

Bank Transparency and Capital Adequacy Ratio: Empirical Evidence from Tunisia

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ABSTRACT

This study analyzes the impact of bank transparency on capital adequacy ratio in a developing country. We introduce into the analysis a number of other variables deemed relevant by the literature to explain the behavior of the capital adequacy ratio. We used a panel data set that employs bank-level data from the Tunisian banking sector covering the period 2000-2014 and estimated the model with generalized method of moments (GMM). The findings of this study suggest that bank transparency, lagged capital and foreign ownership are positively correlated with capital adequacy ratio and managerial efficiency is negatively correlated with capital adequacy ratio. However, Tunisian banks do not take into account the level of risk in the determination of capital adequacy ratio.

Keywords: *Capital adequacy ratio, transparency, risk, capital determinants, Tunisian banking sector, GMM.*

1. INTRODUCTION

Capital adequacy ratio is one of the most significant current issues in banking which evaluate the amount of a bank's efficiency and stability. The Basel Capital Accord (Bale I) is an international standard for the calculation of capital adequacy ratios. The Accord recommends minimum capital adequacy ratios that banks should meet. Using minimum capital adequacy ratios causes promotion in stability and efficiency of the financial system by decreasing the likelihood of insolvency in banks.

Bale II appeared to grant more freedom to the bankers in choosing the method of calculating the capital adequacy ratio. But this freedom increases the risk of manipulation of information reported to supervisors.

Hence the idea to promote transparency of banking companies to support market discipline. The objective of transparency could be achieved by better financial communication. However, it is widely recognized that the minimum standards of financial reporting do not necessarily ensure a sufficient level of transparency. So banks are encouraged to go beyond these standards and voluntarily disclose all information they consider important to know by market operators.

In fact, banks and financial organizations must keep balance between capital and available risk in its assets in order to guarantee their stability. Furthermore, banks can seek to maintain high levels of capital ratio in order to avoid the adverse effects of market discipline.

Indeed, banking institutions, like other companies, are monitored by different stakeholders including investors who hold bank stocks. By disclosing their risk profiles, banks could be penalized for choosing a high level of risk. Therefore, a higher information disclosure could push banks to cover higher risk by higher amounts of equities.

The purpose of this research work is to analyze the effect of voluntary disclosure of financial information by the bank on the strength of this firm. Specifically, we seek to examine whether, after better disclosure of the risk profile by the bank, bankers increase or not the coverage of risks by equities. We seek to ascertain whether market discipline might work in Tunisia, whose economy is characterized by an embryonic stock market. Given that the fundamentals of the second Basel Accord were initially designed for the needs of banks operating in developed countries.

Furthermore, the literature has shown that the level of bank capital is dependent on economic conditions of the country, on the regulatory framework and also on specific factors internal to the bank. So, we introduce these variables into the analysis to better understand the impact of the voluntary disclosure of financial information of banks' risk profile on the behavior of capital adequacy ratio.

2. LITERATURE REVIEW

During the last decade, the number of studies of banking capital structure and its determinants increased; the determinants of capital adequacy ratios seems to receive more attention rather than the capital structures of banks in developing countries. Below, we summarize the factors that affect capital, based on the findings in the literature.

2.1 Disclosure and Transparency

Transparency, through an adequate information disclosure, is a key pillar of a corporate governance framework as it provides stakeholders with the necessary information to judge whether their interests are served.

Transparency is an important element in the monitoring process because it facilitates market discipline in the banking sector (Adeyemi, 2011).

A good financial communication allows market participants to assess with greater precision the strength

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and financial results of banking firms. It may therefore better enable them to base their decisions and contribute to market discipline by encouraging banks to conduct their business more cautiously.

The stakeholders of the bank, including depositors and creditors can take action against banks risk taking by requiring higher incomes when the bank's risk level appears high. However, insured depositors may not have the necessary incentives to exert market discipline on banks. Nevertheless, uninsured depositors have the necessary incentives to exercise control on banks as they are exposed to losses if the bank fails (Nier and Baumann, 2006).

The distinction between the effect of regulatory pressure and market discipline on strengthening capital adequacy ratio was the subject of several empirical studies. In this context, Ashcraft (2001) showed that the increase in capital ratios of weakly capitalized banks is a phenomenon that existed even before the implementation of regulatory measures. He notices that increasing the capital ratio of a weakly capitalized bank is mainly due to market discipline rather than the regulatory pressure.

Similarly, Flannery and Rangan (2002) attribute the increase in capital ratios of US banks to strengthen market discipline. Wall and Peterson (1987, 1995) and Barrios and Blanco (2003) specify that if the capital ratio is not binding, shareholders set policies that maximize the market value of the bank as the distribution of dividends.

