need to assume more risk so as to cover its cost of funds. So the cost of funds ratio indicates to the bank what the best courses of action might be, in order to ensure lower sensitivity to market risk and a stable liquidity position (Hasan et al, 2014).

Nonetheless, consistently greater cost of funds suggests that a bank takes higher risk by increasing its loan portfolio to pay for higher cost of funds. In other words, banks try to attract deposits by raising the interest rates paid to depositors, but to pay these higher rates, banks try to attract borrowers who will foot the bill paid to depositors. Borrowers who will pay higher rates of interest are those whose loans are riskier and have a higher default risk. Thus, a higher cost of funds eventually leads to a portfolio of loans that is relatively higher in risk and lower in quality. Therefore, Cost of Funds is expected to relate positively with the bank's default risk, something that was not previously assessed in the literature for periods of low growth. Hence, the fifth hypothesis in this study is:

H₅: A bank's cost of funds has a significant and positive relationship with asset quality.

2.6 Asset Quality

Asset quality is an indicator of the level and size of a bank's credit risk associated with its loan portfolio. It relates to the left-hand side of a bank's balance sheet and refers to an evaluation of the loans generated by the bank. Previous research addressed the issue of asset quality in many ways, using several asset quality indicators. For example, Loan-loss reserves to gross loans are positively related to risk as shown in a study by Bai and Elyasiani (2013). A recent study by Hasan et al. (2014) confirmed a positive relationship between credit risk, as measured by a widening credit default swap spread, and loan loss reserves as represented by the Loan loss provision ratio. A bank making relatively high-risk loans will allocate more funds to loan loss reserve, compared to a bank taking lower risks (Bai and Elyasiani, 2013). Many studies have examined the possible determinants of asset quality, thus identifying several significant relationships with factors like capital adequacy, profitability, liquidity, efficiency, and cost of funds among others (Tehulu & Olana, 2014). Therefore, this study will examine the relationships between asset quality indicators on one hand and the above mentioned factors on the other, in order to identify patterns of bank behavior during periods of low growth. Through studying these relationships, this study could offer a deep understanding of how Lebanese banks manage the quality of their assets during unfavorable economic conditions.

3. Methodology

3.1 The Data Sources

This study is based on the banking sector data found in the BILAN BANQUE REPORTS, which are the annual publications of the Banks' Union Association in Lebanon, and which perform ratio analysis of the data of published financial statements of all banks operating in Lebanon. The authors of this study selected and analyzed 6 years of data (2010-2015) which witnessed a period of declining GDP growth compared to previous periods (Refer to Graph A below). The selection of the time period was crucial as it reflected the purpose of the study, which was focused on periods of low economic growth. The data for the selected years (2010-2015) appeared in the BILAN BANQUES REPORTS (2011-2016) as the report was published in the years that followed the publication of financial statements.

Graph 1: Annual GDP growth rate (Source: Tradingeconomics.com) by the Central Bank of Lebanon



3.2 The Ratios Selected for Analysis

The authors selected the ratios for data analysis based on the above literature review. The ratios representing the independent variables that are likely to affect asset quality were: CAR for Capital Adequacy (Bostandzic et al., 2017), non-interest-income-to-average-assets, non-interest-income-to-total-income (Sun et al., 2017), and interest spread for *Profitability* (Kosmidou et al., 2005), cost-to-income for *Management Efficiency* (Eldomiaty et al., 2015), portfolio-securities-to-deposits and nonperforming-loans-to-deposits for *Liquidity* (Vasiliki et al., 2014), and cost-of-funds for *Sensitivity to Market Risk* (Hasan et al, 2014). The ratios representing *Asset Quality* were: net-doubtful-loans-to-equity, loan-loss-provision-to-doubtful-

loans, write-offs-to-non-performing-loans, doubtful-loans-to-gross-loans, loan-loss-provision-charge-to-net-loans (Hasan et al., 2014).

3.3 The Statistical Tests Performed

After selection of the ratios based on previous literature, data for the individual bank ratios were copied from the BILAN BANQUE REPORTS (2010 – 2015) and manually entered and analyzed using the Statistical Package for Social Sciences SPSS (20). The authors applied several statistical tests including frequency analysis to depict trends in the data, regression and correlation analysis to identify and measure significant impact of the independent variables on the dependent variables represented by the selected ratios of asset quality, and t-tests to assess significant differences between the risk-related ratios of Alpha versus Beta banks in Lebanon. No previous studies were found that empirically assessed the relationships among the variables under study during low-growth periods, and this is how the current study fills a gap in the literature in this area of study.

4. Findings

In this section, the results of the study are reported. The descriptive statistics are first presented so as to provide an overview about the current status of asset quality and credit risk in the Lebanese banking system. The results of the regression analysis are presented next so as to report and analyze relationships among the variables under study.

