



## The Determinants of Banking Performance in Front of Financial Changes: Case of Trade Banks in Tunisia

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### ABSTRACT

The banking sector in Tunisia has undergone, in the past decades, numerous structural changes which have affected the banking industry in particular and the economy as whole. This paper studies the internal and external determinants of bank performance in Tunisia during the period after financial reforms. We used regression analysis and panel data technique with the linear model of Bourke (1989) and followed the methodology employed by Demirgüç-Kunt and Huizinga (1999) and Dietrich and Wanzenried (2011) in order to address the issue. The empirical results showed that bank performance is positively related with capitalization, privatization and quotation. While, bank size, concentration index and efficiency are negatively related with performance indicators (measured by net interest margin, LIQ, return on assets and return on equity). As for the macroeconomic determinants, our analysis showed that the business cycle, measured by the growth of the gross domestic product is supposed to be favorable to the improvement of the performance of the banks and negative relationship was found with inflation rate. Those variables have to arouse the interest of the decision-makers of economic and restructuring policies to direct their strategies and aiming corrective actions to promote the performance of banking and financial systems.

**Keywords:** Financial Performance, Determinant, Interest Margin, Profitability, Tunisia, Panel Data

**JEL Classifications:** G21, G15, L33

### 1. INTRODUCTION

The profound changes that different banking professions have known are at the origin of many debates relating to the activity of this industry. The importance of the regulatory structure and the external effects on the rest of the economy are the results of the financial sector liberalization, and especially the banking sector, the increase in supply through new forms of financing, the introduction of new information and communication technologies and the tendency of new foreign competitors access to the national financial market.

Within the framework of these restructurings, measure the activity of banks as actors capitals of economic growth, understand their behaviors and the impact of the latter on the variations of the performance of banks as well as its consequences on the national economy is of crucial importance. The weight of the banking sector in the developed economies, its specificity and its role

in the financial stability have attracted a growing interest of the supervisory authorities, officials of banks, and the academic world.

Several work dedicated to the analysis of banking performance, such as those of Molyneux and Thornton (1992), of Demirgüç-Kunt and Huizinga (1999), Goddard et al. (2004), Athanasoglou et al. (2008) and Dietrich and Wanzenried (2011, 2014), adopting the linear specifications, are focusing on the impact of multiple internal and external factors at banks on their performance in terms of profits or interest margin. This paper will reveal the effect of variables characteristic of banks and economic environment on various facets of banking performance and thus to thoroughly examine the relationship between performance and the characteristics internal and external to banks using a panel data analysis on a sample of 17 Tunisian banks over the period 1997-2012. More particularly it is proposed to answer the following question:

What are the specific factors at banks as well as at the macro-economic and financial environment which can explain the difference in performance of Tunisian banks?

The rest of this paper is structured around the following points: initially, we will present a review of the literature which will draw up a portrait of the main studies carried out on the determinants of banking performance. It will then issue of the formulation of hypotheses to be tested, the selection and the description of the data used as well as the methodology to follow with a detailed description of the econometric models used. Lastly we will expose the empirical results as well as attached interpretations.

## 2. REVIEW OF THE LITERATURE: THEORETICAL ASPECTS AND EMPIRICAL WORK

In the economic and financial literature, two key indicators were advanced to measure the banking performance. It is about the profitability of the assets (return on assets and return on equities) and the net margin interest. Nevertheless, the consensus is far from being fully met around the question of the impact of certain variables on bank profitability as it is measured. Whereas the predicted effect of some factors has found certain unanimity within the circle of the economists, controversies remain at the level of the expected impact of other variables. Accordingly, it is legitimate to consider that the exit with the theoretical polemic would be only empirical. Banking performance is related to internal determinants (specific to banks) and external variables (macro-economic and macro-financial) which reflect the economic and legal environment in which the bank operates.