Several research studies have shown that the integration of market mechanisms in the banking supervision can be an adequate solution against excessive risk taking by banks. In this context, Calomiris and Mason (1997) were interested in the bank run that occurred in Chicago in June 1932. In comparing the characteristics of failing banks with those that survived this panic, they have shown that depositors were able to distinguish solvent banks from insolvent ones. The behavior of the depositors has not increased the bank run since they didn't cause the failure of solvent banks. Saunders and Wilson (1996) examined the effects of contagion caused by bank failures by analyzing the movement of deposits of failing banks and others who survived during the period 1929-1933. They showed that the deposit withdrawals from banks that failed were higher as among banks that have not failed. This is consistent with the hypothesis that many depositors are able to distinguish solvent banks from fragile ones.

Therefore, to maximize their value, banks must take into account the reactions of market operators' into risk-taking and the coverage of risks by equity. To cope with the pressure of market discipline, banks can either reduce their risk-taking, or increase their capital in order to reduce the level of debt and reduce the likelihood of bankruptcy. In this context, Nier and Baumann (2006) affirm that the choice of increasing capital is more pronounced for banks rated by the rating agencies. They

also find that banks whose disclose more information; they limit adverse effects of market discipline by choosing higher capital ratios.

To examine the impact of voluntary disclosure of financial information on capital adequacy ratio we assume that banks that communicate more information are subject to greater market discipline and are therefore more motivated to limit their risk of default by holding a higher capital adequacy ratio.

2.2 Risk Level

In banking firms, risk level is the most important determinant of capital adequacy ratio. Legal regulations relate the level of capital that banks must maintain with the level of risks that they carry. The main reason of this is that capital is viewed as a shield against unexpected losses and bankruptcy. Basel Accord states, the weights of risk were determined by an international standards ranging from (0%, 20%, 50%, 100%), which were based on risk- based capital standards and reflect risk inherent in banks' assets portfolio.

Generally, increasing risk level would require a higher level of capital. But, there is a difference between the perception of risk of banks and the perception of risk of supervisory authorities. Because the assets that regulators could find risky for banks could be seen not as risky by the managers (Wong et al. 2005).

Kleff and Weber (2008) observed that changes in portfolio risk have positive and significant impact on changes in the capital adequacy ratio for savings banks. They further noticed that banks increase capital and decrease portfolio risk to rebuild their capital buffer.

2.3 Managerial Efficiency

Another important determinant of bank capital is management quality. High incomes provide shareholders sufficient resources to increase equity's level. In a context of asymmetric information, the strengthening of capital through the retention of profits may be perceived by the market as a positive signal for the bank value (Rime, 2001). Asarkaya and Ozcan (2007) state that in economic growth periods banks generate higher profits. These contribute to increasing their equity. Jokipii and Milne (2008) show that banks with high profitability ratios have a better ability to increase their capital adequacy ratios through the retention of profits. Similarly, Gropp and Heider (2007) and Kleff and Weber (2008) found a positive relationship between bank profitability and capital adequacy ratios.

However, a high level of profitability can be perceived and interpreted by a low level of default (Yu, 2000). Therefore, managers may reduce their capital adequacy ratio knowing that the risk of default is considered very low. On a sample of Malaysian banks, Ahmad et al. (2008) find a negative relationship between profitability and capital ratio. High incomes may lower bank's default probability. As a result, high income led to

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the bank's management reduce "capital cushion" given the low risk of failure. Therefore, the relationship between management efficiency and capital adequacy ratio could be positive or negative.

Management efficiency is included in our regression analyses and measured by the ratio of total banking operating expenses reported to total banking income. A high value of this ratio indicates that the managerial efficiency is low. So a positive sign between this variable and capital adequacy ratio indicates that poorly managed banks are those which choose to have a high level of equity to offset unexpected loss.

2.4 Bank Size

Bank size may affect capital adequacy ratio through several channels. First, large banks are characterized by the presence of economies scales, so they can hold relatively less capital. Second, large banks may have better investment and diversified opportunities.

Thus, they are subject to lower probability of default and need to hold a lower capital adequacy ratio.

In a related work by Kristian (2010), it was found that large banks usually have smaller excess capital reserves than small banks. One explanation for this is the "too-big-to-fail" argument. This means that a government guarantee is implied, since regulatory authorities believe the failure of large banks would have incalculable consequences for the society.

Taking into account these considerations, we include size effects with an expected negative sign. The total asset is using as the bank size and because it is very bigger than other variables, we use the logarithm Napierian of total asset to bring it near to the other variable size.

2.5 Capital Adequacy Ratio of Previous Period

The capital level of the previous period is one of the main factors that determine the capital level of the current period. Maintaining a high level of capital may reflect the effect of the profitability and efficiency of banking operations, while a low level of capital may reflect the effect of negative results. The literature has identified three main reasons pushed banks to hold a higher capital level than required by regulators. These reasons are financing growth opportunities, adjustment costs and downward rigidity of capital (Wong et al., 2005).

Capital may be held to finance future business growth and exploit future business opportunities, such as mergers and acquisitions. Accumulating excess capital by retaining earnings could be a bank's business strategy, giving rise to the persistence of a capital buffer.

Adjusting capital levels to cope with unexpected changes in market conditions could be costly to banking firms because of the time gap between the level of capital

adjustment decisions and the transactions of these adjustments.

