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# The Determinants of Banking Stability: The Example of Tunisia

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## Abstract

This paper try to study the factors of the stability of Tunisian banks from a sample made up of 7 Tunisian banks listed during the period 2005-2014. The important determinants used to explain the stability of the banks are: the z-score and the capitalization ratio.

The results revealed, firstly, that the profitability variables such as: return on assets (ROA) has a positive and significant impact on the stability of banks and return on equity (ROE) has a negative and significant effect. Besides, bank-specific variables such as: the net interest margin (NIM), the non-interest income (NII), the age and the size of the bank affect positively and not significantly the banking stability. But the debt ratio (END) has a negative and significant impact on banking stability. Finally, gross domestic product (GDP) affects positively and not significantly on banking stability.

This paper investigates the connection between earnings management and corporate social.

**Keywords:** The Banking Stability, The z-score, The Capitalization Ratio, The Return on Assets, The Return on Equity.



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## Introduction

Banking instability is linked to the phenomena of financial crises and systemic risk. The latter determine not only the social welfare disadvantages of a situation culminating in a climate of mistrust and uncertainty, but also the aspects and characteristics of a vulnerable and unbalanced system.

The crisis has taught us that market economies can be unstable and that the costs of such instability are considerable. Whether it is unemployment or public debt, it will take many years to deal with the aftermath of those few months during which the global financial system came close to collapse. (Noyer, 2011).

Thus, the onset of the 2007-2009 financial crisis brought to the surface massive information asymmetries between the different actors involved in the activities of financial institutions, the causes of which are often attributed to imbalances and new instruments adopted by all economic agents (Gerth, 2008).

The Tunisian banking sector has undergone major reforms led by the public authorities. These reforms aim to restructure and privatise public banks and to strengthen banking supervision by introducing both prudential legislation and a risk management system.

The limitations of traditional banking regulation would have played a significant role in triggering the financial crises. It is therefore essential to integrate a macroeconomic dimension. This will help to achieve the objective of systemic financial stability (Blanchard and al. 2010).

Banking is an important part of the economy. Its role is to raise funds and redirect them towards financing the most profitable and beneficial projects for the economy.

Policy-makers and economists then agreed on the need to review the regulatory framework. Traditional regulation needs to be adapted to the nature of the risk associated with financial globalisation, i.e. systemic risk. It is now essential to move to macro-prudential regulation. The Bank for International Settlements (BIS), the International Monetary Fund and the World Bank have proposed improved regulatory and supervisory practices aimed at strengthening banking stability.

The purpose of our work is to examine the determinants of the stability of Tunisian banks. We focus on the case of Tunisia for many reasons. First, the banking sector in Tunisia has a great importance in the financial system. Besides, the Tunisian banking sector went through periods of crises and instabilities during the study period.

Our study is prepared as follows. We present in the first section the literature review and our research hypotheses. After that, the methodological aspects will be studied in the second section. In the third section, we try to analysis and discuss our results. Finally, we would sump up the most important results, speak about the limits and the openings of this research.

## The Literature Review and Hypothesis

The literature review shows that many works have studied the indicators of stability of tradionnal banks.

After the global financial crisis of 2007, the majority of banks have recorded losses or failures. Indicators of stability may be the z-score, used by Ghosh (2014), and the capitalisation ratio used by Horvàth et al. (2014). The z-score was developed by Boyd et al (1993). The higher are the z-score and the capitalization ratio, the better is the bank.

Several studies consider the capitalization ratio and the z-score as an indicator of stability (dependent variables). Such as, DeYound and Toma (2013).

To analyse the determinants of stability of many cmmercials banks for the period 1998-2008, Nguyen et al. (2012) showed that the z-score ratio increases with factors such as the bank size, the NII, the capitalization ratio, and the business cycle. In contrast, the z-score ratio decreases with factors such as the credit losses and ex post concentration.

For the purpose of comparing the stability (z score) of small and large banks in China, Lee and Chih (2013) studied the effect of financial regulation on the risk of bankruptcy of these banks. The results showed that smaller banks were at greater risk of bankruptcy than larger banks. In addition, the capital ratio and the leverage effect have an impact on the risk of small banks.

To study the factors of banking stability in many countries over the period 2003-2010, Fu et al. (2014) analyzed 1500 observations over the Asia Pacific region. The dependent variable used is z-score and the independent variables used are the efficiency of banking, the competition, the concentration, the size, the allowance for credit



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losses on assets, the NIM, the GDP. The results recommend that competition and the NIM are the variables that increase stability. However, the concentration leads to a degradation of the stability. In addition, the results show that small banks have turned out to be less risky and more stable.