The first observation is that the Loans-to-Deposits ratio shows a growing trend during the years of study. This indicates that banking institutions are lending out more money to borrowers thus increasing their asset portfolio. Though this is a good indication that shows growth in the banking system, it also raises concerns flagging the importance of ensuring effective credit risk management policies. It may be worthwhile to mention that the final year of the study witnessed a decline in growth of the Loans-to-Deposits ratio. The trend of the Loans-to-Deposits ratio over the 6 years of the study is shown in Figure 1.

Figure 1: Loans-to-Deposits (2010 – 2015)

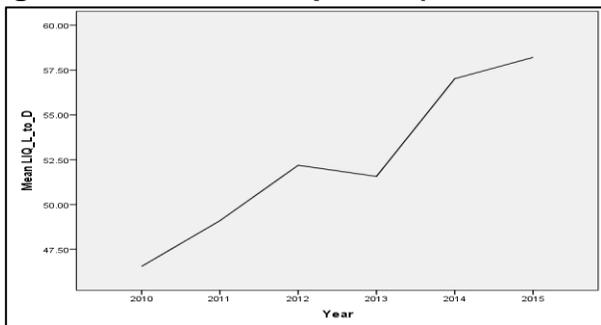
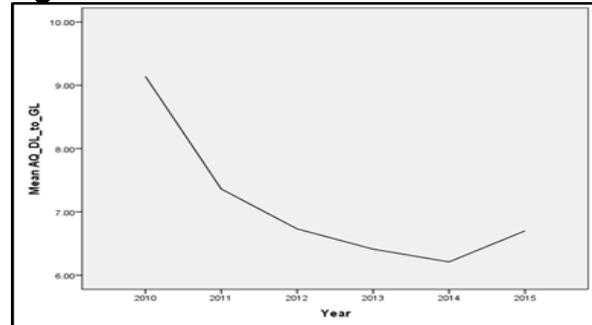


Figure 2: Doubtful Loans-to-Gross Loans



However, though Doubtful Loans-to-Gross Loans had previously been falling, they have on average started to increase as of 2014, indicating a growing threat to asset quality. When doubtful loans increase relative to gross loans, this should send a warning signal to banking institutions. The trend in Doubtful Loans-to-Gross Loans is shown in Figure 2.

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In 2014, another observation was made: the average ratio of Loan Loss Provisions-to-Doubtful Loans increased in an upward trend in a way that corresponds to the rise in Doubtful-to-Gross Loans depicted in Figure 2. This may explain the rise in the LLP-to-DL ratio starting in 2014, as shown in Figure 3.

Figure 3: Loan Loss Provision-to-Doubtful Loans

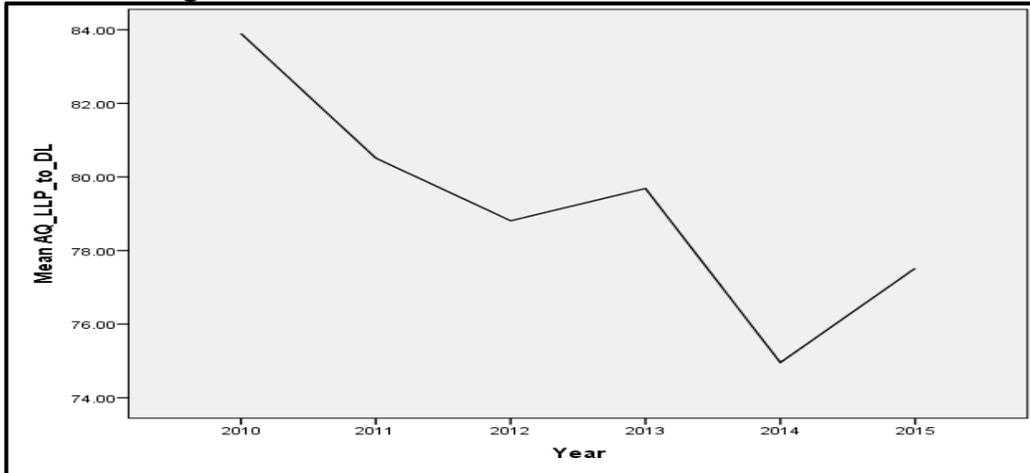
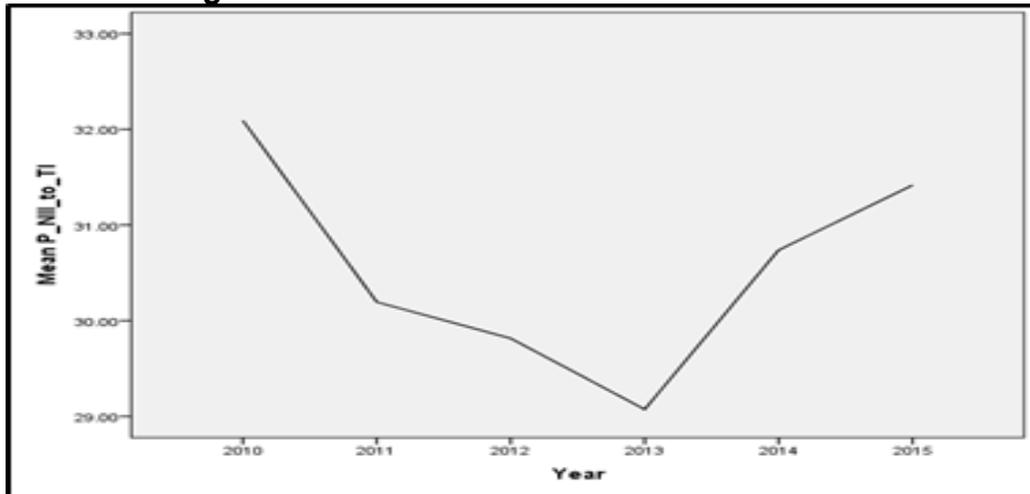