Banks may choose to maintain high levels of capital by refusing to return the surplus to shareholders since this action can generate undesirable market signals.

This consideration would lead management to simply follow the past practice of choosing the level of capital adequacy ratio, resulting in a downward rigidity of the capital ratio. Therefore, the capital amount that banks want to maintain in the current period can be associated with the capital amount of the previous period. So we expected to have a positive relationship between the current capital ratio and that of the previous period

2.6 Cost of Capital

For banking sector and the rest of economy, one of the main determinants of capital that firms hold is the cost of capital. An increase in the cost of capital decreases the willingness of banks to hold more capital. Mishkin (2007) indicates that banks seeking to hold high capital ratios, as regulators require them to do so. He explains when capital has high costs, bank managers often seek to hold capital lower than those required by the regulatory authorities.

Empirical results of works studying the effect of the cost of capital on capital adequacy ratio are contradictory. Alfon et al. (2004) found a positive but not significant relationship between the capital ratio and the variable apprehending the cost of capital. However, Kleff and Weber (2008) found a negative but insignificant relationship. Wong et al. (2005) find a negative and significant relationship between variable apprehending the cost of capital and the level of bank's equity. They explain that banks choose to reduce equity's level when capital cost is high.

As the most suitable indicator of bank's capital cost, return on equity (ROE) will be used in the regression analyses.

2.7 Capital Adequacy Regulatory Pressure

Regulatory requirement is important component which majorly contributes the capital adequacy ratio in the banking sector. Regulatory authority set the capital adequacy ratio which becomes obligation for the banks to comply with that minimum ratio.

Banks usually choose to maintain a high level of equity in order to reduce the costs associated with the regulatory intervention when the level of equity is approaching the regulatory minimum. Such costs may include, for example, time spent on supplementary management in response to a more careful supervision.

Keeley (1988) studied the effect of regulation on the level of capital of the 100 largest bank holding companies. He found that regulation has succeeded in pushing banks with low capital ratios to increase their

capital levels. In addition, it has pushed banks with a capital ratio increased to slow the growth of their assets.

However, in a sample of US commercial banks, Marcus (1983) shows that regulatory pressure may not always have an effect on banks' capital ratios. He explained that a general decline in the capital of these companies does not lead regulatory authorities to review all of banks and, therefore, banks are not found in the need to readjust the level of their capital ratios.

2.8 Economic Growth

The business cycle is a vital component which explaining the banks' capital adequacy ratios. In the positive economic growth period there is low risk and the banks retain low capital ratio and make more investments in other financial sectors. However, when there is negative growth rate banking firms may need a relatively high capital or may face sudden economic losses, to hedge that risk banks maintain high capital ratio.

According to Asarkaya and Ozcan (2007) banks generally tend to work with more capital in periods when expectations on the economy turn to negative. Having more capital may reduce the negative effects of the economic environment by signaling a strong capital structure. It may also limit the negative effects of adjustment costs that tend to increase in these periods.

Ayuso et al. (2004), Lindquist (2004) and Jokipii and Milne (2008), studied the relationship between capital ratio and economic growth of Spanish banks, Norwegian and EU, respectively. They all found a negative and statistically significant relationship between these two variables. Their results suggest that capital ratios increase during economic recessions and fall during economic growth. However, on a sample of British banks for the period covering the years 1998-2006, Francis and Osborne (2009) found a positive relationship. Further analysis has enabled the authors to conclude that this positive relationship is due rather to the regulatory pressure, since the period of economic recession coincided with the implementation of the first Basel Accords. They concluded that regulatory pressure can increase equity levels despite the contradictory effect of the economic cycle.

3. RESEARCH METHODOLOGY

3.1 Data

Data used in the empirical analysis are derived from financial statements of the ten banks listed on the Stock Exchange of Securities of Tunis (BVMT) in the period 2000-2014. We retained in the sample all listed banks which are 10 in number. We have paid particular attention to the continuity of temporal banks' data. The information about the capital adequacy ratio is obtained from the Central Bank of Tunisia database. We also used aggregated data from the statistics of National Institute of Statistics (INS). These data concern mainly, gross domestic product and the index of consumer prices. All

other information is collected from the banks' annual activities reports.

We are particularly interested to Tunisian banks because, like all developing countries, financing of the Tunisian economy is based primarily on banking firms. However, when those establishments show signs of fragility, they can negatively affect the entire economy and the welfare of households.

3.2 Variables' Measures

The dependent variable (CAR) represents the Cooke ratio calculated by the Central Bank of Tunisia (BCT) in reference to Basle I international standards. It represents the ratio of Total capital to risk-weighted assets.

Total capital in the nominator is divided into two Tiers: which are called Tier I capital (prime capital) and Tier 2 capital (supplementary capital). Tier one capital consists of paid-in capital, all kinds of reserves, retained earnings. While Tier two capitals consist of undisclosed reserves, assets revaluation reserves, general provisions, hybrid capital instruments and subordinated term debt. A risk-weighted asset in the denominator of the capital adequacy ratio represents on balance sheet and off balance sheet assets in the bank's balance sheet weighted by their risk.