In Asia, Williams (2014) carried out a work of many banks during the period 1998-2012. This study concluded that variables, namely, the capital, the assets, the GDP and the deposit rate increased the banking stability and reduced the bankruptcy risk.

Horváth et al. (2014) analyzed the indicators of commercial banking stability during 10 years. The findings suggest a significant and positive correlation between stability and capitalization.

To compare public and private Indian banks stability over the period 1990-2011, Nguyen and Nghiem (2015) noted that the risk of credit is increasing in both sectors. In this case banks reduce loan amounts by focusing on specific factors; the GDP and inflation reduce equity.

In Brasil, Tabak et al. (2015) examined the determinants of the stability of many commercial banks for 11 years. The findings suggest that the ROA improves banking stability.

Tan and Anchor (2016) studied the interrelationship between performance and stability in the Chinese banking sector during the period 2003-2013. They find a significant and negative correlation between stability and ROA ratio.

From the literature cited above we can deduce the following hypotheses:

**H1:** The Return on assets affects positively banking stability.

**H2:** The Return on equity has a positive impact on banking stability.

**H3:** The net interest margin has a positive impact on banking stability.

**H4:** The Non-interest income has a positive impact on banking stability.

**H5:** The debt ratio affects negatively the stability of banks.

**H 6:** The size of the bank has a positive impact on banking stability.

**H7:** The age of banking has a positive effect on banking stability.

**H8:** The rate of GDP growth has a positive impact on the stability of banks.

## The Methodology

### Sample and Data Collection

In order to assess the stability of Tunisian banks, our study covers a sample of 7 commercial banks listed on the Tunis Stock Exchange. The study period extends over a period of 10 years, ranging from 2005 to 2014. On the basis of this sample, we collect accounting and financial information from the financial statements and stock market data published by the Financial Market Council and the Professional Association of Banks of Tunisia. That is to say, balance sheets and results accounts tables available in the banks' annual activity reports. In addition, from the Bankscop database and bank websites.

### The Variables Selected

- **The Dependent Variables**

To measure the stability of banks, two indicators are generally used: the Z sore and the capitalisation ratio. We will therefore use them both in our analyses. Let us detail here what precisely these two indicators measure:

The Z- score: We measure the Z score like most authors (Williams, 2014; Bertay et al. (2013)) by calculating the return on assets plus the capital ratio divided by the standard deviation of the return on assets,

$$\text{Z- SCORE} = \frac{\text{ROA+CAR}}{\text{SD ROA}}$$

Where;

ROA is the rate of return on assets, CAR is the capital/asset ratio and SD_ROA is an estimate of the standard deviation of the rate of return on assets.

A higher z-score indicates more financial stability and less risk of bankruptcy (default).



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*The Capitalisation ratio:* We measure it by the ratio $=\frac{\textbf{shareholders' equity}}{\textbf{total assets}}$

Portant, Horváth et al. 2014 argued that higher capital increases stability through the availability of financial support in case of unexpected loss or financial crisis. Thus, authors Besanko and Kanatas (1996); Aiyar et al, (2015) analysed, higher capital ratios should enhance the security of the banking sector and strengthen the stability of the banking sector therefore, a positive relationship between capital ratios and banking sector stability is expected. In addition, this ratio measures the risk of the bank, since a higher capitalization ratio means a lower risk of failure, allowing the bank to raise funds (equity or debt) at lower cost, which translates into higher profits.

In fact, the higher the risk, the higher the profitability according to the classical theory of the risk-return trade-off.

- **The Independent Variables**

Two profitability ratios are used, generally measured by return on assets (ROA) and return on equity (ROE).

The effect of profitability on stability can have two possible scenarios. The first foresees a positive relationship between return on assets and bank stability, thus avoiding the risk of failure. Then, one can think that the most profitable banks are the most stable banks. The second is a negative impact between return on equity and bank stability. In this case, the most profitable banks are banks that take excessive risks. These risks negatively influence bank performance and lead to a decrease in bank stability.

*The ROA ratio:* This ratio is defined as profit after-tax divided by total assets. The more the ROA increases, the more the profitability increases.

*The ROE ratio:* This ratio is defined as the ratio of profit after-tax to equity. The more the ROE increases, the more the profitability increases.