Many studies tried to explain the contribution of such or such variable on the performance of the banks. It should be noted that very often, the authors find results different even contradictory. That is explained in particular by the different data that they use, for different periods and territories. Thus, some authors studied the banking performance starting from data on several countries, such Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (1999), Abreu and Mendes (2002), Goddard et al. (2004) Athanasoglou et al. (2008), and Guillen et al. (2014). For other studies, the analysis of the determinants was focused on a single country (Berger et al. 1987 [the United States], Barajas et al. 1999 [Colombia], Mamatzakis and Remoundos, 2003 [Greece], Garcia-Herrero et al. 2009 [China], Dietrich and Wanzenried, 2011 [Swiss]).

In what follows, we will expose the various potential determinants of banking performance by splitting them into internal variables (specific to banks), macro-financial (related to banking industry) and external (macroeconomic), while questioning their expected effects in conformity with the predictions of the economic theory and the estimates derived from the empirical studies conducted in developed and developing countries.

### 2.1. Internal Determinants

#### 2.1.1. Size

As for many variables, the impact of the size, measured by the active total, on the banking performances is strongly discussed between researchers. Indeed certain authors whose Short (1979), Smirlock (1985), Bikker and Hu (2002), Pasiouras et al. (2007) and Guillen et al. (2014) consider that the size has positive impact on the performance, since a significant size reduce the costs because of the economies of scale that it entails, and that banks of significant size can moreover raise capital at lower cost. For others such as Stiroh and Rumble (2006), Kasman (2010), and Dietrich and Wanzenried (2011), the impact of the size on the performance is negative. They empirically showed negative effects of the size and stress that the larger one bank is, the more it will be difficult to manage.

#### 2.1.2. Capitalization (CAR)

Capitalization is generally measured by the ratio of equity/total assets (CAR). Several authors who are leaning on the effect of capitalization on the banking performance (Bourke, 1989; Berger 1995; Demirgüç-Kunt and Huizinga, 1999; Abreu and Mendes, 2002; Goddard et al. 2004; Naceur and Goaid, 2001; Pasiouras and Kosmidou, 2007; Garcia-Herrero et al. 2009; Liu et al., 2010, and De Jonghe, 2010) have concluded that the most powerful banks are those which manage to maintain a high level of own capital compared to their assets. Indeed and according to these authors, a high level of stockholders' equity reduced the risk of bankruptcy incurred by the banks. They can thus be allowed, to maintain an identical level of risk, to invest in riskier credits and of which awaited profitability will be higher. It has resulted in better performance. So a high level of stockholders' equity is a positive signal sent to the market on the solvency of the bank and its weak credit risk. Consequently, such banks are able to reduce their costs of financing, by paying a weak interest rate on their debt for example. Furthermore, according to these authors, a strongly capitalized bank, compared to a slightly capitalized bank, does not need to borrow as much to finance a given level of assets and thus its cost of debt will be less.

#### 2.1.3. Efficiency

According to several studies, (Berger and Mester (2003), Kasman and Carvallo (2013)), the efficiency, measured by ratios (ratio of costs on outcome or ratio of overheads on assets) or estimated by parametric methods (SFA) and non-parametric (DEA), improves the performance of banks. Athanasoglou et al. (2008) proved a positive relationship in the case of Greek banks (1985-2001) and explained that a more effective bank is more capable of the best use of its resources and reduce its costs, which generates a better performance This reasoning was picked up by Liu et al. (2010), in their analysis of the Japanese banks from 2000 to 2007, suggesting that regardless of the variable used to measure the performance (return on assets [ROA], return on equity [ROE] or net interest margin [NIM]), the cost efficiency has a positive impact on the performance. The study of Guillen et al. (2014) on the determinants of banking profitability, covering 12 South American countries, has concluded that cost-efficiency measured by DEA approach has a positive and significant effect on the performance measured by the ROE.

#### 2.1.4. Ownership structure

The majority of the authors showed that public banks are less powerful than private banks. Innotta et al. (2007), Barth et al. (2004) and Cornet et al. (2010), reveal that the public banks grant riskier loans, which mean higher credit risk and a less quality of assets, and then face of solvency ratios worse than those of private banks. Cornet et al. (2010) point out that the difference in performance between the private and public banks is even more marked in countries where power is strongly involved in the banking system and where political corruption exists.