To test the effect of voluntary disclosure of financial information (DISCL) on the capital adequacy ratio of Tunisian banks we use as a predictor an index of voluntary disclosure of financial information published in the annual activity reports of Tunisian banks. Referring to the study of Nier and Baumann (2006) we identified 17 items. These items relate to financial information disclosed differently by Tunisian banks in their annual reports. Some banks provide this information by providing all the details attached to it. However, other banks are limited to communicate this information without giving any explanatory detail. We present in the table (6) shown in the appendix, detailed information regarding the 17 items retained to build the disclosure index.

To examine the impact of risk-taking on the capital adequacy ratio we hold two different measures which are: the rate of non-performing loans, represented by the ratio of non-performing loans to total loans (RISK); and Loans Loss provisions apprehended by the ratio of loan loss provisions to total loans (LLPGL). This ratio is used to determine the impact of new provisions on the level of capital adequacy ratio. A negative relationship indicates that is more difficult for banks with financial problems to increase their equity levels. However, a positive relationship may signal that banks increase their capital in order to overcome their bad financial situations. Blose (2001) finds that the loan loss provisions cause a reduction of the capital adequacy ratio.

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The size of the bank (SIZE), measured by the natural logarithm of total assets, assesses the impact of the strategy of growth opportunities on the capital adequacy ratio. It can also capture the presence of capital ratio adjustment costs. To test whether banks pursue the same practices of the past in choosing the level of the capital ratio, we introduce in the model the capital adequacy ratio of previous period (L.CAR). In order to check the regulatory pressure effect, we use in our regression analyses an indicator variable that takes the value of 1 when the bank is undercapitalized ($CAR < 8\%$), 0 otherwise.

The cost of capital is apprehended by the variable (ROE: Return in Equity). This ratio represents net income reported to equity. Estrella (2004) argues that banks can choose a low level of equity in order to maximize their profitability. For considering the economic conditions, we used the real growth rate of Gross Domestic Product (GDP). Managerial Efficiency (EFFIC) is measured by the ratio of total banking expenses to total banking incomes.

The variable dividend (DIV) is introduced into the empirical model as a control variable to capture the effect of the distribution of dividends on the capital adequacy ratio. We use the ratio of dividends to net income. Within the framework of empirical research seeking to determine the factors affecting the firms' capital structure, Smith and Warner (1979) have shown that there is a negative relationship between the distribution of dividends and the level of equity. When the bank decides to distribute a higher amount of dividends, retained earnings and the capital adequacy ratio also decrease.

In the same way, we introduce in our empirical analysis the bank's ownership nature (NAT_OW) as a control variable. This variable is apprehended by the percentages of the two types of ownership, namely public ownership (POWN) and foreign ownership (FOWN). The difference in behavior between public banks and private banks is widely recognized. This difference is due to the mission of public banks. The latter focus principally on economic and social developments of the nations. This mission affects significantly the level of risk of these banks, and therefore, the level of equity could be affected.

Barth et al. (2004) based on a sample of 107 banks belonging to countries and Micco et al. (2004) based on a sample of financial institutions owned by 119 emerging countries, found that public ownership is positively related to the level of risk of these institutions.

Therefore, we assume that if the portfolio quality and bank profitability are affected, capital adequacy ratios may in turn be affected by the bank's ownership nature.

Moreover, the behavior of domestic private bank differs from foreign private banks. Levine (1996), states that private banks with foreign participation play a very

important role in the economy. They help to increase competition between banks and improve the services' quality provided to customers. Moreover, foreign banks allow introducing new technologies that facilitate access to international markets. In this context, Delis et al. (2008) found, in a sample of 553 banks from 22 countries in transition in the period 1999-2006, that foreign ownership improves the bank's productivity. Similarly, Barth et al (2002, 2004) show that foreign ownership improves the credit quality and reinforces the stability of the banking system as a whole; however, restrictions on the entry of foreign capital increase the probability of failure.

Therefore, we expect a positive relationship between the percentage of foreign ownership and the capital adequacy ratio.

3.3 The Model

Banks adjust capital so as to achieve a desired level of capital. Following Kleff and Weber (2008) and Brewer et al (2008), this can be written as:

$$\Delta capital_{i,t} = \alpha [capital^*_{i,t} - capital_{i,t-1}] + \varepsilon_{i,t}$$

Where,

$$\Delta capital_{i,t} = capital_{i,t} - capital_{i,t-1}$$

This equation shows how the adjustment is made. If the managers observe that capital in the last period ($capital_{i,t-1}$) falls below the desired level ($capital^*_{i,t}$) they will increase the capital in the current period so that $\Delta capital_{i,t}$ is positive. The coefficient in front of the adjustment term (α) measures the speed of adjustment. The high value of α , means that managers respond strongly to deviations from the desired level of capital.