*The Net Interest Margin (NIM):* We measure this ratio by Net Interest Income on Total Capital. Thus, according to authors Ben Naceur and Omran (2008), NIM is defined as "interest income minus interest expenses divided by interest bearing assets", these are measures of the profitability of the banking sector. We believe that profitable banks have a higher net interest margin, hence they are more stable. Moreover, in the literature the majority of authors have argued that higher net interest margin leads to banking stability.

*The Non-interest income (NII):* We measure non-interest income by non-interest income on total income. The higher the ratio, the greater the stability of the banking sector.

*The Gross Domestic Product (GDP):* At both external and internal level, several macroeconomic indicators are set by the central bank to identify the stability of the banking system. We choose the GDP growth rate as a macroeconomic indicator. In addition, we measure this ratio by the real GDP growth rate. Indeed, we are well aware that GDP growth is a macroeconomic variable. However, we want to include it in our analysis because we believe that it can have a significant impact on the stability of banks.

**The Control Variables**

Three control variables are used in our study. Namely, the debt ratio, the bank size and the bank age.

*The debt ratio (End):* We measure the debt ratio as most authors do, by calculating total debt to total assets.

*The bank Size (BS):* To measure the size of the bank we will use the natural logarithm of total assets. Indeed, this ratio plays a key role in determining bank stability, so the literature focuses on the impact of size on bank stability. So, several researches share the advantages of bank size: large banks can reduce risk and credit costs and are more stable than small banks. On the other hand, smaller banks are more unstable; more exposed to risk and therefore better able to withstand the major banking crisis.

*The bank age (BA):* We measure this ratio in terms of the number of years since the creation of the bank. In the literature this variable is rarely used. Moreover, we think it may be important to integrate it. We believe that the older the bank is, the wider its experience in the field and the more the accumulation of skills will allow the bank's managers to better select investment projects for the purpose of banking stability.

The following table summarizes the definitions and measures used for the different variables used.



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**Table 1: Definitions and Measures of Variables Used**

| Variables | Definitions | Mesures |
|---|---|---|
| **Z- score** | The standard score | $\frac{\text{ROA} + \text{CAR}}{\text{SD ROA}}$ |
| **CAR** | The capital ratio | $\frac{\text{shareholders' equity}}{\text{total assets}}$ |
| **ROA** | The Return on assets | Net profit / total assets |
| **ROE** | The Return on Equity | Net profits / equity |
| **NIM** | Net Interest Margin | Net interest income / Total capital |
| **NII** | Non-Interest Income | Non-interest income / Total income |
| **END** | The debt ratio | Total debts / total assets |
| **BS** | The size of the bank | The natural logarithm of total assets |
| **BA** | The age of the bank | The number of years since the creation of the bank |
| **GDP** | The Gross Domestic Product | The growth rate of an economy |

**Presentation of the Models to be Estimated**

In our study, we will estimate two models:

***Model 1:***

$$\text{Z-score}_{it} = \alpha_0 + \alpha_1 ROE_{it} + \alpha_2 ROA_{it} + \alpha_3 NIM_{it} + \alpha_4 NII_{it} + \alpha_5 END_{it} + \alpha_6 BS_{it} + \alpha_7 BA_{it} + \alpha_8 GDP_{it} + \varepsilon it$$

***Model 2:***

$$CAR_{it} = \beta_0 + \beta_1 ROE_{it} + \beta_2 ROA_{it} + \beta_3 NIM_{it} + \beta_4 NII_{it} + \beta_5 END_{it} + \beta_6 BS_{it} + \beta_7 BA_t + \beta_8 GDP_{it} + \varepsilon it$$

As mentioned, the dependent variables which are the z-score or the capital ratio (CAR)

Where,

- $\boldsymbol{\beta_i}$ : The coefficients of the explanatory variables (i = 1,...,10).
- $\boldsymbol{a_i}$ : The coefficients of the explanatory variables (i = 1,...,10).
- **i** : The index for each bank (i = 1,...,7).
- **t** : Moment t.
- $\boldsymbol{\varepsilon_{1t}}$ et $\boldsymbol{\varepsilon_{2t}}$ : Error terms

**Results and Discussions**

To test the validity of the two models, we will do an analysis of the descriptive statistics of the variables in the model first (table 2). Secondly, we will study the correlation test (table 3). Finally, we will test the research hypothesis and we will analyse the different regressions of the two models.