Figure 4: Non-interest income-to- total income



Moreover, the descriptive statistics showed that the non-interest income of banking institutions relative to total income was on a rising trend as of 2013. This suggests that the portion of income generated by interest on borrowed funds was declining, while the portion of income generated by service fees was on the rise. The non-interest income-to-total income trend is shown in Figure 4.

Similarly, the Non-Interest Income relative to Average Assets was also shown to be on the rise as of 2013. This indicates that interest income relative to Average Assets is on the decline by comparison. This suggests that service income is gradually becoming a growing portion of the profits generated by banking institutions. The Non-Interest Income-to-Average Assets ratio is depicted in Figure 5.

Figure 5: Non-Interest Income-to-Average Assets

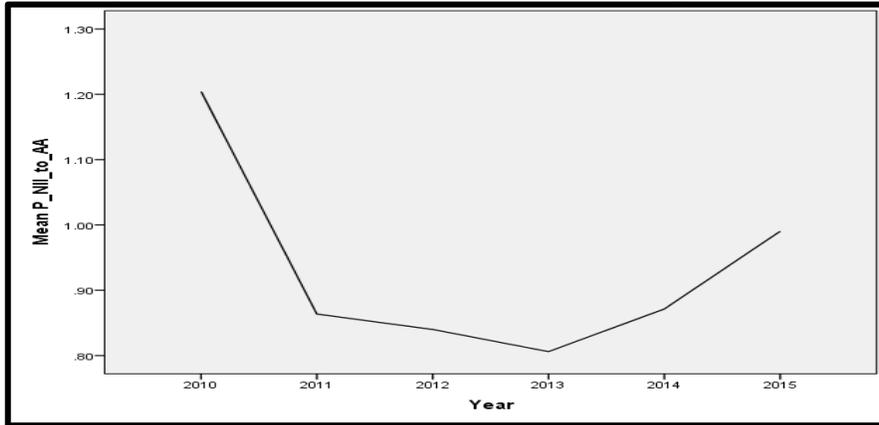
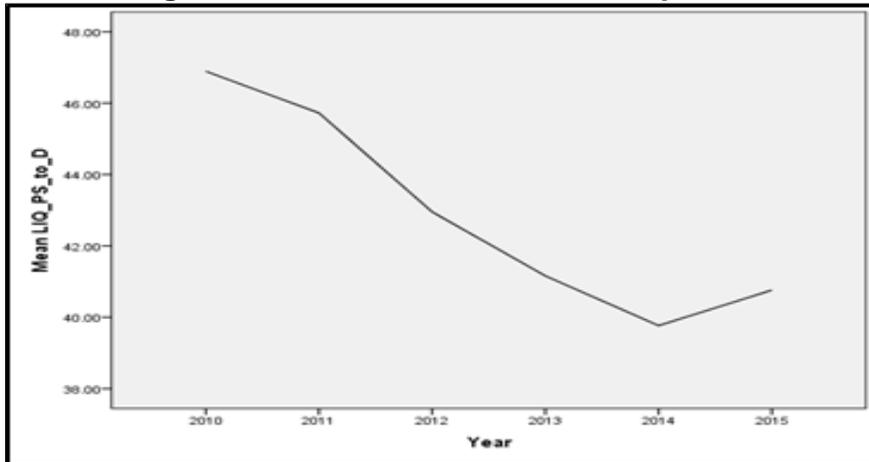
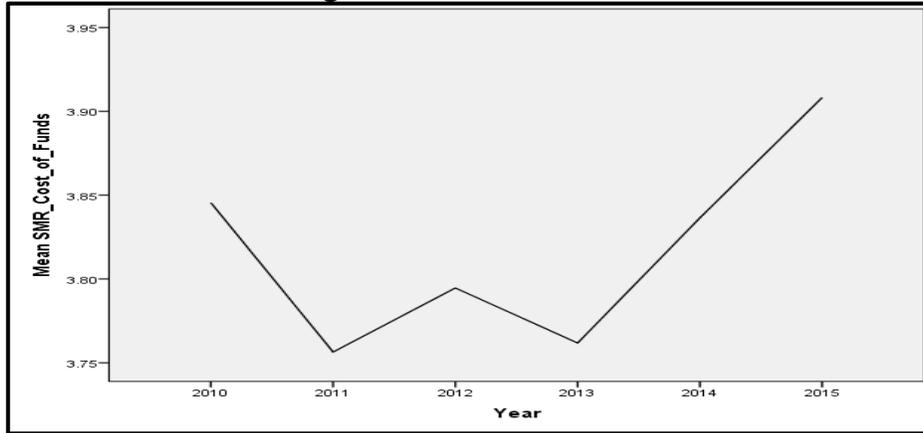