We can write the above equation as:

$$capital_{i,t} = (1 - \alpha) capital_{i,t-1} + \alpha capital^*_{i,t} + \varepsilon_{i,t}$$

Since the target level of capital is not observed, we use proxy variables for the unobserved variable $capital^*$. We use transparency, portfolio risk, return on equity, managerial efficiency, asset size, regulatory pressure, real growth rate of gross domestic product, ownership structure, and dividends as proxy variables for the target level of capital.

3.4 Empirical Specification

We specify the empirical equation of capital adequacy ratio as follows:

$$CAR_{i,t} = \beta_0 + (1-\alpha) CAR_{i,t-1} + \beta_1 DISCL_{i,t-1} + \beta_2 RISK_{i,t} + \beta_3 LLPGL_{i,t} + \beta_4 ROE_{i,t} + \beta_5 EFFIC_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 REG_{i,t} + \beta_8 GDP_{i,t-1} + \beta_9 NAT_OWN_{i,t} + \beta_{10} DIV_{i,t} + u_{i,t}$$

Avec $u_{i,t} = \mu_{i,t} + \varepsilon_{i,t}$ où $\mu_{i,t} \sim IID(0, \sigma_\mu^2)$ et $\varepsilon_{i,t} \sim IID(0, \sigma_\varepsilon^2)$

As already mentioned, we used in this study individual (10 banks) and temporal (15 years) data.

Baltagi (2001) and Hsiao (1986) indicate that the methodology of Panel data controls the individual heterogeneity, reduces the problems associated with multicollinearity and bias estimation. Estimates by ordinary least squares (OLS) on panel data presupposes uniformity of individuals who make up the sample, otherwise the estimators are biased.

The heterogeneity of the average values of variables and their standard deviations, presented below in table 2, shows the need for other tests in order to choose the appropriate estimator. In conducting the test of Fisher (F-test) and Breusch-Pagan Lagrange Multiplier (LM), we accept the rejection of homogeneous panel and therefore our model is either fixed individual effects or random individual effects. The Hausman test (1978) tells us that the model that fits the data structure of the sample is fixed effects.

However, in our regression model there is a lagged dependent variable ($CAR_{i,t-1}$) on the right side of the equation. $CAR_{i,t-1}$ is correlated with the individual specific effects. Accordingly, the estimation results are biased (Nickell, 1981). A possible solution suggested by Anderson and Hsiao (1982) is to remove the individual specific effects by first differencing the equation. But the problem of correlation remains persistent. Arellano and Bond (1991) suggest using further lagged variables as instruments within a GMM-model. GMM enables to optimally exploit the orthogonality conditions between the lagged dependent variable and the disturbances. An important advantage of GMM is the fact that it allows to consider explicitly the endogeneity not only of the lagged dependent variable but also of other right-hand variables.

Arellano and Bover (1995) argue that the GMM model in first differences described above (GMM-DIF) may suffer from weak instruments. As a consequence, poor estimation precision may result. They propose to use instruments in first differences for equations in levels in addition to using instruments in levels for equations in first differences. Blundell and Bond (1998) recommend using this extended linear GMM (GMM-SYS). Tests of Hansen/Sargan are used to test the model specification validity. This test examines the lack of correlation between the instruments and the error term.

4. FINDINGS AND RESULTS

4.1 Descriptive Statistics of Dependent and Explanatory Variables

Descriptive statistics presented below at table 1, show that the capital adequacy ratio is of considerable dissimilarity. On average this ratio is equal to 10.28%.

However, the bank where the level of capitalization is the lowest, the capital adequacy ratio is equal to 0.4%, by against the most capitalized bank has a capital ratio equal to 22.1%.

Similarly, we note that the financial variables apprehending transparency, portfolio risk and management quality, have a fairly significant difference.

The disparity of these variables reflects a considerable difference in the behavior of banks. Hence it is very important to examine the impact of these factors on the capital adequacy ratio.

Table 1: Summary statistics

Variables	Mean	Std. Dev	Min	Max
CAR	10.285	4.030	0.046	22.1
DISCL	0.5848	0.287	0	1
RISK	19.825	12.660	5.08	56.940
LLPGL	0.359	0.226	0.080	0.971
ROE	16.451	99.157	-176.479	969.258
EFFIC	5.056	1.121	3.195	8.534
SIZE	14.512	0.501	13.539	15.445
REG	0.122	0.329	0	1
GDP	4.95	1.299	1.7	6.3
POWN	22.479	27.316	0	68.4
FOWN	24.781	22.780	0	64.2
DIV	402.727	3531.103	0	35000

4.2 Correlations and Multicollinearity among Variables

Table 2 shows correlation between the variables used to estimate the regression model. Portfolio risk, size of assets, regulatory pressure, growth rate of gross domestic product (GDP), the percentage of public ownership and the percentage of foreign ownership are negatively correlated with our dependent variable, capital adequacy ratio. Lagged capital, loan loss provisions, Return on Equity, managerial efficiency, bank transparency and dividends are positively correlated with capital adequacy ratio.

Table 2 shows also a high correlation coefficient between the percentage of public ownership and the percentage of foreign ownership.