According to table 2, we notice that the dependent variable Z SCORE, which measures the risk of bank insolvency, can reach a maximum of 80.83984. As long as its minimum value is -7.029942, its risk which is measured by the standard deviation is 25.9063 and its mean is equal to 39.34321. Besides, we can also see that the mean of the dependent variable CAR of our samples is 12.00757. In fact, this variable varies on average respectively between -3.94 and 33.99.

Moreover, we found that the return on assets and return on equity have an average of 7.674429 and 9944286 respectively. In addition, the ROA ratio can reach a maximum value of 22. As long as its minimum value is -77.1. Whereas, the ROE ratio varies on average respectively between -4.89 and 3.65.

In other words, Tunisian banks tend to ensure a positive interest margin which is the difference between the interests received and the interests perceived. This variable varies on average between 0 and 4.23 respectively.



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For Non-Interest Income (NII), we noticed that the mean is 46.40786; whereas, his Min is 0 and his Max is 72.66. Regarding the GDP, the average is equal to 3,416.

For the control variables, the debt ratio (END), the size of the bank (BS) and the age of the bank (BA), we found that these variables have an average respectively 87,257; 7.12 and 1.38.

**Table 2: Descriptive Statistics of the Variables Used**

| Variables | Observation | Mean | Std. Div | Min | Max |
|---|---|---|---|---|---|
| **Z SCORE** | 70 | 39.34321 | 25.9063 | -7.029942 | 80.83984 |
| **CAR** | 70 | 12.00757 | 7.029567 | -3.94 | 33.99 |
| **ROE** | 70 | 0.9944286 | 1.102539 | -4.89 | 3.65 |
| **ROA** | 70 | 7.674429 | 11.879884 | -77.1 | 22 |
| **NIM** | 70 | 2.575 | 0.8722198 | 0 | 4.23 |
| **NII** | 70 | 46.40786 | 12.79742 | 0 | 72.66 |
| **GDP** | 70 | 3.416 | 2.120246 | -1.92 | 6.71 |
| **END** | 70 | 87.25069 | 7.68232 | 65.25632 | 104.2119 |
| **BS** | 70 | 7.12e+09 | 7.49e+09 | 6.51e+08 | 6.66e+10 |
| **BA** | 70 | 1.38e+09 | 6.10e+08 | 1.52e+08 | 2.11e+09 |

Source : Output using Stata

- **The Correlation Matrix**

In the present research work, we carried out a test of the correlation between the different variables used. The tolerance limit is set according to the Pearson coefficient which is equal to (0.6). The study of this matrix makes it possible to detect the existence or not of a multi-colinearity problem.

From this table, we notice that the correlations between the independent variables are low, and all the Pearson correlation coefficients between these variables are below 0.6, i.e. there is no multi-colinearity problem. Except for the correlation coefficients between ROA and ROA (0.8027) which does not cause problems when estimating the two models Z score and CAR. Table 3 summarizes the results relating to correlation.

**Table 3: The Correlation Matrix**

| | Z score | CAR | ROA | ROE | NIM | NII | PIB | END | TB | Age B |
|---|---|---|---|---|---|---|---|---|---|---|
| Z score | 1.0000 | | | | | | | | | |
| CAR | 0.5267 | 1.0000 | | | | | | | | |
| ROA | 0.3468 | 0.5649 | 1.0000 | | | | | | | |
| ROE | 0.1999 | 0.1073 | 0.8027 | 1.0000 | | | | | | |
| NIN | 0.1071 | 0.3560 | 0.3739 | 0.1495 | 1.0000 | | | | | |
| NII | 0.2739 | 0.0570 | 0.0062 | 0.0494 | -0.0593 | 1.0000 | | | | |
| GDP | 0.0212 | 0.0943 | -0.0443 | -0.1005 | 0.1383 | -0.1061 | 1.0000 | | | |
| END | -0.380 | -0.8245 | -0.4737 | -0.0574 | -0.1572 | 0.1594 | -0.0401 | 1.0000 | | |
| BS | -0.120 | -0.0238 | -0.0219 | -0.0030 | -0.0580 | 0.0672 | 0.0732 | -0.0038 | 1.0000 | |
| BA | 0.0120 | 0.1671 | 0.1031 | -0.0092 | -0.0280 | -0.2007 | 0.0316 | -0.2379 | -0.244 | 1.0000 |

Source : Output using Stata

- **The Estimation by Within and GLS Techniques**

Table 4 presents the results of the estimation of our regression model using the within and GLS techniques.