Some authors, however moderate this relationship between control and performance. Micco et al. (2007) find indeed that bank control has an impact on the performance, but this relationship is particularly checked in the developing countries where the nationalized banks know weak performances, low margins and high overheads. In developed countries, this relationship seems much less marked.

Dietrich and Wanzenried (2011), in the case of Switzerland, have confirmed that public banks are less powerful than the private banks. However, the current financial crisis reversed this tendency, nationalized banks are regarded as safer and better managed than private institutions. Dietrich and Wanzenried (2014) have also studied the determinants of banking profitability on a broad sample of 118 countries during the period 1998-2012; they have resulted in a negative and significant effect of the privatization on banking performance.

#### 2.1.5. The risk

RISK: It is about a variable of banking risk measurement whose choice seems to be debatable in similar research tasks. The literature suggests several alternatives of measurement and each method can wake up singular criticisms. On the one hand, and joining in the line of Gilbert (1984), Hannan and Hanweck (1988), Sinkey (1999), this variable will be estimated bank's risk index (RI).

The risk index is written as follows:  $RI = (E(ROA) + CAR) / \sigma(ROA)$ .

Where, (ROA) and  $\sigma(ROA)$  are respectively the mean and the standard deviation of the returns on assets and CAR is the capital average ratio defined as the report own capital/total assets.

According to the theory of balanced markets, which predicts a strong relationship between risk and profitability, the banks which manage well their credit risk will have a raised score, they are consequently most careful in risk management, but they will have a lower profitability. Therefore the most high-performing banks are those which manage to maintain a low risk index.

#### 2.1.6. Market share

Liu et al. (2010), analyzing the behavior of banks having a weak market share, showed a negative relationship between market share and performance (measured by net margin interest). Those banks seek to grow and gain market shares by the granting of credits to risky people and so matching higher interests, which will increase their NIM and their performance. For Peria and Mody (2004),

banks with strong market share, can use their shares and their size to eliminate existing or potentials competitors by reducing their margins on interest rates. This will, in the short-term, reduce interest incomes and the performance of these banks.

#### 2.1.7. Governance

Beltratti and Stulz (2009) included the governance in their lists of independent variables. With this intention, they used the Corporate Governance Quotient model, which, on the basis of several criteria such as the board meeting composition, directors' remuneration, or the presence of an independent audit committee, emits a note. However, their results didn't indicate better performance of banks with a high note, and showed indeed that banks to which the board meeting was the closest to shareholders (many shareholders in board meeting, bank policy in conformity with the wishes of the shareholders..), knew the worst performance.

## 2.2. Macro-Financial Determinants

### 2.2.1. Market concentration

The concentration (CON) is defined as the percentage of the assets held by the k most large trade banks, measured by total assets, (usually k=3 or 5) compared to the total assets of the sample's banks (CRk). The concentration in the banking sector may have broad lasting consequences for banks stability, competition and the performance of financial sector. The effects of concentration on the banking sector can be positive or negative. On one hand, the concentration increases the market power and therefore likely to prevent competition and performance. On the other hand, if the economies of scale result in banking mergers and acquisitions, then the increase in the concentration can lead to improvements of the performance (Demirguc-Kunt et al., 2000; Grigorian and Manole, 2002; Casu and Girardone, 2009).

Two theories face as regards impact of the concentration on the performance of the banks. The first is the traditional thesis (structure-behavior-performance) (SCP)<sup>1</sup> affirming that an increase in the market share and concentration leads to monopoly power. The second is that of the efficient structure (ES)<sup>2</sup> opposes the first.

### 2.2.2. Financial market maturity

Demirguc-Kunt and Huizinga (1999) have analyzed the links between banks performance and maturity of the banking system, as measured by its size and level of development. They showed a negative relationship between the size banking sector and banks performance. Naceur and Omran, 2011 have fixed the stock market level of development as determining variable of banks performance. They have found that banks operating in areas with well-developed stock market had known more important profits than banks operating in regions where the stock exchange was less developed.

