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Impact of Internal and External Factors on the Short Run and the Long Run Profitability of Commercial Banks in Lebanon

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Abstract
The study of the determinants of bank profitability has a long history. A vast literature on these determinants has developed since the early 1980s. It is common in the literature to divide these determinants into internal and external factors. Internal factors are those factors under the control of the bank, while banks do not have control over external factors. This paper adds to the literature the effect of these same factors on the book value of bank equity, and not only on the Net Interest Margin. This is seldom tested elsewhere. Showing how the short run and the long run profitability of commercial banks is affected by these factors is important in order to identify which factors are relevant, the extent to which they are relevant, and to help banks react optimally to changes in these factors. Although theoretically the signs of the impacts of the factors are uncertain the results show that most of the factors selected have a statistically significant impact on the two measures of profitability, the Net Interest Margin, and the Net Worth. Moreover the results show that there is a statistically significant differential impact of some of these factors on large banks relative to small banks. The paper thus unveils quantitatively how banks respond to changes in economic indicators. This can help banks predict, react, and compare their performance to the market, to the industry, and to its own past evolution.
Keywords: Profitability, commercial banks, Lebanon, internal and external factors, robust least squares

1. Introduction

The paper dwells on the impact of internal and external factors on the short run and the long run profitability of commercial banks in Lebanon. For the purpose of this paper the book value of the equity of a bank represents the long-run (past) profitability. Among the internal factors seven of them are selected. Among the external factors also seven factors are selected. These are listed in section 3. Some of the factors are fundamental ones whereas others are controlling factors, acting as instrumental variables, like, for example, the return on total assets (ROA), and the operating efficiency (OE). Regression is conducted between the independent variables that represent the internal and external factors and the two dependent variables which are the Net Interest Margin (NIM) and the Net Worth (NW) for all sampled banks, and jointly for large banks and small banks. Hence one regression is conducted for both large and small banks, using interactive dummy variables. Hypothesis testing is carried out for all sampled banks and for large and small banks taken separately. A salient feature of the paper is its choice of conducting robust least squares, in addition to pooled regressions with heteroscedasticity and autocorrelation robust standard errors (HAC). Robust least squares are recommended in case there are outliers in the variable series. In fact section 5 which gives the descriptive statistics, unveils the presence of many outliers in most variable series. The regression procedure is a MM-estimation for the regressions without interactive dummies. A MM-estimation corrects for outliers in both the dependent and the independent variables. For the regressions with interactive dummies, an M-estimation is carried out which corrects for outliers in the two dependent variables only. By construction it was impossible to test a MM-estimation on the regressions with interactive dummy variables. Conducting robust least squares is more efficient than omitting outliers since the latter can provide valuable information on the variability of the series. Moreover, including interactive dummies is more efficient than separating the regression into two, one for large banks and the other for small banks. The former loses a lower amount of degrees of freedom relative to the latter, and is, in addition, theoretically and empirically more acceptable and more productive as comparisons can be made directly on the estimated coefficients.

The paper is organized as follows. In section 2 there is a brief comment on the Lebanese banking system. In section 3 the data and definition of the variables are provided. Section 4 summarizes the empirical and theoretical foundations to the paper. Section 5 is a descriptive analysis of all variables. Section 6 is the empirical part section and summarizes the results of all regressions that are carried out. The conclusion is in the last section, section 7.

2. The Lebanese banking system in brief

During the period considered (2003-2013) the Lebanese banking sector has proved to be highly resilient, and to have solid fundamentals, and was able to resist internal and external financial crises, and to withstand an internal instability after the murder of Prime Minister Hariri in 2005, an external conflict with Israel in 2006, and an

internal conflict with Hezbollah in 2008 (Mantach, 2014). However, this political instability did leave its muted marks on the banking sector if lost opportunities are factored in. In addition, and since 2011, the economic growth in GDP, which recorded an average growth rate of 8.9% during the period under study, decelerated, but the Lebanese banking sector managed still to grow. The reason behind this growth was the large depositor's base compared to the population number in Lebanon. Deposits at Lebanese banks have reached three times the country's GDP in recent years. There are around forty two commercial banks, eleven foreign banks and seventeen investment banks in the Lebanese banking sector and these banks employ over twenty two thousand workers of which 72% have a university degree.

The Lebanese Central Bank holds a huge amount of funds to hedge against the country's massive public debt, to face up to the twin budget and trade deficits, and to protect the value of the domestic currency. Since the end of 1998, the central bank adopted a conservative exchange rate policy of an adjustable peg to the US dollar. Consequently the fluctuations against the US dollar remained limited within a small range. This came at the expense of an independent monetary policy, which became dictated by the accretion of foreign exchange reserves (Azar, 2014). By example and at the end of September 2015 foreign exchange reserves at the Central Bank topped $ 32 billion, to which should be added around $ 10 billion held in gold bullion.

Banks in Lebanon were successful in bringing in deposits and a notable reason behind this is their reputation on the one hand and the interest rates that are being offered in the local market on the other hand. Currently the offered rates of interest are 7% on the Lebanese pound and 3% on the US dollar. This happens at times when the interest rates in advanced economies are close to 0%, notwithstanding the recent trend of negative rates in Switzerland.

Banks in Lebanon show personal care for their clients and their needs and they keep a high standard of customer service and offer a large variety of products and services and other banking facilities (Mantach, 2014). This is true essentially because in Lebanon everybody benefits from the banking secrecy law, established since a long stretch of time, and which is more restrictive than the one in Switzerland. Moreover, the Lebanese banking system puts huge efforts to fight money laundry and keep a high level of banking reputation. The lending activities in the Lebanese banking sector for resident and non-resident private sectors have actually exceeded the Lebanese GDP.

Banks in Lebanon are motivated by the Central Bank to lend for housing loans to the middle income class. They are also encouraged to invest in technology startups. In return the Central Bank reduces the reserve requirements from participating banks, and in case of liquidity needs the Central Bank extends loans to these banks at lower rates.