Figure 6: Portfolio Securities-to-Deposits



Banks make investments in securities to generate income, and in this study, banks' Portfolio Securities relative to Deposits followed a declining trend throughout the study period, but reversed the trend in 2014 where the ratio on average started to rise. It is known that Portfolio Securities are considered a safe investment that generates a stable income. When banks increase their investment in Portfolio Securities, they tend to secure a stable income while maintaining a relatively liquid portion of their portfolio. At times when doubtful loans to gross loans are growing, banks are wise to increase their investments in securities in order to maintain a high asset quality. The Portfolio Securities-to-Deposits ratio is shown in Figure 6.

Figure 7: Cost of Funds



In addition, the banking institutions' cost of funds seemed to take an upward trend starting 2013, as it rose on average over 16 basis points from 3.76% to 3.92% in two years. This finding may explain why banks turned more to non-interest income which could be generated from service fees rather than money-lending activities at a time when the cost of funds was rising sharply. The trend in cost of funds over the years under study are shown in Figure 7.

4.1 Capital Adequacy Ratio

In studying the relationships among the various variables in this study, it was found that there was indeed a negative and significant relationship between Capital Adequacy Ratio (CAR) and the ratio of Net-Doubtful-Loans-to-Equity (Standardized $\beta = -0.167$; Sig. = .032). This means that the greater the capital adequacy ratio, the lower the net doubtful loans-to-equity, which helps the bank maintain reasonable solvency. Therefore, the greater the capital put forth by the banks to cover the net doubtful loans, the less the risk borne by the bank, and therefore the better the asset quality. This finding means that the first hypothesis in the study was accepted and supported by the data (Table 1).

Table 1: Relationship between CAR and net doubtful loans-to-equity

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
(Constant)	32.345	10.56		3.06	.003
CAR	-1.490	.690	-.167	2.16	.032

a. Dependent Variable: AQ_NDL_to_Equity

4.2 Profitability

As for the relationship between Asset Quality and Profitability, we found a significant and negative relationship between Non-interest-income-to-total-income and loan-loss-provision-to-doubtful-loans ($B = -0.416$; $p = 0.01 < 0.05$), suggesting that when banks rely more on non-interest income, the need to allocate provisions declines, thus indicating increased asset quality.

Table 2a: Relationships between Profitability variables and Asset quality as indicated by loan-loss-provision-to-doubtful loans. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	95.429	9.738		9.79	.000
P_ROA	-.557	2.854	-.021	-.195	.845
P_ROE	.240	.146	.146	1.64	.102
P_NII_to_TI	-.604	.231	-.416	-2.61	.010
P_NII_to_AA	6.089	4.039	.284	1.50	.134
P_InterestSpread	-2.828	3.136	-.125	-.902	.369

a. Dependent Variable: AQ_LL_P_to_DL

Furthermore, in another test, a significant relationship was found between asset quality as indicated by write-offs-to-non-performing-loans and profitability as indicated by non-interest-income-to-average assets. This suggests that as non-interest-income-to-AA rises, write-offs are likely to fall. In addition, as interest spread increases, write-offs to non-performing-loans also significantly increase, suggesting that as the bank relies more heavily on non-interest income, the credit risk decreases as write-offs decrease. Therefore, the second hypothesis is accepted and supported by the data. (Tables 2a and 2b).

Table 2b: Coefficients Table showing relationships between Profitability variables and Asset quality as indicated by write-offs to non-performing-loans. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.988	4.408		1.35	.176
P_ROA	3.879	3.111	.124	1.24	.214
P_NII_to_AA	-5.274	2.645	-.206	-1.99	.048
P_InterestSpread	5.847	2.329	.216	2.51	.013

a. Dependent Variable: AQ_WO_to_NPL

4.3 Management Efficiency

The findings confirmed a positive and significant relationship between asset quality and management efficiency. The data analysis suggested a positive and statistically significant relationship between efficiency as indicated by cost-to-income, and the ratio of doubtful-loans-to-gross-loans, with the beta coefficient ($B = 0.269$; $p = .000 < 0.05$).