## 2.3. Macro-Economic Determinants

In addition to the internal determinants of banks, it remains more interesting to stop on the external determinants, such as inflation

1 According to this thesis, an increase in the concentration of the market led to a weakening of competition and generates a market power. Firms will be allowed to fix prices beyond competitive levels and therefore release of calculating high profitability because of monopoly profits.

2 See Berger (1995) for more details of the efficient structure theory.



and business cycle, in order to draw up a wider study of the literature on the determinants of banks performance.

### 2.3.1. Inflation

Many authors such as Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (1999), Athanasoglou et al. (2006, 2008), Pasiouras and Kosmidou (2007) and Dietrich and Wanzenried (2011; 2014), were interested in the effect of inflation on banking performance, and have found a positive and significant impact. However, the studies of Afanasieff et al. (2002) and Ben Naceur and Kandil (2009) have yielded an opposed result revealing that inflation has a negative effect on interest margins. They offer the following explanation: the main activity of trade banks is the granting of credit. The market therefore relies on a supply of credit (provided by the banks), and a request (that of the individuals and firms). Inflation would reduce the demand for credit, because it increases uncertainty on the future. However, it was proven that individuals and companies are generally very light showers to the uncertainty (ambiguity-aversion). This fall in demand would involve a decrease of credits and therefore a go down of the performance.

### 2.3.2. Business cycle

We assume that the development of economic activity, as measured by the growth of gross domestic product (GDP), has a positive effect on banks performance: a period of strong growth resulted in an increase in investment and consumption, from where a rise in credits, and thus a rise of banks performance. This is actually the result reached by the majority of authors who have studied this relationship, namely Goddard et al. (2004), Demirgüç-Kunt and Huizinga (1999), Arpa et al. (2001), Bikker and Hu (2002), Schwaiger and Liebig (2008) and Dietrich and Wanzenried (2011, 2014).

## 3. METHODOLOGY

### 3.1. Assumptions of Research

The overflight of the theoretical and empirical literature on internal and external variables, retained as determinants of banking performance which was measured by, the net interest margins, the liquidity ratio, the return on assets and return on equity, allows formulating certain assumptions about the links between banking performance and its fundamental explanatory factors:

H<sub>0</sub>1: The size has a positive and significant effect on the banking performance.

H<sub>0</sub>2: Capitalization has a positive and significant effect on the banking performance.

H<sub>0</sub>3: The efficiency-cost has a positive and significant effect on the banking performance.

H<sub>0</sub>4: Privatization is generating of an increase in banks performance.

H<sub>0</sub>5: Quotation has a negative and significant effect on the banking performance.

H<sub>0</sub>6: The risk index has a negative and significant effect on the banking performance.

H<sub>0</sub>7: The concentration has a positive and significant effect on the banking performance.

H<sub>0</sub>8: Inflation has a positive and significant effect on the banking performance.

H<sub>0</sub>9: The business cycle has a positive and significant effect on the banking performance.

## 3.2 Sample and Specification of the Model

### 3.2.1. Sample

Our sample consists of 17 credit institutions approved in the capacity as universal banks (list in Appendix 1), and over 16 years period, going from 1997 up to 2012. This period coincides well with the major programs of reforms and liberalization touching real and financial sectors. The used data were excited from annual reports of the Tunisian Professional Association of Banks and Financial institutions and the Central Bank of Tunisia. We also used, for external variables, data extracted from the statistics of the National Institute of Statistics and the World Bank database.