Banks in Lebanon have a very high quality of assets. Net doubtful loans to equity account for 4% and net doubtful loans to gross loans stand at about 1.2%. As for the profitability of commercial banks in Lebanon, while they suffered in the recent past because of the international financial crisis they still managed to generate a growth of 5% on their consolidated profits. As for liquidity, the banking sector enjoys and has enjoyed traditionally a high degree of liquidity and this in turn has allowed banks to hedge against the high political and security risks of the country. In this regard the Central Bank of Lebanon imposes a 15% legal reserve requirement against certain deposits. This does not prevent banks to have a large average liquidity, some of which kept in foreign currency, which exceeds 15% on average.

Concerning the compliance with the international financial regulations, the Lebanese banks have been following strictly these regulations in order to have a sound international standing. They keep a minimum capital adequacy ratio of 12% as set by the central bank long before it was set by the Basel agreements. Lebanese banks are also less sensitive than other international banks to a financial crisis as they do not have exposures to derivatives securities. The Central Bank has issued a circular that instructs banks not to invest in the derivatives market, and this gave banks in Lebanon more protection against an eventual credit crisis originating from these markets.

3. The data & the variables

The sample is made up of 36 commercial banks in the Lebanese banking sector. Banks have been placed into two categories, Alpha and non-Alpha banks as per the classification of the Lebanese Association of Banks. The sample consists of 15 Alpha banks which have a deposit base over 2 billion US dollars, and 21 small banks. The current price of one US dollar is around Lebanese pounds 1,507. The period of study is yearly and is chosen over 11 years from 2003 till 2013. The financial statements of every bank over the eleven year period were collected from the archives of the Lebanese Association of Banks. The variables are defined as follows, with 7 internal factors, and 7 external factors. The ROA and the Operating Efficiency (OE) can be considered to be instrumental variables.

- NIM (Net Interest Margin) is the difference between interest income and interest expense divided by the average earning assets. It measures the short run profitability.
- Net Worth (NW) is the total stockholders' equity of each bank and it is considered as a measure of the

long run profitability of banks. It is taken in natural logs.

- CAR (Capital Adequacy Ratio) is the bank's capital divided by the risk-weighted assets.
- LDR (Loan to Deposit Ratio) is bank loans divided by bank deposits.
- LIQ (Liquidity) is the bank primary liquid assets over total assets.
- NPL (Non-Performing Loans) is bank's loan loss provisions divided by total loans.
- OE (Operating Efficiency) is the bank interest expense divided by its interest revenue.
- MPR (Market Share) is the bank total loans divided by the total loans of the whole banking sector.
- ROA (Return on Assets) is the bank Net Income divided by its total assets.
- COMP (Competition) is the average total assets of the 3 largest banks divided by the total assets of each bank. A high value means less competition.
- INT (Interest Rate) is the 12-month Treasury-bill rate taken as the yearly average of monthly values.
- GM3 (Growth in the Money Supply M3) is the growth rate in the M3 money supply posted by the Central Bank. It includes deposits in both domestic and foreign currencies, besides banknotes.
- INF represents the yearly inflation rate
- GCI (Growth in the Coincident Indicator) is the yearly growth in the Coincident Indicator as compiled by the Central Bank. It reflects business and consumer confidence.
- SIGMA is the yearly standard deviation of the monthly 12-month Treasury-bill rates.
- GASSETS (Growth in Assets) is the growth rate of the total assets of each bank on a yearly basis.

4. Theoretical & empirical foundations

The factors affecting the Net Interest Margin (NIM) and the Net Worth (NW) can be divided into internal and external factors. Some of these factors are fundamental, others are controlling. The latter serve as instrumental variables if they are correlated with the dependent variable and uncorrelated with the regression residual. The internal factors are the return on assets (ROA), the capital adequacy ratio (CAR), the loan to deposit ratio (LDR), liquidity (LIQ), non-performing loans (NPL), operating efficiency (OE), and the growth in assets (GASSETS). The external factors are market interest rates, measured by the 12-month T-bill rate (INT), market interest rate variability, measured by the standard deviation of the 12 monthly T-bill rates for each year (SIGMA), competition (COMP), market share (MS), money supply growth (GM3), and inflation (INF). Most of these variables have an ambiguous expected sign for their impact. Hence if a variable enters statistically insignificantly in the regressions it may mean that two opposite transmission channels are working at the same time. For the rest the direction of the impact sign is an empirical question.

Theoretically the effect of market interest rates on the NIM is ambiguous. On the one hand banks, to remain viable, need in the long run to have a positive impact of interest rates on the NIM (Flannery 1981, 1983; Daley, 2012; Godspower-Akpomiemie, 2012; Raharjo et al., 2014), but, on the other hand, if banks borrow short and lend long this can translate to a negative relation because deposits are rolled over more frequently than loans (Mburu, 2013; Khan and Sattar, 2014). In Lebanon's case it should be noted that deposit interest rates are sticky while loan rates are more flexible. This translates into a positive effect of market rates on the NIM.

Concerning the Net Worth the effect of interest rates is also ambiguous. The effect can be detrimental because high interest rates decrease the value of total assets and total liabilities, thereby lowering the value of equity. Similarly when interest rates and discount rates are high the profitability of past and future investments as measured by the Net Present Values decreases leading to a negative relation between interest rates and long run profitability as measured by Net Worth. However, if interest rates enhance the NIM they indirectly contribute to the formation of more equity, at least in the short run.

A higher overall profitability, as measured by a higher ROA, is an indicator of a positive interest rate gap, or a positive NIM. Therefore the ROA must be found empirically to be positively related, and statistically significantly so, to the NIM (Godspower-Akpomiemie, 2012; Malik et al., 2014; Raharjo et al., 2014). The banks that generate positive net income are likely to be the same banks that have a high range for the NIM. The ROA can be considered to be as either an internal factor explaining the NIM, or, at least, as a controlling factor. Likewise if one considers Net Worth to be a proxy for long term profitability, the ROA is expected to contribute positively, although temporarily, to the formation of this Net Worth.