Table 3: Coefficients table showing a positive and significant relationship between cost-to-income and doubtful-loans-to-gross-loans.

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.385	2.010		.689	.492
EFF_C_to_I	.097	.027	.269	3.578	.000
EFF_AUR	.033	.393	.006	.085	.932

a. Dependent Variable: AQ_DL_to_GL

Therefore, the third hypothesis in this study was accepted and supported by the data, as the relationship between asset quality and management efficiency was confirmed (Table 3).

4.4 Liquidity

The data in this study showed that when banking institutions increased their investments in Portfolio Securities, which are safe and generate a stable income, the banks enjoyed several good performance indicators. For example, when banks decreased the loans issued relative to deposits, and increased their investment in Portfolio Securities, the Non-Performing Loans-to-deposits tended to fall demonstrating better asset quality. A bivariate correlation test showed that the ratios of PS-to-Deposits and Non-Performing Loans-to-Deposits were negatively and significantly correlated ($r = -0.538$; $p = .000 < 0.05$). Similarly, as the ratios of PS-to-Deposits and Cost-to-Average Assets were significantly correlated with ($r = -0.157$; $p = 0.041 < 0.05$).

The correlations are shown in Table 4. This suggests that as banking institutions increase their investments in Portfolio Securities, costs and non-performing loans decrease. This seems to be the general approach adopted by Lebanese banking institutions at a time when credit risk and cost of funds are on the rise in this developing economy.

However, this should not be confused by banks' intention to attract more borrowers – far from it. Banks continue to seek to lend more borrowers, but they seek to increase their Portfolio Securities at a higher rate as a means of securing a stable income during economically unfavorable conditions. Therefore, Hypothesis 4 was accepted and supported by the data (Table 4).

Table 4: Correlation Coefficients Table

		Correlations		
		LIQ_PS_to_D	LIQ_NPL_to_D	EFF_C_to_AA
LIQ_PS_to_D	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	169		
LIQ_NPL_to_D	Pearson Correlation	-.538**	1	
	Sig. (2-tailed)	.000		
	N	169	169	
EFF_C_to_AA	Pearson Correlation	-.157*	.256**	1
	Sig. (2-tailed)	.041	.001	
	N	169	169	169
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

4.5 Sensitivity to Market Risk

The data analysis has shown that as the cost of funds rises, the Loan-Loss-Provision-Charge-to-net-loans (LLPC) increases, as they seem to go hand in hand, driven by low growth economic periods. Banks tend to make more charges to their loan loss provisions due to increasing rate of default during periods of low or negative growth. This may prompt banks to fiercely compete to attract depositors through a higher cost of funds. By the same token, those banks tend to attract risky borrowers who are willing to pay higher interest rates, thereby securing a source of income to foot the bill for deposits, albeit decreasing asset quality. The lower asset quality as indicated by higher LLPC will eventually lead to a higher cost of funds as shown in Table 5 below.

An alternative explanation is that as the cost of funds rises due to high competitive pressures, banks relax their lending criteria and give out credit to non-credit-worthy customers, thus leading to lower asset quality. Therefore, hypothesis 6 was accepted and supported by the data (Table 5).

Table 5: Coefficients table showing relationship between Cost-of-funds & Asset Quality Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-.049	.201		-.241	.810
SMR_Cost_of_Funds	.103	.051	.158	2.041	.043

a. Dependent Variable: AQ_LLPC_to_NL

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The above results suggest that all the hypotheses of this study are accepted and provide answers to our research questions. This study identified the 5 variables under study as significant determinants of asset quality, demonstrated how the banking industry in Lebanon addressed credit risk during low growth periods, and identified the significant differences between Alpha and Beta banks, with Delta and Gamma banks excluded due to lack of data.

4.6 Comparative Analysis (Alpha vs. Beta Banks)

Banks in Lebanon are divided into four categories based on bank size: Alpha, Beta, Gamma, and Delta. Alpha group includes banks with deposits over 2 Billion USD; Beta group includes banks with deposits between 500 Million and 2 Billion USD; Gamma group includes banks with deposits between 200 and 500 Million USD; and Delta group includes banks with deposits under 200 Million USD.

Though there are four bank categories, our study will examine only the two largest categories (Alpha banks and Beta banks) because the two remaining categories (Gamma and Delta) are banks and financial institutions undergoing either restructuring, facing buyout, are branches of global or regional banks with capital derived from their headquarters in foreign countries, or simply missing data over the study's six years-period due to periods of non-functionality. Therefore, the two largest and fully functional bank categories (Alpha and Beta) are compared using an independent samples t-test to look for statistically significant differences in the way these two groups address Asset Quality concerns.