### 3.2.2. Econometric specification of the model

In the line of the existing literature, we will proceed with a linear regression. The choice of a type of function made the object of several studies, mainly those of Short (1979), Bourke (1989), and Berger and Mester (2003), having proved that the linear analysis produced results as interesting as from any other type of functions. We are thus going to be inspired by the linear model of Bourke (1989) and, following the methodology adopted by Dermiguc-Kunt and Huizinga (1999) and Dietrich and Wanzenried (2011), to opt for a study aiming to test the statistical effect of various variables retained as determiners of the banking performance, on the various facets of the latter, in reference to the measures suggested by the theory. This model arises as follows:

$$Perf_{it} = \alpha + \beta X_{it}^k + \varepsilon_{it} \quad (1)$$

### Appendix 1: List of banks of the sample

| Denomination   | Bank          | Capital in TND |
|--|---------------|----------------|
| Banque Nationale Agricole                                      | BNA           | 160,000,000    |
| Société Tunisienne de Banque                                   | STB           | 124,300,000    |
| Banque Arabe de Tunisie  | BIAT          | 170,000,000    |
| Banque Attijari de Tunisie                                     | ATTIJARI BANK | 198,741,000    |
| Banque de Tunisie  | BT            | 112,500,000    |
| Union Internationale de Banques                                | UIB           | 196,000,000    |
| Banque de l'Habitat  | BH            | 90,000,000     |
| Union Bancaire pour le Commerce et l'Industrie                 | UBCI          | 80,494,000     |
| Amen Bank  | AB            | 100,000,000    |
| Arab Tunisian Bank   | ATB           | 100,000,000    |
| Banque Franco-Tunisienne                                       | BFT           | 5,000,000      |
| Société Tuniso-Saoudienne d'investissement et de développement | STUSID BANK   | 100,000,000    |
| Banque de Tunisie et des Emirats                               | BTE           | 90,000,000     |
| Banque Tuniso-Libyenne   | BTL           | 70,000,000     |
| Qatar National Bank  | QNB (ex TQB)  | 60,000,000     |
| CITIBANK on shore  | CB on shore   | 25,000,000     |
| Banque Tuniso-Koweitienne                                      | BTK           | 100,000,000    |

Source: BCT and Tunisian Professional Association of Banks and Financial institutions

Where

$Perf_{it}$ : Dependant variable reflecting the performance of bank i at year t (measured by NIM, LIQ, ROA and ROE),  $\alpha$  is a constant,  $X_{it}^k$  is a vector of explanatory variables, and  $\varepsilon_{it}$  represent the term of error.  $I=1, N$  ( $N=17$ : The number of banks).

$T=1, T$  ( $T=16$ : The number of years).

$K=1, K$  ( $K=9$ : The number of explanatory variables).

$\beta, \dots, \beta_1, \beta_K$ : Coefficients of various explanatory variables.

As our linear model contains 9 independent variables, the equation (1) can spell so:

$$Perf_{it} = \alpha_i + \beta_1 \ln TA_{it} + \beta_2 EFF_{it} + \beta_3 RCM_{it} + \beta_4 RISK_{it} + \beta_5 CON_{it} + \beta_6 PRIV_{it} + \beta_7 COT_{it} + \beta_8 CE_{it} + \beta_9 INF_{it} + \varepsilon_{it} \quad (2)$$

With:

$Perf_{it}$ : Performance of bank i at year t.

$\ln TA_{it}$ : Size of the bank i in year t, measured by the logarithm of total assets.

$Eff_{it}$ : Score of efficiency of bank i in year t.

$CAR_{it}$ : The capital average ratio of bank i in year t.

$RISK_{it}$ : Risk index of bank i in year t.

$CON_{it}$ : Concentration index of the banking sector, measured by CR3, in year t.

$PRIV_{it}$ : Binary variable taking the value 1 if the bank is privatized the year t and 0 if not.

$COT_{it}$ : Binary variable taking the value 1 if the bank is quoted the year t and 0 if not.

$CE_{it}$ : Business cycle measured by the variation of GDP in year t.

$INF_{it}$ : Inflation rate in year t.