The theoretical impact of CAR on the NIM is again ambiguous. Goddard et al. (2004) argue that a high capital adequacy ratio is a symptom of over-cautiousness on the part of banks, leading to banks missing profitable opportunities and hence generating less profitability. In this case risk-weighted assets, which are in the denominator of the ratio, are not large enough. However, Pasiouras and Kosmidou (2007) argue that more capital reduces the need for external financing, and hence leads to higher profitability.

The impact of the CAR on Net Worth is also ambiguous. The intuitive and more evident impact is positive. However, too much relative capital may signal that a given bank is not using optimally the internal financial resources that it has, and that its lending policy is stricter than it should be.

There is an ambiguous relation between LDR and profits. The higher the LDR the more the liquidity

shortages and needs are, the riskier the bank is, and hence the more volatile is its profitability. Too high a LDR means that earning assets are relatively larger which enhances profitability (Bordeleau and Graham, 2010; Demirgüç-Kunt and Huizinga, 1999; Godspower-Akpomiemie, 2012; Raharjo et al., 2014, Rengasamy, 2014). A high LDR indicates more risk-taking which increases default risk and implies a higher premium, thus a higher NIM.

Liquidity of the banks is empirically negatively related to NIM and NW (Godspower-Akpomiemie, 2012; Pastory and Swai, 2013). But the expected effect is ambiguous. More liquidity may denote that assets are not well-managed and this is a signal that the bank is overly cautious in its lending policy. However, too little liquidity is also problematic if the bank cannot accommodate easily uncertain deposit withdrawals.

Operating efficiency (OE) is used by banks to control the ratio of operating expenses to operating income and it is negatively related to profits (Almazari, 2014) and to Net Worth.

Non-performing loans (NPL) have an ambiguous effect. A high number means that the bank is taking too many risky investment endeavors. A small number means that the bank is not issuing enough loans (Raharjo et al., 2014).

Growth in assets (GASSETS) enters as an interactive variable with the market interest rate (Flannery, 1981, 1983). Hence the marginal effect of market rates is higher the higher is the growth in total assets. In this case GASSETS serves as an indicator of more business and banking activity, and should have a positive relation with the NIM and the Net Worth. Taken alone the GASSETS variable is either found to be positively correlated with NIM (Claessens et al., 2000) or negatively correlated with it (Tarus et al. 2012). In this last alternative asset growth indicates too much managerial and bureaucratic costs as banks become too big and hence asset growth will have a negative effect on NIM.

Interest rate variability (SIGMA) imposes additional adjustment costs to the bank, and increases the volatility of income and its risk. Although Flannery (1981, 1983) considers that the impact of such variability has an ambiguous sign, it is more logical to assume that this impact should be negative on both the NIM and the Net Worth.

There is a positive relation between competition between banks (COMP), NIM and NW (Godspower-Akpomiemie, 2012, Raharjo et al., 2014). In fact theoretically banks in Lebanon have tended to be organized as in a monopolistic competition. They spend heavily on advertisement in order to provide the impression that they have a differential product which is in reality mostly homogeneous for all banks. Monopolistic competition can generate large profits in the short run but is a loss-making activity in the long run. Therefore it is expected that less competition will boost short run profits, like the NIM, but affect adversely long run profits, which are part of Net Worth.

Berger et al. (2009) have found a positive impact between market share (MS) and profitability of commercial banks. Smirlock (1985) posits that larger banks have higher accessibility for loans and products in the market than smaller banks, and so larger banks have the advantage of having higher profitability than smaller banks. This contradicts Godspower-Akpomiemie (2012) who finds that small banks are more profitable. If large banks are too big to fail because of the effect of large bank failure on systemic risk, then large banks will take more risks and NIM and Net Worth become more volatile. Although more risk comes usually with higher returns it may turn out actually to reduce profitability by increasing non-performing loans. Non-performing loans decrease income and ROA. Non-performing loans also decrease equity but the impact on the return of equity (ROE) is ambiguous because both the numerator and the denominator decrease. If ROE is an indicator of profitability then the effect of a bank being too large is ambiguous on Net Worth.

Concerning inflation and money supply growth there is empirically a positive relationship between inflation and both of NIM and NW, and there is empirically a negative relation between money supply growth and both of NIM and NW (Berument 1999; Gelos 2006; Godspower-Akpomiemie, 2012). The effect of inflation depends on the extent to which banks can forecast inflation and build this forecast into expected interest rates. The negative effect of money supply growth is due to the fact that the money supply is mostly formed of deposits. More money means more deposits therefore more interest rate costs. However more money means that the business activity of banks is greater and should lead to more profits.

In the study of Godspower-Akpomiemie (2012) on large and small banks the findings are as follows. The market interest rate was positively related to NIM but negatively related to NW for both large banks and small banks. In small banks CAR, NPL and COM were positively related to NIM; however, LIQ was negatively related to NIM. In large banks CAR and LIQ were negatively related to NIM whereas NPL and COM were positively related to NIM. In small banks CAR and NPL were negatively related to NW whereas LIQ and COM were positively related to NW. In large banks CAR and NPL were positively related to NW whereas LIQ and COM were negatively related to NW. In addition small banks are found to be more profitable than large banks.

5. Descriptive analysis

Table 1 presents descriptive statistics on all selected variables. All the variables are not normally distributed