The results of the t-test are shown in Table 6 below which summarizes all the ratios that were significantly different, thus indicating a difference in the way the two bank categories approach asset quality.

To start with, we consider both bank categories' asset quality as indicated by **doubtful-loans-to-gross-loans**. The results showed in Table 6a, a statistically significant difference between alpha and beta banks where the means for alpha and beta were 6.1834 and 8.8228 respectively. This shows that beta banks have more doubtful loans-to-gross loans than alpha banks, which therefore have better **asset quality**.

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Table 6: Ratios that were statistically significantly different between the two bank categories.

<i>Independent sample test</i>						
		<i>Levene's Test for Equality of Variances</i>		<i>t-test for Equality of Means</i>		
		<i>F</i>	<i>Sig.</i>	<i>t</i>	<i>df</i>	<i>Sig. (2-tailed)</i>
AQ_DL_to_GL	<i>Equal variances assumed</i>	21.323	.000	-2.547	143	.012
	<i>Equal variances not assumed</i>			-2.323	84.658	.023
LIQ_L_to_D	<i>Equal variances assumed</i>	33.497	.000	-2.877	143	.005
	<i>Equal variances not assumed</i>			-2.654	89.387	.009
EFF_C_to_I	<i>Equal variances assumed</i>	25.052	.000	-6.735	143	.000
	<i>Equal variances not assumed</i>			-6.092	81.545	.000
SMR_Cost_of_Funds	<i>Equal variances assumed</i>	4.852	.029	3.323	143	.001
	<i>Equal variances not assumed</i>			3.104	94.676	.003
P_ROA	<i>Equal variances assumed</i>	11.084	.001	5.127	143	.000
	<i>Equal variances not assumed</i>			4.886	103.970	.000
P_NII_to_TI	<i>Equal variances assumed</i>	.678	.412	3.003	143	.003
	<i>Equal variances not assumed</i>			3.054	134.146	.003
P_NII_to_A	<i>Equal variances assumed</i>	3.595	.060	2.436	143	.016
	<i>Equal variances not assumed</i>			2.736	124.211	.007

Table 6-a: Means of doubtful loans to gross loans in alpha and beta banks

	Category_by_Size	N	Mean	Std. Deviation	Std. Error Mean
AQ_DL_to_GL	Alpha	85	6.183	4.42898	.48039
	Beta	60	8.822	7.97654	1.02977

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Next we consider both bank categories' liquidity as indicated by **loans to deposits**. The results in Table 6b, show a mean of 35.8968 for alpha banks and 41.6463 for beta banks. Concerning alpha banks, they lend less in loans relative to deposits than beta banks, which may explain why the alpha banks have better asset quality.

Table 6-b: Means of loans to deposits in alpha and beta banks

	Category_by_Size	N	Mean	Std. Deviation	Std. Error Mean
LIQ_L_to_D	Alpha	85	35.896	9.06743	.98350
	Beta	60	41.646	14.94955	1.92998

Regarding the **cost to income ratio**, there was a statistically significant difference between the two bank categories as shown in Table 6-c below. This ratio includes the cost of operation, cost of salaries, cost of maintenance, and the cost of paying interest. Beta banks showed a larger cost to income which indicates that alpha banks are more efficient. This result was expected since alpha banks are larger in size and therefore enjoy economies of scale.

Table 6-c: Means of cost to income in alpha and beta banks

	Category_by_Size	N	Mean	Std. Deviation	Std. Error Mean
EFF_C_to_I	Alpha	85	50.225	8.39044	.91007
	Beta	60	64.085	16.14977	2.08493

Alpha and Beta banks also had a statistically significantly different Cost-of-Funds ratio as shown in Table 6-d below. This indicates that alpha banks are offering better terms of credit to attract depositors, thus incurring higher costs.

For instance, at Blom Bank, the minimum amount of having a savings account with a starting interest of 1% used to be \$10,000 but it was recently decreased to \$5,000 for the same interest rate, for the purpose of attracting more depositors. Increasing the number of depositors enables the banks to lend more and thereby generate a higher interest income. It also brings in more business to the bank – fee-based and non-interest based business -- which is a growing source of income for alpha banks.