Before the multivariate regression, it is imperative to verify the absence of multicollinearity between the explanatory variables. For a tolerance level of 5, VIF test results show that explanatory variables used do not present a problem of multicollinearity. Also, before performing the VIF test, we proceeded first to linear regression of explanatory variables on the dependent variable, the variable (FOWN) was automatically omitted because of its strong collinear with the variable (POWN). So, we decide to introduce these two variables separately in the regression model.

Table 2: Correlation matrix for the variables

	CAR	L.CAR	RISK	LLPGL	ROE	EFFIC	SIZE	DISCL	REG	GDP	DIV	POWN	FOWN
CAR	1												
L.CAR	0.967	1											
RISK	-0.3242	-0.3597	1										
LLPGL	0.3803	-0.2761	0.4273	1									
ROE	0.1287	0.1464	-0.4667	0.1656	1								
EFFIC	0.2752	0.2943	-0.3116	0.3019	0.2759	1							
SIZE	-0.1396	-0.1666	0.0227	0.5343	-0.3514	-0.5846	1						
TRANS	0.5781	0.5352	-0.3506	-0.4523	-0.0250	0.1889	0.2898	1					
REG	-0.4168	-0.4383	0.3346	0.3473	-0.3610	-0.1976	-0.0140	-0.3426	1				
DISCL	-0.1196	-0.1234	-0.0160	0.0062	0.1046	0.0685	0.0567	0.0079	0.1394	1			
DIV	0.2187	0.2208	-0.0306	0.0317	-0.2815	0.1699	-0.0828	0.1639	-0.235	-0.2369	1		
POWN	-0.1643	-0.1860	0.2114	0.2351	-0.2217	0.5245	0.3328	-0.1681	0.5316	-0.3406	-0.0750	1.0000	
FOWN	-0.2086	-0.0818	0.0516	0.3369	0.5639	-0.5422	-0.3329	0.1706	-0.496	0.3256	-0.3510	-0.6394	1.0000

Table 3: Results of VIF test on explanatory variables

Variables	POWN	DISCL	EFFIC	SIZE	LLPGL	L.CAR
VIF	4.86	2.87	2.86	2.63	2.49	2.11
Variables	REG	RISK	ROE	DIV	GDP	Mean VIF
VIF	1.76	1.58	1.44	1.26	1.05	2,26

4.3 Regression Analysis

Our findings are in line with our predictions from the theory. In particular, lagged capital has a significant effect on current capital, which shows that the dynamic model is a good choice in explaining capital. This result suggests that bank's capital adequacy ratio in the previous year affects its capital adequacy ratio in the current year. The amount of capital is the results of the accumulation year after year, and cannot change in a short time period. Consequently, previous year capital directly determines current year capital.

According to the regression results displayed in Table (4) we notice that the extent of voluntary disclosure of financial information by Tunisian banks (DISCL) of a given year is positively and significantly associated to capital adequacy ratio of the following year. This result

corroborates that of Nier and Baumann (2006) and shows that when Tunisian banks choose to disclose rich information about their profiles' risk in their annual activity reports; they seek thereafter to increase the capital adequacy ratio in order to limit the adverse effects of market discipline. Nevertheless, we note from the regression results that the level of risk (RISK) in Tunisian banks is not a factor that determines the capital adequacy ratio. This result can question the effectiveness of Basel accord guidelines on capital adequacy in reducing risk-taking for the case of Tunisian banks.

Financial communication should help reduce risk-taking by banks. In the case were the communication of information is of good quality, it allows market discipline to encourage banks to act prudently and efficiently as bank executives know that their risk

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exposures will be clear to market operators. Fear reactions can encourage banks' managers to improve their risk management practices. However, if the financial market is still primitive and embryonic, as the case of the Tunisian market, fears the reactions of market participants by the bankers could diminish. So, Tunisian Banks do not find themselves forced to reduce their risk-taking following a good communication to the market as found by Dhouibi and Mamoghli, 2015. We can therefore conclude that greater transparency cannot force the Tunisian banks to limit their risk-taking, but they opt to the solution to increase capital adequacy ratio to reduce their risk of default and comply with regulatory requirements for capital adequacy.

Regarding the variable (EFFIC) apprehending managerial efficiency, we notice that it have a statistically and significant positive effect on the capital adequacy ratio of Tunisian banks. That means that a higher ratio of total expenses to total incomes is associated to a high capital adequacy ratio. This result could be interpreted by the fact that the least efficient banks, those holding the highest operating expenses or weakest incomes, are seeking to hold higher capital adequacy ratios to minimize their default risk. We can therefore conclude that inefficient Tunisian banks keep a high capital adequacy ratio to reduce their risk of failure.

Furthermore, the results show that the variable (LLPGL), which represents loan loss provisions divided by total loans, apprehending the new risks faced by the bank, has a negative and statistically significant effect on the capital adequacy ratio of Tunisian banks. This result is consistent with those of Alfon et al. (2004), Wong et al. (2005) and Osborne and Francis (2009). This indicates that banks that allocate a high amount of loan loss provisions are less able to increase their capital adequacy ratios.