according to the Jarque-Bera test which tests jointly the hypothesis of skewness and kurtosis. The mean Net Interest Margin (NIM) is a healthy 2.428% and varies between a minimum of 0.540% and a maximum of 7.610%. The distribution of NIM is severely leptokurtic as shown by a kurtosis of 6.034. The 12-month T-bill rate (INT) has a mean of 6.681% and has a higher variability than for the NIM. The standard deviation of INT is 1.292 while that of the NIM is 0.981. Capital adequacy has a rather high mean of 19.59% but can be as large as 93.05% and as low as 0% for the bankrupt banks. The loan to deposit ratio (LDR) has a low mean of 40.94% but varies a lot between a minimum of 0.300% and a maximum of 368.3%. Consequently the standard deviation of LDR is very large at 47.29%. Liquidity (LIQ) is on average substantial at 30.08% and reaches a minimum of 1.082%, which is critical, and a maximum of 84.54% which is too much. The standard deviation of LIQ is high at 12.23% but not as high as that of LDR. The percent of non-performing loans has a mean of 0.838% which is quite acceptable but can reach as high as 14.25%. The minimum is not surprisingly negative. The ROA has a mean close to 12% but reaches 96% at the highest and -25.4% at the lowest for banks incurring losses. MPR, the proxy for market share, has a wide distribution and a relatively high standard deviation (4.388%). However this variability is much smaller than that of COMP, which measures competition between banks, and which has a record variability of 124.3%. Operating efficiency hovers around 60% but can go as high as 110.3% for banks that are loss-making. The growth in M3 is volatile with a standard deviation of 31.24% and varies between very negative rates and very positive ones. The variability of market interest rates (SIGMA) is on average 23.21%which is relatively quite high. The average growth in total bank assets is a healthy 12.43% but this figure hides a minimum of -32.11%. The growth in the Coincident Indicator is positive at 7.57% and varies little with a standard deviation of 5.086%. Finally the inflation rate has a mean of around 4% but varies between -0.720% and 10.76%. All the above statistics point to a salient feature of the data: the presence of outliers. The presence of outliers makes maxima too high and/or minima too low, and may affect the skewness. Therefore a classical econometric procedure will be invalid, unless outliers are removed. Another approach is to estimate the regression equations by a technique that takes into consideration outliers. Fortunately such a technique is available, and it is called robust least squares. Therefore the subsequent analysis will be mainly based on the output from robust least squares although pooled regressions are also estimated just to show the improvements made by using robust least squares.

Table 1: Descriptive statistics.

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	P-value
NIM	2.428	2.200	7.610	0.540	0.981	1.431	6.034	0.0000
Log(NW)	11.45	11.24	14.81	6.787	1.513	0.321	2.495	0.0058
INT	6.681	6.723	8.755	4.803	1.292	-0.111	1.614	0.0000
CAR	19.59	14.87	93.05	0.000	15.32	2.226	9.061	0.0000
LDR	40.94	31.66	368.3	0.300	47.29	4.771	28.84	0.0000
LIQ	30.08	29.30	84.54	1.082	12.23	0.643	4.729	0.0000
NPL	0.838	0.401	14.25	-11.25	2.105	1.709	17.28	0.0000
ROA	11.47	10.50	96.00	-25.36	9.723	3.373	19.81	0.0000
MPR	2.955	1.091	24.54	0.000	4.388	2.317	8.906	0.0000
COMP	51.43	18.24	946.5	0.744	124.3	4.771	27.44	0.0000
OE	58.63	66.06	110.3	3.464	19.58	-0.948	3.005	0.0000
GM3	-0.104	8.359	16.04	-97.59	31.24	-2.763	8.777	0.0000
SIGMA	23.21	5.541	87.58	0.000	28.18	1.075	2.969	0.0000
GASSETS	12.43	9.981	208.4	-32.11	16.98	4.847	52.42	0.0000
GCI	7.757	5.710	17.32	0.000	5.086	0.600	2.314	0.0000
INF	3.996	4.060	10.76	-0.720	2.996	0.569	3.108	0.0000

Notes: All figures are in percent except the statistics of the log of the NW, the skewness, the kurtosis, and the p-value. The P-value is the actual P-value for the Jarque-Bera normality test.

6. Empirical analysis

Table 2 presents the results of the regression of the NIM against the chosen independent variables for the whole combined sample of banks. Two statistical procedures are conducted: (1) a pooled regression with HAC robust standard errors (Newey and West, 1987), and (2) a robust least squares pooled regression that corrects both the dependent and the independent variables for outliers (MM-estimation), with Huber Type I robust standard errors. The intercepts, while included in the regressions, have been omitted from all the tables.

Table 2: NET INTEREST MARGIN (NIM) POOLED REGRESSIONS FOR ALL SAMPLED BANKS

	HAC		Robust least squares (MM estimation) Huber type 1		Literature	
Variable	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**	**Coefficient**	**Significant**
CAR	0.00566	0.2287	0.005392	0.0006	0.287	YES
LIQ	-0.025219	0.0000	-0.022067	0.0000	-0.0050	NO
LDR	-0.0009	0.4171	-0.001994	0.0001	0.1985	NO
INT	0.145974	0.0000	0.120685	0.0000	0.3640	YES
NPL	NOT SIGNIFICANT		NOT SIGNIFICANT		1.019	YES
COMP	0.000858	0.1998	0.001294	0.0000	0.002	YES
MPR	0.014015	0.3505	0.020582	0.0076	0.0291	YES
OE	-0.030085	0.0000	-0.029489	0.0000	-0.4724	NO
ROA	0.312947	0.0001	0.463935	0.0000	0.7347	YES
GM3	-0.002332	0.0587	-0.003071	0.0018	-0.0680	NO
INF	NOT SIGNIFICANT		NOT SIGNIFICANT		-0.143	NO
SIGMA	-0.266421	0.0097	-0.309350	0.0019	0.20941	NO
GASSETS*INT	0.080731	0.0457	0.082293	0.0000	0.64637	YES
GCI	NOT SIGNIFICANT		NOT SIGNIFICANT			
R-Squared	0.7307		0.5488			

The R-squared of the robust least squares regression is 0.5488, meaning that 54.88% of the variation in the dependent variable is explained by the model. All coefficients in the robust least squares regression are statistically significant at a marginal significance level less than 1%. This contrasts with the pooled regression in which six coefficients are not statistically significant. Using robust least squares has definitely improved the significance of the results. As already mentioned this is due to the presence of outliers in all variables, dependent and independent. Moreover the signs on all the coefficients correspond to those in the literature. Only one discrepancy is noted: the NPL variable turns out to be an insignificant variable and was omitted from the regressions while in the literature it had a positive and statistically significant coefficient.

From the coefficient on the CAR variable, a history of consistent profits, as measured by the book value of the bank capital, is more likely to be associated with a positive NIM. This shows that banks that were in general profitable are more likely to have a wide NIM. Hence there is a momentum in profitability. The coefficient on the ROA variable confirms that short run profitability is usually associated with a wider NIM.