Table 6-d: Means of cost of funds in alpha and beta banks

	Category_by_Size	N	Mean	Std. Deviation	Std. Error Mean
SMR_Cost_of_Funds	Alpha	85	4.106	.57736	.06262
	Beta	60	3.706	.87351	.11277

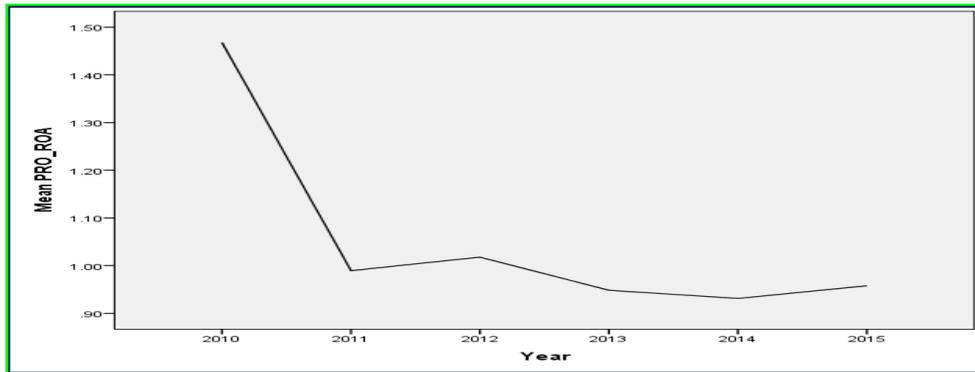
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With respect to return on assets, the analysis (Table 6-e) shows a statistically significant difference between the ROA of alpha banks and that of Beta banks. Over the 6-year period of the study, Alpha banks recorded a mean of 1.0531 while that for beta barely reached 0.7383. This indicates that Alpha banks have a significantly higher ROA ratio indicating significantly higher profitability. Though profitability fell drastically in 2011 as shown in Figure 8 below, ROA is currently stable.

Table 6-e: Means of ROA in alpha and beta banks

	Category by Size	N	Mean	Std. Deviation	Std. Error Mean
P_ROA	Alpha	85	1.053	.31746	.03443
	Beta	60	.738	.42165	.05444

Figure 8: This table shows the bank profitability over the six-year period of the study.



Non-interest income to total income measures all income that is not related to interest, such as income from transaction fees, trading and securitization, investment banking and advisory fees, brokerage commissions, and other income. These activities are different from the traditional deposit taking and lending functions of banks. Note that Non-interest-income is used to diversify bank revenue and improve the risk/return tradeoff. The results show that alpha banks increasingly depend on non-interest income in profitability, significantly more so than Beta banks as shown in Table 6-f below.

Table 6-f: Means of Non-interest-income to Total Income in alpha and beta banks

	Category by Size	N	Mean	Std. Deviation	Std. Error Mean
P_NII_to_TI	Alpha	85	33.440	9.76859	1.05955
	Beta	60	28.675	8.87555	1.14583

The last significant difference between alpha and beta banks is non-interest income to average assets which scored a mean of 1.02 and 0.76 in alpha and beta banks respectively (Table 6-g). This suggests that alpha banks generate more Non-interest-income relative to average assets than beta banks do, probably a factor in increasing alpha bank profitability relative to beta banks. Examples vary: any statement of account will be charged an average of \$25.

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Customers reloading mini-cards at the branch are charged \$4\$. A customer making a transfer will be charged an average fee of \$30. Any incoming transfer with no IBAN number will be charged automatically an amount of \$10. Moreover, applying for a checkbook costs an average of \$15, returned checks cost \$7 each and a bank check costs the customer an average of \$5. While banks net interest margins are highly dependent on interest rate movements and economic cycles, Non-interest-income is less vulnerable to market risk, and provides diversification and greater stability for bank profits.

Table 6-g: Means of Non-interest-income to Average Assets in alpha and beta banks

	Category_by_S ize	N	Mean	Std. Deviation	Std. Error Mean
P_NII_to_A	Alpha	85	1.0218	.76667	.08316
A	Beta	60	.7640	.34320	.04431

5. Conclusion

To underscore the significance of this study's findings, it can be concluded that asset quality has important determinants which affect it positively or negatively, therefore providing bankers with guidelines for mitigating credit risk. This helps move knowledge in this field forward especially for the purpose of improving asset quality during periods of low growth.

Specifically, the findings of this study showed that capital adequacy had a significant relationship with banks' asset quality, emphasizing the need for banks to increase the CAR when non-performing loans to deposits increase. This reflects sound credit management policy by Lebanese banks, which is also encouraged by the Lebanese Central Bank authorities. It can also be concluded that there is a significant and negative relationship between asset quality and profitability. This result was demonstrated when non-interest income rose while loan loss provisions were decreased, indicating that in periods of low growth, banks would do well to diversify their income and focus on non-interest income sources as a way to improve asset quality. This finds support in previous literature (Whalen, 1991) and highlights the inverse relationship between asset quality and profitability from diversified sources.