However, the results show that the relationship between the bank's size (SIZE) and the capital adequacy ratio is not significant. This result reverses those of Wong et al. (2005) and Francis and Osborne (2009). These authors indicate that banks with small size need to keep higher level of capital adequacy ratio. This insignificant result could be interpreted by the fact that Tunisian banks are, on the whole, characterized by a reduced size.

Similarly, the variable (ROE) apprehending the cost of capital and the variable (GDP) apprehending economic growth have no effect on the behavior of capital adequacy ratio. Shahchera (2013) also found an insignificant coefficient between ROE and capital adequacy ratio of Iranian banks.

Nevertheless, we see from the results that the variable (REG) has a negative and statistically significant coefficient on the capital adequacy ratio. This variable captures the regulatory pressure from the central bank on banks with capital adequacy ratios below the threshold required by the regulatory authorities. The negative sign

indicates that regulatory pressure pushes banks to reduce their capital ratios. This result contrasts with expectations, as regulatory pressure should push banks to increase the level of equity. This unreasonable result can be explained for the case of Tunisian banks, that banks with low levels of capital ratios have also high levels of under-provisioned bad loans. The efforts of these banks in recent years were oriented to the provisioning of non-performing loans to align the requirements of the Central Bank of Tunisia on provisioning of bad loans.

Finally, we note that the percentage of bank public ownership has no effect on the level of the capital adequacy ratio. Contrariwise, the percentage of foreign ownership has a positive and statistically significant effect on the capital adequacy ratio of Tunisian banks. This result confirms the findings of Barth et al. (2002, 2004) which prove that foreign ownership reinforces the stability of the banking system as a whole; and the restrictions on the entry of foreign capital can increase the probability of failure. We also note that banks that distribute a higher amount of dividends are those characterized by a reduced ability to increase their capital adequacy ratios.

The results emerging from this work highlight some objects of interest to bank management and supervisory bodies enable them to take necessary measures to reduce the degree of fragility of Tunisian banks. They should direct their efforts towards empowering administrators with regard to the importance of voluntary disclosure of financial information particularly with respect to the risk profile. They should also involve prudential regulation to other measures that may have more effect on risky behavior of Tunisian banks. They can further enhance shareholder liability by applying the dual liability principle (Benston et al. 1986, Kane 1989 and Macey et Miller 1992). They can also strengthen the accountability of managers by encouraging managerial ownership (Cole and Mehran, 1998).

Table 4: Regression model results (dependent variable: Capital Adequacy Ratio)

	(1)	(2)
VARIABLES	CAR	CAR
L.CAR	0.570***	0.579***
	(0.141)	(0.135)
L.DISCL	0.0483**	0.0692***
	(0.0232)	(0.0238)
RISK	-0.000376	-0.000351
	(0.000297)	(0.000262)
LLPGL	-0.593**	-0.536**
	(0.283)	(0.268)
ROE	-0.0223	-0.0137
	(0.0185)	(0.0159)
EFFIC	0.0635*	0.0695*
	(0.0385)	(0.0391)
SIZE	-0.710	-0.883

	(0.723)	(0.538)
REG	-3.981***	-4.315***
	(1.320)	(1.330)
L.GDP	-0.0950	-0.108
	(0.221)	(0.223)
DIV	-0.0101**	-0.0140***
	(0.00439)	(0.00364)
POWN	-0.0161	
	(0.0110)	
FOWN		0.0271***
		(0.00956)
Constanta	11.89	10.03*
	(7.943)	(6.081)
Observations	150	150
Banks number	10	10

Reported in parentheses are standard errors.

*** Significant at 1% level, ** significant at 5% level and * significant at 10% level.

4.4 Robustness

The results of the regression function do not show a significant relationship between the capital adequacy ratio and economic growth as measured by the real GDP growth rate of previous period. To better examine this relationship we advance the same model by introducing the contemporary real GDP growth rate. In reality, growth or recessions may immediately or later affect the results of banking firms and their ability to rebuild capital. The results of this estimation are shown in the table (5) in the equations (1) and (2). The estimated coefficient of macroeconomic variable remains insignificant. This result confirms that capital management practices are not affected by the economic conditions of the country.

We also used another indicator of managerial efficiency or the quality of management. The latter is measured by the net interest margin (NIM). This measure is defined as the ratio of net interest income to the total assets. This measure of managerial efficiency has been used by Alfon et al. (2004), Wong et al. (2005) and Osborne and Francis (2009). The results of this estimation are shown in the table (5) in the columns (3) and (4).

These results show that the coefficients remain significant with a negative sign. This result indicates that the managerial efficiency is negatively related to the capital adequacy ratio. This result confirms that found in the first model and shows that the least efficient banks are those that seek to keep a high level of the capital adequacy ratio in order to increase their strength and minimize their default risk.

Furthermore, the results show that the coefficient of the variable RISK, apprehending the quality of assets, appears significant at the 10% threshold in equations (1) and (2). The coefficient relating this variable with the capital adequacy ratio appears negative, which could be explained by moral hazard behavior among Tunisian banks. This means that when the amount of capital the bank is small, the bankers can afford to engage in risky activities. But the coefficient appears very small and approaching zero. These results confirm those previously obtained and show that Tunisian banks do not adjust their capital ratio according to the asset quality.