As we have 4 dependent variables, we would have 4 linear models, whose each dependent variable is a function of 9 explanatory variables:

Model  $M_1$

$$MIN_{it} = \alpha_i + \beta_1 \ln TA_{it} + \beta_2 EFF_{it} + \beta_3 CAR_{it} + \beta_4 RISK_{it} + \beta_5 CON_{it} + \beta_6 PRIV_{it} + \beta_7 COT_{it} + \beta_8 CE_{it} + \beta_9 INF_{it} + \varepsilon_{it} \quad (3)$$

Model  $M_2$

$$LIQ_{it} = \alpha_i + \beta_1 \ln TA_{it} + \beta_2 EFF_{it} + \beta_3 CAR_{it} + \beta_4 RISK_{it} + \beta_5 CON_{it} + \beta_6 PRIV_{it} + \beta_7 COT_{it} + \beta_8 CE_{it} + \beta_9 INF_{it} + \varepsilon_{it} \quad (4)$$

Model  $M_3$

$$ROA_{it} = \alpha_i + \beta_1 \ln TA_{it} + \beta_2 EFF_{it} + \beta_3 CAR_{it} + \beta_4 RISK_{it} + \beta_5 CON_{it} + \beta_6 PRIV_{it} + \beta_7 COT_{it} + \beta_8 CE_{it} + \beta_9 INF_{it} + \varepsilon_{it} \quad (5)$$

Model  $M_4$

$$ROE_{it} = \alpha_i + \beta_1 \ln TA_{it} + \beta_2 EFF_{it} + \beta_3 CAR_{it} + \beta_4 RISK_{it} + \beta_5 CON_{it} + \beta_6 PRIV_{it} + \beta_7 COT_{it} + \beta_8 CE_{it} + \beta_9 INF_{it} + \varepsilon_{it} \quad (6)$$

## DESCRIPTIVE STATISTICS

### 4.1. Definitions of the Variables

To measure banks performance, three indicators are generally used: ROA, ROE, and NIM on total assets. For our analysis, and seen the importance of the liquidity in the banking financing we will introduce, as fourth indicator, the ratio of LIQ (measured by total deposits/total assets). According to Grigorian and Manole (2002) and Mian (2003), this ratio constitutes with the NIM and the indicators of profitability, best indicators of the performance. Our data file is composed of several explanatory variables whose choice was guided by several previous studies on the banking performance Bourke (1989), Molyneux and Thornton (1992), Dermiguc-Kunt, and Huizinga (1999), Liu et al. (2010) and Dietrich and Wanzenried (2011).

The following Table 1 recapitulates dependent and explanatory variables selected in our study as well as the expected signs from the latter:

### 4.2. Descriptive Statistics and Matrix Correlation

Table 2 synthesizes averages, standard deviations, as well as the minimal and maximal values of dependant and explanatory variables. While Table 3 redraws Matrix correlation between the variables of the models.

In the light of these results we can notice the great heterogeneity of the banks in our sample. Indeed, the standard deviations are rather high what indicate that dispersion is significant.

For the estimated model, Table 4 shows that the correlation matrix is to verify the degree of correlation between variables, revealing that the level of correlation between them is very small which justifies the absence of multi colinearity.

## 5. EMPIRICAL RESULTS AND INTERPRETATION

### 5.1. Hausman Test

As the data are panel data, we have to specify the fixed effects estimation or random effects. The realization of the Hausman test for the four models selected gave us the following results.

The Hausman test shows that our regression is for random effect. Indeed the provided statistics of the test in comparison with their  $P$  value ( $P > \text{Chi-square}$ ) are all higher than 10%. Thus, the adoption of a random effects model is privileged.

### 5.2. Results of Estimating the Random Effects

The results of estimation of the 4 models are illustrated in Table 5.