A significant relationship between efficiency and non-performing loans has been identified. The findings showed that the higher the doubtful Loans to gross loans, the higher the cost to income. In addition, the findings showed that as doubtful loans to gross loans increase, the cost of funds also increases, thus reducing the efficiency of the banks. An alternative explanation could be that as banks compete for clients, they offer higher interest on deposits and charge a lower interest rate on loans thus raising cost of funds. In low growth economic periods, this could be accompanied by a larger chunk of doubtful loans, which is an important reason for banks to adopt non-loan-related sources of income such as fee income. A positive relationship between efficiency and asset quality is consistent with previous studies (Ab-Rahim et al, 2012). Their study found a significant and negative relationship between efficiency and credit risk, and so did Kwan and Eisenbeis in 1994 who showed that there was a negative relationship between non-performing loans and efficiency.

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Furthermore, a significant but negative relationship was found between banks' liquidity and Non-performing Loans. The findings showed that portfolio securities are negatively correlated with non-performing loans to gross loans. This is supported by the findings of Bordo et al. (2001) which suggested that banks with a big size of loans will be confronted with higher liquidity risk. The authors of this study also suggest that there is a significant and negative relationship between bank's liquidity and doubtful loans. Hence, it can be concluded that banks need to increase their investment in portfolio securities as a means of improving asset quality during periods of low growth. This finds support in Salas and Saurina (2002) where portfolio composition was found to be a significant determinant of bank profitability.

An important finding in this study was the increasing dependency of Alpha banks on non-interest income as a way to mitigate the increasing risk of non-performing loans. Alpha banks have adopted the technique of attracting clients not necessarily for the purpose of giving out loans but rather for the purpose of doing all other kinds of fee-based business with them, thereby generating transaction-income as a means of decreasing their dependency on interest income activity. This has proved to be a viable strategy in periods of low growth. Finally, a significant relationship has been found between asset quality as indicated by Loan Loss Provision Charge and the banks' cost of funds. It was confirmed that as cost of funds increase, banks find it necessary to take higher risk in approving risky loans so as to cover the higher cost of funds, which gives rise to the loan loss provision charges, and adversely affects asset quality. This may explain why cost of funds and asset quality are negatively related. The key actions recommended for the banking sector for effective credit risk management during low growth periods are shown in Figure 9 below.

Figure 9: Key actions for effective credit risk management during low growth periods in the banking sector.



This research project was intended to analyze and study the credit risk management in the Lebanese banking sector. The purpose of this research study was to determine the factors affecting asset quality in economic contractionary periods where default rate on loans is expected to surge.

The quantitative approach was adopted where the data was extracted from secondary data source (BILAN BANQUES 2010-2015). The results were analyzed and all five hypotheses were accepted and confirmed such that the determinants of asset quality were empirically demonstrated to be Capital adequacy, liquidity, sensitivity to market rate, non-interest income, and operating efficiency. In previous studies, there was mixed evidence that these factors had a significant impact on asset quality. The importance of this study is that it empirically confirms the impact of the variables under study on asset quality during periods of low growth.

5.1 Implications

This study offers the following implications. In order to manage asset quality in periods of low growth, banks would do well to increase the proportions of investments in portfolio securities rather than increase their loan portfolio. Moreover, Alpha banks enjoy a higher percentage of non-interest-income than Beta banks, which provides income diversification while reducing market risk. Therefore, this constitutes a suggested strategy for Beta banks which could benefit from this approach as well. Beta banks could also benefit from investing in portfolio securities since it has proved to be a safe investment for banks in times of low economic growth. Further, this study identifies the factors which affect Asset Quality as Portfolio Securities and Cost to Income. It was confirmed that Asset Quality is an important factor in determining the profitability of the banking sector, such that profitability increases as asset quality improves as opposed to holding risky assets with “supposedly” high returns. Finally, this study was able to identify significant differences between Alpha and Beta banks especially in the way they deal with Non-interest income, portfolio securities, cost to income, their risk appetite and how this affects their profitability.

6. Limitations of the Study

The main limitation of this study was the authors' inability to include all size categories of Lebanese banks in the study. As was discussed earlier, Delta banks were excluded from the trend and regression analyses due to missing information in their data sets. In addition, the gamma banks were not included in the t-test mean comparisons because this category was too small in number and portfolio to compare against Alpha and Beta banks. Therefore, having an accurate and meaningful comparison we had to exclude gamma banks from our independent samples t-test. Though Delta and Gamma banks constitute a relatively small proportion of the banking industry in Lebanon, excluding them could be considered one of the limitations of this study for if their data sets had been complete they might have added insight to our results. Therefore, including a complete data set of all bank categories would constitute an opportunity for further research.

The second limitation is that the study focused on Lebanese banks, when a wider bank sample that may have included banking institutions from the region could have yielded more generalizable results. Nonetheless, it is recommended that future studies include banks from other countries in the region in order to yield a deeper understanding of how banks in the region address asset quality issue in periods of low growth.

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