The results also show that the coefficient on the extent of voluntary disclosure of financial information remains significant in the four equations of both models. These results prove the robustness of the first model.

Table 5: Regression model results-robustness (dependent variable: Capital Adequacy Ratio)

	(1)	(2)	(3)	(4)
VARIABLES	CAR	CAR	CAR	CAR
L.CAR	0.576***	0.585***	0.552***	0.563***
	(0.133)	(0.124)	(0.137)	(0.133)
L.DISCL	0.0448**	0.0661***	0.0512***	0.0700***
	(0.0197)	(0.0207)	(0.0193)	(0.0219)
RISK	-0.000318*	-0.000285*	-0.000345	-0.000271
	(0.000290)	(0.000249)	(0.000262)	(0.00020)
LLPGL	-0.579**	-0.514*	-0.455*	-0.319*
	(0.295)	(0.276)	(0.260)	(0.191)
ROE	-0.0218	-0.0124	-0.00850	0.00667
	(0.0166)	(0.0141)	(0.0193)	(0.0171)
EFFIC	0.0878*	0.0675*		
	(0.0501)	(0.0381)		
NIM			-0.997*	-1.310***
			(0.536)	(0.319)
SIZE	-0.623	-0.822*	-1.053*	-1.323***
	(0.660)	(0.466)	(0.609)	(0.494)

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REG	-3.924***	-4.260***	-4.215***	-4.616***
	(1.294)	(1.303)	(1.322)	(1.358)
GDP	-0.000934	-0.00963	-0.0455	-0.0150
	(0.0638)	(0.0747)	(0.217)	(0.204)
DIV	-0.00934**	-0.0133***	-0.00957***	-0.0131***
	(0.00379)	(0.00310)	(0.00354)	(0.00382)
POWN	-0.0169		-0.0200**	
	(0.0111)		(0.00944)	
FOWN		0.0273***		0.0280***
		(0.0101)		(0.00860)
Constanta	10.77	9.203*	20.82**	22.40***
	(6.719)	(5.301)	(8.328)	(6.537)
Observations	150	150	150	150
Banks number	10	10	10	10

Reported in parentheses are standard errors.

*** Significant at 1% level, ** significant at 5% level and * significant at 10% level.

5. CONCLUSION

The main objective of this study is to investigate the relationship between the capital adequacy ratio and banks' voluntary disclosure of their risk profile. This study contributes to the literature by estimating a panel data model of capital adequacy ratio for the Tunisian banking sector. It is the first study of this sort for this sector, to our knowledge. The findings of the empirical study are generally in line with other empirical evidence from other countries.

Regression analyses show that voluntary disclosure and foreign ownership are positively correlated with capital adequacy ratio and managerial efficiency is negatively correlated to the dependant variable. However, Tunisian banks do not take into account the level of risk in the determination of capital adequacy ratio and regulatory pressure has a negative effect on capital adequacy ratio.

We notice that there are some variables that affect the capital adequacy ratio differently in Tunisia. We think that this can be explained by the circumstances of the Tunisian banking sector in the period covered in this study. The study covers a period in which banks and the overall economy was in difficulty. On the other hand, the Basel II framework was recently implemented in Tunisia.

It is very interesting to see how Tunisian banks respond to these changes in regulatory framework.

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APPENDIX

Table 6: Presentation of items retained for the construction of the voluntary disclosure index of Tunisian banks over the period 2000-2014

Sub-index	Items	Categories
Assets		
Loans	S1 : Loans by maturity	Loans and advances (3 months, loans and advances 3-12 months, loans and advances 1 year)
	S2 : Loans by counterparty	Loans to group companies, loans to other corporate, loans to banks
	S3 : Problem loans	Total problem banks
	S4 : Problem loans by type	Overdue/ restructured/ other non-performing loans
	S5 : Risk weighted assets	Total of risk weighted assets
Other earning assets	S6 : Securities by type	Treasury bills, other bills, bonds, CDs, equity investments, other investments
	S7 : Securities by holding purpose	Investments, trading
Liabilities		
Deposits	S8 : Deposits by maturity	Demand, saving, sub 3 months, 3-6 months, 6 months-1 year, 1-5 years,
	S9 : Deposits by maturity	Banks/customers/municipal, government
Other funding	S10 : Money Market funding	Total money market funding
	S11 : Long-term funding	Convertible bonds, mortgage bonds, other bonds, subordinated debt, hybrid capital
Income statement		
	S12 : Non interest income	Net commission income, net fee income, net trading income
	S13 : Loan loss provisions	Total loan loss provisions
Memo lines		
	S14 : Reserves	Loan loss reserves (memo)
	S15 : Capital	Total capital ratio, Tier 1 ratio, total capital
	S16 : Off-balance sheet (OBS) items	OBS items
	S17 : Liquid assets	Total liquid assets