Banks that keep higher level of liquidity are more likely to have a small NIM. Banks should better use the excess liquidity to invest in earnings assets. The coefficient on the LDR has a negative coefficient of -0.001994. This suggests that banks are not keeping high margins to compensate for the additional credit and default risk of loans. The coefficient on the interest rate variable is positive, with a coefficient of 0.120685. This coefficient is expected to be negative if a bank lends long and borrows short because deposits are rolled over more frequently than loans. However in our case, the explanation is that deposit rates are sticky and are not sensitive to changes in the economic outlook, whereas lending rates are sensitive to this outlook. The result is a positive effect on NIM. The interactive variable between the growth in assets and the interest rate implies that the marginal effect of the interest rate on the NIM is greater the greater is the growth in total assets. The variable Competition has a positive coefficient of 0.001294. Less competition between banks raises the short run profitability. This is as expected because in a monopolistic competition short run economic profits may be positive. The coefficient on MPR suggests that a larger share in the market generates a positive NIM. This is similar to the effect of competition since a larger market share reduces competition. Operating efficiency has a negative coefficient of -0.029489. As operating efficiency is enhanced profitability is also enhanced. A higher growth rate in the money supply M3 has a negative impact on the NIM. This is because money supply is composed essentially of deposits and, hence, as deposits increase so will the interest expense paid by banks, resulting in lower profitability. The inflation variable was removed from the model as it was found to be statistically insignificant. This may mean that inflation affects equally the interest revenue and the interest expense. But it may also mean that interest revenues and interest costs vary independently of the inflation rate. Another explanation is that banks are able to forecast well inflation and, consequently, are able to internalize its effect on interest revenues and costs. The variability in interest rates, as measured by the SIGMA variable, has a negative coefficient of -0.309350. It is expected that the higher the rate of interest rate variability the higher are the bureaucratic and adjustment costs of banks and thus the lower their profitability. The variable that measures business and consumer confidence, the Coincident Indicator, was removed from the model as it was found to be

statistically insignificant. The NIM varies independently of market confidence, or, at least, confidence impacts equally deposit and loans rates.

The results from the internal factors, on which banks have control, imply that banks in Lebanon should increase their capital, reduce their liquidity, decrease the loan to deposit ratio, improve operating efficiency, enhance the bottom line, and try to maximize the growth in total assets. As for external factors, on which banks have little control, higher interest rates, higher market shares, a lower growth in the M3 money supply, and less variability of interest rates all contribute positively to short run profitability, i.e. to the NIM. Finally, more competition is detrimental to short run profitability. However, few would advocate decreasing competition.

Tables 3 and 4 present the regression results that include interactive dummies. The dummy is defined as being one if the bank is large and zero otherwise. Its complement takes the value one if the bank is small and zero otherwise. The dummy is included interactively with all variables, and its complement dummy is also included interactively with all variables. The coefficients on these interactive dummies measure the impacts of the independent variables separately on large banks (Table 3) and small banks (Table 4), although it is one regression and not two. Such a model specification is more efficient, because the alternative of splitting the sample into two results in the loss of many more degrees of freedom.

The R-squared of Tables 3 and 4 is 0.5604 meaning 56.04% of the variation in the dependent variables is explained by the model. The information criteria are all better for the regression in Tables 3 and 4 relative to the regression in Table 2. Therefore the effects of the variables differ for small and large banks. Below this will be discussed in more details.

What is noteworthy in Table 3 is that the following variables have statistically insignificant coefficients: CAR, LDR, LIQ, COMP, and MPR. The remaining variables, i.e. INT, OE, ROA, and the growth in M3 have statistically significant coefficients and have the same correct sign as in Table 2. The impacts of SIGMA and the interactive variable GASSETS*INT are marginally significant statistically, but have the correct sign.

In order to explain the statistically insignificant variables it seems that large banks have optimal capital, liquidity, and LDR ratios that are independent of cyclical variations, and are already the least competitive in the market. Their position in the market allows them to earn a stable NIM.

The coefficient on INT has the same sign and significance as the findings in the literature. It has a positive coefficient of 0.099824 and is statistically significant meaning this shows that deposit rates are sticky whereas lending rates are sensitive to interest rates thus as the interest rate increases the marginal profitability of banks also increases. NPL was removed from the model as it was found to be statistically insignificant. Operating efficiency of large banks has a coefficient of -0.053305 and is statistically significant. This means that the better operating efficiency the better the NIM.

Table 3: NET INTEREST MARGIN (NIM) POOLED REGRESSION RESULTS FOR LARGE BANKS

	HAC		Robust Least Squares (M-estimation) Huber Type 1		Literature	
Variable	**Coefficient**	**P-value**	**Coefficient**	**P-Value**	**Coefficient**	**Significant**
CAR	0.00486	0.2238	0.005552	0.2462	-0.089	YES
LDR	0.005849	0.3219	0.001735	0.6788	NOT IN LITTERATURE	
INT	0.101439	0.0000	0.099824	0.0003	0.037	YES
LIQ	-0.002669	0.3733	-0.003072	0.4268	-0.035	NO
NPL	NOT SIGNIFICANT		NOT SIGNIFICANT		0.010	NO
COMP	0.000479	0.6453	0.000911	0.2344	0.006	NO
MPR	NOT SIGNIFICANT		-0.001894	0.8772	NOT IN LITTERATURE	
OE	-0.041175	0.0001	-0.053305	0.0000	NOT IN LITTERATURE	
ROA	0.418818	0.0014	0.313041	0.0038	NOT IN LITTERATURE	
GM3	-0.002794	0.0259	-0.003126	0.0215	-0.009	NO
INF	NOT SIGNIFICANT		NOT SIGNIFICANT		0.008	NO
SIGMA	-0.136102	0.2552	-0.241790	0.0690		
GASSETS*INT	0.066701	0.0000	0.067335	0.0466	NOT IN LITTERATURE	
GCI	NOT SIGNIFICANT		NOT SIGNIFICANT			
R-Squared	0.75069		0.560395			

The sign and significance of the two variables ROA and GM3 are similar to the results in Table 2. The reader is referred to the previous section. The inflation variable INF was removed from the model as it was found to be statistically insignificant. The reasons from such insignificance were rehearsed earlier in the previous section.