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**Table 4: Estimation Results Using the within and GLS Techniques**

| Variables | **Model 1 : Z score** | | **Model 2 : CAR** | |
|---|---|---|---|---|
| | **Within** | **GLS** | **Within** | **GLS** |
| ROA | 7.400693<br>(0.000) | 1.60051<br>(0.816) | 3.847767<br>(0.002) | 3.644217<br>(0.000) |
| ROE | -0.4665289<br>(0.002) | 0.2417007<br>(0.649) | -0.2523069<br>(0.003) | -0.2394637<br>(0.001) |
| NIM | 0.6608913<br>(0.565) | -0.0044487<br>(0.999) | 0.7806812<br>(0.242) | 0.8958317<br>(0.085) |
| NII | 0.1927173<br>(0.005) | 0.6849827<br>(0.002) | 0.1063141<br>(0.007) | 0.0994163<br>(0.001) |
| GDP | 0.1462804<br>(0.661) | 0.8425251<br>(0.527) | 0.2137768<br>(0.271) | 0.2030173<br>(0.274) |
| END | -0.7568887<br>(0.001) | -1.380446<br>(0.011) | -0.4984027<br>(0.000) | -0.5370611<br>(0.000) |
| T B | -4.96e-11<br>(0.627) | -5.68e-10<br>(0.137) | -2.26e-11<br>(0.702) | -2.44e-11<br>(0.648) |
| Age B | 9.55e-10<br>(0.453) | -2.80e-09<br>(0.567) | 2.64e-10<br>(0.720) | -4.63e-11<br>(0.946) |
| _cons | 89.48913<br>(0.000) | 129.6064<br>(0.009) | 45.72462<br>(0.000) | 49.70392<br>(0.000) |

Source : Output using Stata

From Table 4 we can see that estimation using the Within and GLS techniques gives expected and insignificant results. Hence the need for additional tests.

Hausman's arbitrage test (1978) distinguishes between the fixed and random effects of linear regression. It is a specification test to determine whether the coefficients of the two estimates are fixed or random or statistically different. In our study, we tested two models which gave the following results.

- **Individual Effects Specification Test: Hausman Test**

Through the Hausman test, we can distinguish between the models and choose the most suitable one for our study. The results obtained are presented in the following tables:

**Table 5: Hausman Test for Model 1**

| **Chi 2 Test** | Chi 2 (6) = -8.36 |
|---|---|
| | Prob Chi (2) < 0 |

Source : Output using Stata

According to this table, the probability of Chi 2 < 0 < 5%. So we reject H0, and conclude that the model is fixed-effect.

**Table 6: Hausman Test for Model 2**

| **Chi 2 Test** | Chi 2 (6) = 1.04 |
|---|---|
| | Prob Chi (2) = 0.9839 |

Source : Output using Stata

According to this table, the probability of Chi 2 = 0.983 greater than 5%. So we reject H1, and conclude that the model is random.

- **Correction of Heteroscedasticity and Autocorrelation Problems**

The Z-score and CAR variables are regressed against five bank-specific variables, two profitability variables and one macroeconomic variable. The analysis is carried out using Panel data between 2005 and 2014 for 7 commercial banks listed on the Tunis Stock Exchange (BVMT). The results of the two models are presented as follows:



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**Table 7: Results of the Final Estimates with Correction of Heteroscedasticity and Autocorrelation Problems**

| Variables | Model 1 : Z-score | Model 1 : CAR |
|---|---|---|
| ROA | 7.400693 | 3.644217 |
| | **(0.000)*** | **(0.000)*** |
| ROE | -0.4665289 | -0.2394637 |
| | **(0.000)*** | **(0.000) *** |
| NIM | 0.6608913 | 0.8958317 |
| | (0.535) | (0.113) |
| NII | 0.1927173 | 0.0994163 |
| | (0.211) | (0.205) |
| GDP | 0.1462804 | 0.2030173 |
| | (0.765) | (0.443) |
| END | -0.7568887 | -0.5370611 |
| | **(0.015)**** | **(0.000)*** |
| Size B | 4.96e-11 | -2.44e-11 |
| | (0.219) | **(0.045)**** |
| Age B | 9.55e-10 | 4.63e-11 |
| | (0.206) | (0.868) |
| _cons | 89.48913 | 49.70392 |
| | **(0.003) *** | **(0.000)*** |
| N | 70 | 70 |

**, **,***, significance re spectively at %;5% and 10%.* Source : Output using Stata

The empirical validation of our research work is presented in the results mentioned in Table 7.

***The Return on assets (ROA):*** The results show that the return on assets ratio has a positive and significant impact at a threshold of 1% on the stability of banks. This validates hypothesis 1. These results show that the increase in profitability of the asset generates an increase in banking stability. This result is confirmed by Ghosh (2014) and Anginer et al. (2014).

***The Return on equity (ROE):*** The regression results show that the ROE has a negative and significant effect on banking stability. Hence, the non-validation of hypothesis 2. This result does not coincide with the work of Kich and Prieto (2015).

***The net interest margin ratio (NIM):*** The results show that the net interest margin ratio has a positive and insignificant impact on the stability of banks. This validates hypothesis 3. Several authors have found a positive relationship between this ratio and banking stability, such as Fu et al. (2014); Köhler (2015); Ozili and Uadiale (2017) and Dwumfour (2017).

***The Non-interest income (NII):*** The results show that non-interest income has a positive and insignificant coefficient on banking stability. Thus, the acceptance of Hypothesis 4 according to the study by Williams (2016) and Ozili (2017).

***The debt ratio (END):*** The results show that the debt ratio has a negative and significant coefficient at the 5% threshold on z-score (banking stability) and a negative and significant impact at the 1% threshold on CAR. Hence, the acceptance of Hypothesis 5.

***The Bank size (BS):*** The results show that the bank size variable has a positive and insignificant impact on z-score. Hence, the validation of hypothesis 6. In accordance with the study by Rajhi and Hassairi (2013) and (Hu et, al. 2004), large banks have the necessary resources to properly assess loan applications. and improve the quality of their portfolios. In addition, the size of the bank has a negative and significant effect at the 5% level on the CAR variable. This result is confirmed by Köhler (2015), Fu et al. (2014) and Beck et al. (2013).

***The Age of the bank (BA):*** The regression results note that the age of the bank has a positive and insignificant impactt on banking stability. Hence, the validation of Hypothesis 7. This result is confirmed by Fu et al. (2014. Indeed, the old banks were well capitalized compared to the new banks. Schaeck and Cihàk (2014); Mirzaei et al. (2013) have shown that age is a non-significant variable for stability (z score).

***The Gross domestic product (GDP):*** The results found have shown that gross domestic product positively and not significantly affects banking stability. Hence, the validation of Hypothesis 8. This result is proven by Rajhi and



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Hassairi (2013), Nguyen et al. (2012), Williams (2014), Mirzaei et al. (2013) and Köhler (2015). According to them, national wealth is good for the whole economy and contrary to what thinks Dong et al. (2014.

The study of banking stability is identified by the presence of several explanatory factors, namely, internal factors such as variables specific to the bank, such as the size, age and the bank debt ratio, variables of profitability such as return on assets and equity, net interest margin ratio, non-interest income. These factors are considered to be the determinants of banking stability, and they must be considered together with other external factors such as the rate of GDP growth.

**Conclusion**

In our study, we have examined some factors that may influence the stability of banks in Tunisia (z-score and capitalisation ratio). The results revealed, firstly, profitability variables: return on assets (ROA) has a positive and significant impact on the stability of banks and return on equity (ROE) has a negative and significant effect.

Secondly, the bank specific variables: the net interest margin ratio (NIM), non-interest income (NII) and the age of the bank (Age B) have a positive and insignificant impact on banking stability, in addition the size of the bank (Size B) has a positive and insignificant effect on the z-score and a negative and significant impact on the capitalisation ratio (CAR). Finally, the debt ratio (END) has a negative and significant impact at the 5% threshold on the z-score and a negative and significant impact at the 1% threshold on the CAR.

Thirdly, the macroeconomic variable: GDP growth rate has a positive and insignificant effect on the stability of the banks, in which case all the hypotheses have been validated.

This study has some limitations. First, this study focuses only on measures of Tunisian banking stability. Second, this study is conducted on 7 commercial banks for the years 2005 to 2014. Future research may also consider market-based performance measurement with the larger sample.

Our line of research will give rise to several developments. A first possibility would be to integrate other determinants of bank solvency such as governance, concentration, diversification, inflation...). Another possibility would be to examine the determinants of bank solvency over a wider geographical horizon in order to increase the sample size and to identify the most important variables determining bank solvency.

To sum up, our work is useful in providing valuable information to relevant parties such as: bank customers, bank management and bank regulators.

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