As for the marginally significant variables, SIGMA has a coefficient of -0.24179. This means that as the interest rate variability is higher this will leave banks with higher bureaucratic and adjustment costs decreasing

their profitability. It also may denote that the economic outlook is more erratic. The interactive variable, growth in assets multiplied by the interest rate, has a coefficient of 0.067335. The marginal effect of interest depends upon the growth rate of total assets, so if growth is high the interest sensitivity is also high. The growth in the Coincident Indicator was removed from the model as it was found to be statistically not significant.

The implications are that large banks should improve operating efficiency and pay particular attention to maximizing Net Income relative to total assets. Large banks should beware from a fall in interest rates or a higher variability of interest rates. As for the negative impact of the growth of the money supply, and despite this significant impact, it is unreasonable for banks to lobby for less creation of money which is their bread and butter. The remaining variables, not mentioned in this paragraph, enter statistically insignificantly. This is surprising that so many variables are not significantly related to the NIM, which leads us to surmise that large banks are not vulnerable to most of the internal and the external factors, that they have a dominant financial position and are, therefore, insensitive to many economic indicators.

Table 4 presents the results of the same regression as in Table 3 that includes all interactive dummies, but reports only regression results pertaining to small banks. The coefficient on CAR for small banks has the expected positive sign but is statistically insignificant. The same happens for large banks in Table 3. This finding is puzzling because in the whole regression (Table 2) this variable entered statistically significantly. All the other variables enter statistically significantly, except for the market share variable which enters as marginally significant statistically. The reasons behind these results are the same as those rehearsed for Table 2 and will not be repeated. One thing is noteworthy: less competition among small banks increases the NIM.

Small banks should lower their loan to deposit ratio, lower the primary liquidity, improve the operating efficiency, and be mindful about the income statement. In addition small banks benefit from higher interest rates, and lower variability of interest rates. Again an increase in money supply is detrimental to the NIM, but it would be unreasonable for banks to lobby for a lower money supply creation. Finally, less competition has a favorable effect on profits, but, again, it would be awkward for banks to lobby for less competition as such lobbying will be adversely regarded and resisted by the general public.

Table 5 presents the results of the same regression as in Tables 3 and 4, but including only the interactive variables on the dummy of large banks. This implies that the coefficients on the interactive dummies represent the additional and differential influence of large banks. At least three variables have differential influence. These are: LIQ, OE, and INT. The liquidity effect is smaller for smaller banks. The reader is reminded that the LIQ variable entered statistically insignificantly in Table 3 for large banks. The effect of current interest rates on the NIM is higher for small banks. Hence small banks are more sensitive to interest rate fluctuations, maybe because they do not have stable interest revenues and costs, and are doing business in a less mature market relative to large banks. Finally the NIM of large banks is more sensitive in absolute values to operating efficiency.

Table 4: NET INTEREST MARGIN (NIM) POOLED REGRESSION RESULTS FOR SMALL BANKS

	HAC		Robust Least Square (M-estimation) Huber Type 1		Literature	
Variable	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**	**Coefficient**	**Significant**
CAR	0.005203	0.3861	0.000476	0.7602	0.298	YES
LDR	-0.000909	0.4729	-0.001259	0.0094	NOT IN LITTERATURE	
LIQ	-0.028719	0.0000	-0.003072	0.0000	-0.02	NO
INT	0.195153	0.0023	0.185515	0.0000	0.481	YES
NPL	NOT SIGNIFICANT		NOT SIGNIFICANT		2.195	YES
COMP	0.001013	0.3789	0.002006	0.0000	0.01	NO
MPR	-0.035970	0.8332	-0.128749	0.0630	NOT IN LITTERATURE	
OE	-0.031181	0.0000	-0.315160	0.0000	NOT IN LITTERATURE	
ROA	0.294037	0.0005	0.391438	0.0000	NOT IN LITTERATURE	
GM3	0.001013	0.3789	-0.003166	0.0026	-0.0996	NO
INF	NOT SIGNIFICANT		NOT SIGNIFICANT		-0.208	NO
SIGMA	-0.315191	0.0613	-0.319713	0.0025		
GASSETS*INT	0.089643	0.1607	0.077767	0.0000	NOT IN LITTERATURE	
GCI	NOT SIGNIFICANT		NOT SIGNIFICANT			
R-Squared	0.75069		0.560395			

Table 5: POOLED REGRESSION FOR DIFFERENCE BETWEEN LARGE & SMALL BANKS
Robust Least Squares with M-estimation and with Hubert Type I standard errors

DEPENDENT VARIABLE: NET INTEREST MARGIN (NIM)		
Variable	**Coefficient**	**P-Value**
CAR	0.005076	0.3133
LDR	0.002993	0.4777
LIQ	0.025905	0.0000
INT	-0.085693	0.0123
COMP	-0.001095	0.1907
MPR	0.126859	0.0712
OE	-0.021789	0.0000
ROA	-0.078403	0.4772
GM3	0.000040	0.9814
SIGMA	0.077911	0.6464
GASSETS*INT	-0.010423	0.7867
R-Squared	0.560395	

Table 6 presents the regression results on the log of Net Worth for the whole sample of banks. The R-squared is 0.6932 meaning that 69.32% of the variation in the dependent variable is explained by the model. All variables enter statistically significantly, except for LIQ and the interactive variable between the growth in bank assets and the interest rate. Nevertheless the latter variable is statistically significant in the pooled regression. Therefore the marginal effect of the interest rate may not depend on the growth rate of bank assets. This marginal effect of the interest rate is negative and is statistically significant. The likely explanation for this negative relation is that higher market interest rates reduce the past long term profitability of a bank, because it will raise the discount rate on investments and hence lower their Net Present Values. Consequently cumulated profits in net worth are adversely affected.

Table 6: POOLED REGRESSIONS FOR ALL SAMPLED BANKS

	LOG OF NET WORTH				**NET WORTH**	
	HAC		**Robust Least Squares MM-estimation Huber Type 1**		**LITERATURE**	
Variable	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**	**Coefficient**	**Significant**
INT	-22.24735	0.0000	-27.52102	0.0000	163.97	YES
CAR	0.807084	0.0098	0.53275	0.0028	20.814	NO
LDR	0.131906	0.1881	0.13469	0.0246		
LIQ	0.161698	0.5994	-0.03079	0.8700	8.209	YES
NPL	NOT SIGNIFICANT		NOT SIGNIFICANT		-100.042	NO
INF	NOT SIGNIFICANT		NOT SIGNIFICANT		36.062	NO
COMP	-0.739659	0.0000	-0.78027	0.0000	0.644	NO
GM3	0.509263	0.0000	0.41303	0.0002	-18.564	NO
MPR	6.881387	0.0001	5.14607	0.0000		
ROA	1.194887	0.0187	1.33911	0.0000		
OE	-0.332766	0.3775	-0.45155	0.0109		
SIGMA	9.322102	0.0483	-33.56699	0.0154	-66.548	NO
GASSETS*INT	-5.907963	0.0024	-3.13564	0.1552		
GCI	NOT SIGNIFICANT		2.66708	0.0004		
R-Squared	0.8863		0.69326			

The coefficient on CAR has the same sign as in the literature and is positive. A higher capital base, or a lower volume of risk-weighted assets, contributes positively to the book value of capital. The LDR's effect on NW is positive. This is because more loans relative to deposits will increase the risk of banks and raise the need to keep higher levels of capital. Operating efficiency (OE) has a negative coefficient and it is statistically significant. As interest expense increases relative to revenues the bank's profits will decrease, decreasing the net worth of the bank. A higher market share (MPR), a higher ROA, and more competition (a low COMP) contribute all to the formation of book equity. It seems that monopolistic competition creates short run profitability and long run losses. A higher growth in the money supply increases the growth of deposits, thereby

increasing business activity of banks and leading to higher long run profitability. Interest rate variability, SIGMA, has a negative coefficient. This effect is similar to the effect of the same variable on NIM. In other terms variability increases business bureaucratic, and adjustment costs not only in the short run but also in the long run, and conveys an erratic economic situation. Growth in the Coincident Indicator is an additional contribution to the literature. It has a positive coefficient. This shows that when business and consumer confidence is high the long run profitability of banks is also high leading to higher net worth. This implies that bank profits are cyclical as they respond positively to the business cycle.

Non-performing loans (NPL) was removed from the model as it was found to be statistically insignificant. The inflation rate (INF) was also removed from the model as it was found to be statistically insignificant. The reasons behind the insignificance of the latter variable stem from the same reasons that were identified above for the independence of inflation from the Net Interest Margin.

The implications are that banks, in order to perk up the book equity, should care about their capital adequacy, their operating efficiency and their Net Income, and should pay particular attention to the loan to deposit ratio. A higher market share and lower competition provide for excess returns, but are two issues that banks cannot lobby for. Surprisingly more money creation is positively related to net worth, while it had a negative impact on the NIM. Since net worth is more important than the NIM one should advocate more money creation. Finally, while the NIM and the net worth are both adversely affected by interest rate variability, the effect of higher interest rates is ambiguous, positive on NIM and negative on the NW. Therefore it is unclear whether higher interest rates are always good for banks. But an improvement in the outlook for businesses and consumers creates the appropriate boost to Net Worth.

Table 7: POOLED REGRESSION RESULTS FOR ALL LARGE BANKS

	LOG OF NET WORTH				NET WORTH	
	Pooled regression HAC		Robust Least Squares M-estimation Huber Type 1		Literature	
Variable	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**	**Coefficient**	**Significant**
INT	-17.81367	0.0000	-19.010420	0.0000	-94.127	NO
CAR	-0.692227	0.2042	-0.915083	0.0755	587.54	NO
LDR	2.08235	0.0000	1.918545	0.0000		
LIQ	-1.583456	0.0003	-1.106302	0.0108	-7.481	NO
NPL	NOT SIGNIFICANT		NOT SIGNIFICANT		1667.5	NO
OE	2.274482	0.0633	1.273296	0.0204		
INF	NOT SIGNIFICANT		NOT SIGNIFICANT		243.44	NO
MPR	-2.998021	0.0042	-3.137845	0.0165		
ROA	8.68293	0.0001	6.186426	0.0000		
COMP	-1.298116	0.0000	-1.303370	0.0000	-2509.05	NO
GM3	0.313348	0.0245	0.391958	0.0069	-169.912	NO
SIGMA	7.895966	0.4015	-16.061110	0.3472	74.73	NO
GASSETS*INT	-0.497736	0.9148	-5.184647	0.1600		
GCI	NOT SIGNIFICANT		1.89084	0.0583		
R-Squared	0.9245		0.760264			

Tables 7 and 8 present the regression results on the Net Worth that include the two interactive dummies. The dummy is defined as being one if the bank is large and zero otherwise. Its complement takes the value one if the bank is small and zero otherwise. The dummy is included interactively with all variables, and its complement dummy is also included interactively with all variables. The coefficients on these interactive dummies measure the impacts of the independent variables separately on large banks (Table 7) and small banks (Table 8), although it is one regression and not two. Such a model specification is more efficient, because the alternative of splitting the sample into two results in the loss of many more degrees of freedom.

The R-squared is 0.7602 meaning that 76.02% of the variation in the dependent variable is explained by the model.

In Table 7 that pertains to large banks all variables enter significantly except for the following: CAR, SIGMA, and the interactive variable GASSETS*INT. The growth in the coincident indicator is marginally significant. The coefficient signs in parentheses on the following variables are consistent with the results of the whole sample: INT (-), LDR (+), LIQ (-), COMP (-), ROA (+), and GM3 (+). The reasons for these signs are the same as those made above for Table 6. The variable MPR, representing the market share, has a coefficient with a different sign than in the whole sample regression (Table 6). More monopolistic competition provides for long

term losses. This is consistent with the theory of monopolistic competition which predicts short run abnormal profits and long run normal losses.

INF was removed from the model as it was found to be statistically not significant. Similar arguments as those mentioned above explain this feature.

Growth in the Coincident Indicator is an additional contribution to the literature. It has a coefficient of 1.89084 and is marginally statistically significant. This shows that when business and consumer confidence is high it will increase banks profitability leading to higher accumulated profits, or Net Worth.

In Table 8 that pertains to small banks all variables enter significantly except for the following: CAR, SIGMA, LIQ, COMP, and GM3. The interactive variable GASSETS*INT turns out to be statistically significant with a negative coefficient. The marginal negative effect of interest rates on NW is enhanced as the growth in bank assets rises. The coefficient signs in parentheses on the following variables are consistent with the results of the whole sample: INT (-), LDR (+), MPR (-), OE (-), and ROA (+). The reasons for these signs are the same as those made above for Table 6.

NPL was removed from the model as it was found to be statistically insignificant.

INF was removed from the model as it was found to be statistically insignificant. Similar arguments as mentioned above explain this feature.

Growth in the coincident indicator is an additional contribution to the literature. It has a coefficient of 1.71472 and is statistically significant. This shows that when business and consumer confidence is high it will increase small banks profitability leading to higher accumulated profits, or Net Worth.

Table 8: POOLED REGRESSION RESULTS FOR ALL SMALL BANKS

LOG OF NET WORTH					NET WORTH	
	HAC		Robust Least Squares M-estimation Huber Type 1		Literature	
Variable	**Coefficient**	**P-Value**	**Coefficient**	**P-Value**	**Coefficient**	**Significant**
INT	-13.00612	0.0320	-17.229730	0.0000	-34.782	NO
CAR	0.209841	0.5845	-0.166271	0.3269	-10.906	NO
LDR	0.380468	0.0000	0.424595	0.0000		
LIQ	0.137205	0.5993	0.018959	0.9077	12.803	YES
NPL	NOT SIGNIFICANT		NOT SIGNIFICANT		-81.394	NO
OE	-0.472921	0.1567	-0.449935	0.0031		
MPR	-57.62459	0.0038	-60.298540	0.0000		
ROA	0.775694	0.0166	0.743571	0.0011		
INF	NOT SIGNIFICANT		NOT SIGNIFICANT		68.356	YES
COMP	-0.800727	0.0000	-0.796868	0.0000	0.118	NO
GM3	0.370611	0.0023	0.198813	0.0812	24.162	NO
SIGMA	-2.246821	0.7875	-21.615800	0.1275	269.28	YES
GASSETS*INT	-8.213339	0.0021	-5.708200	0.0045		
GCI	NOT SIGNIFICANT		1.71472	0.0247		
R-Squared	0.9245		0.760264			

Table 9 presents the results of the same regression as in Tables 7 and 8, but including only the interactive variables on the dummy of large banks. This implies that the coefficients on the interactive dummies represent the additional and differential influence of large banks. At least six variables have a differential influence. These are the following: LDR, LIQ, COMP, MPR, OE, and ROA. In Table 5 for the NIM regressions, only LIQ, OE, and INT had significant coefficients.

The impact of LDR is higher for large banks. The long run profitability of large banks is more sensitive to higher loans relative to small banks. The liquidity effect is more negative for large banks. Large banks seem to hold non-optimal liquidity ratios that affect adversely their long run profitability. The effect of current interest rates on the NW is the same for large and small banks. Hence large and small banks are equally sensitive to interest rate fluctuations. Competition, COMP, is more negative for large banks. This is explained by monopolistic competition. The effect of market share (MPR) is more positive for large banks. It is expected that the higher market share the more short and long run profitability. The effect of ROA on NW is higher for large banks. Finally, the effect of operating efficiency is smaller for large banks.

Table 9: POOLED REGRESSION FOR DIFFERENCE BETWEEN LARGE & SMALL BANKS
Robust Least Squares with M-estimation and with Huber Type 1 standard errors

DEPENDENT VARIABLE: LOG OF NET WORTH		
Variable	**Coefficient**	**P-Value**
CAR	-0.7488110	0.1671
LDR	1.4939510	0.0009
LIQ	-1.1252610	0.0153
INT	-1.7806950	0.6846
COMP	-0.5065020	0.0000
MPR	57.1607100	0.0000
OE	1.7232310	0.0025
ROA	5.4428575	0.0000
GM3	0.1931450	0.2953
SIGMA	5.5547610	0.8025
GASSETS*INT	0.5235860	0.9008
GCI	0.176120	0.8886
R-Squared	0.760264	

In testing for the differences between large and small banks note the following. Large banks benefit from economies of scale, from less competitive market forces, higher and more stable market shares and have a greater control over costs, including labor and deposit costs. That is why they are less sensitive to interest rate risk and operational efficiency and benefit from low competition in the short run while incurring higher costs in the long run. Mindful low competition necessitates heavy advertising budgets that generate abnormal short run profits but affect adversely long run profits as these profits revert to the mean. Large banks are more profitable than small banks because of many factors like economies of scale, anti-competitive behavior, and more control over the needs of their clientele, be it borrowers or depositors.

7. Conclusion

This paper has tested more than seventeen internal and external factors that impact the short run profitability and the long run profitability of commercial banks in Lebanon for the recent decade. The short run profitability is measured by the Net Interest Margin, and the long run (past) profitability is measured by each bank's book equity. Most of the factors selected have a statistically significant relation with profitability, although large banks seem to be less sensitive to these factors. Two ratios are peculiar, one internal and the other external: the loan to deposit ratio has a negative relation with NIM, but a positive relation with book equity; the effect of interest rates is positive on the NIM, but negative on the NW. The paper also found evidence that the reaction of large banks is different from that of small banks with respect to certain specific factors. The paper can help banks compare their performance to the industry, and take action whenever their response to the economic indicators is marginal and/or different. In addition bank managers can understand the typical effect of these economic factors and indicators, and monitor these for the benefit of their institutions. An avenue for future research is to repeat the analysis on the net worth of banks in international markets, a subject matter that is scarcely researched, especially since most such banks have publicly traded common shares and hence the equity can be measured by market values. Another avenue for research is to test the models herein for different years and to check whether there is temporal stability in the impact and sign of the reaction coefficients.

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