### 5.3. Determinants of Banking Performance

The reading of Table 5 lets note that size acts negatively banks performance, what confirming that banks of big size did not profit from economies of scale, on the contrary they could possibly deal with diseconomies of scale. Moreover the size can result from an aggressive growth strategy. This result confirms with those obtained by Stiroh and Rumble (2006), Kasman (2010)

**Table 1: Dependent and independent variables**

| Variables             | Definition   | Expected sign |
|-----------------------|--|---------------|
| Dependent variables   |  |               |
| NIM/total assets      | (Interests and assimilated income - incurred interests and assimilated loads)/total assets     |               |
| LIQ                   | Total deposits/total assets  |               |
| ROA                   | Net profit/total asset   |               |
| ROE                   | Net profit/own capital   |               |
| Explanatory variables |  |               |
| CAR                   | Own capital/total assets   | (+)           |
| Efficiency            | We will use the scores of efficiency as estimated by the stochastic frontier approach          | (+)           |
| CON                   | Concentration=CR3=total asset (BNA+STB+BIAT) <sup>4</sup> /total asset of the sample's banks   | (+)           |
| Size                  | Logarithm of the total assets  | (+)           |
| Risk index            | RI=(E (ROA)+CAR)/σ(ROA)  | (-)           |
| Privatization         | Dummy variable which takes value 0 when the bank is public and value 1 when it is privatized   | (+)           |
| Quotation             | Binary variable which takes value 1 if the bank is quoted in stock exchange and value 1 if not | (-)           |
| INF                   | Inflation rate   | (+)           |
| Business cycle        | Growth rate of GDP   | (+)           |

CAR: Capital average ratio, GDP: Gross domestic product, CON: Concentration, NIM: Net interest margin, ROA: Return on assets, ROE: Return on equity, <sup>4</sup>For our analysis, STB, BNA and BIAT constitute the three biggest banks of the sample in terms of total asset

**Table 2: Descriptive statistics of variables**

| Variables | N   | Moyenne  | Ecart-type | Min       | Max      |
|-----------|-----|----------|------------|-----------|----------|
| MIN       | 270 | 0.03130  | 0.02143    | -0.02231  | 0.10578  |
| LIQU      | 270 | 0.68221  | 0.31148    | 0.00632   | 2.26536  |
| ROA       | 270 | 0.00016  | 0.06722    | -0.075196 | 0.09183  |
| ROE       | 270 | 0.08321  | 0.64865    | -0.42904  | 0.94226  |
| Taille    | 270 | 13.77989 | 1.29365    | 10.96176  | 15.88465 |
| EFF       | 270 | 0.93017  | 0.06887    | 0.590655  | 0.996878 |
| CAR       | 270 | 0.175166 | 0.230056   | -1.33232  | 0.874381 |
| CON       | 270 | 0.448944 | 0.021419   | 0.415648  | 0.47978  |
| RISK      | 270 | 16.85076 | 8.611819   | 0.590253  | 49.92545 |
| PRIV      | 270 | 0.474074 | 0.50025    | 0         | 1        |
| COT       | 270 | 0.592592 | 0.492264   | 0         | 1        |
| INF       | 270 | 0.034566 | 0.009614   | 0.02      | 0.055    |
| CE        | 270 | 0.031216 | 0.020496   | -0.031324 | 0.053507 |

NIM: Net interest margin, ROA: Return on assets, ROE: Return on equity

and Dietrich and Wanzenried (2011). The widening of the size of the banking sector seems to constitute a factor which blocks the interest margins and profits. The tendency to improve the economies of scale' levels causes load and tends to decrease the profits. These results reflect Tunisian banking reality where the events of regrouping initially tended to improve the profits, but later, they affect them negatively.

The positive impact of capitalization on the banking interest margins and profits is in accordance with the former empirical literature (Bourke, 1989; Berger, 1995; Demirgüç-Kunt and Huizinga, 1999; Pasiouras and Kosmidou, 2007; García-Herrero et al., 2009; De Jonghe, 2010 and Dietrich and Wanzenried, 2011, 2014). Indeed, have a high own capital is a positive signal sent to the market on the solvency of the bank. Consequently, such banks are able of reducing their financing costs.

The positive impact of privatization on the interest margin which goes with most theoretical works completed on the impact of this variable on banking performance, stipulating that private banks are more powerful than public banks. The concentration index acts negatively on the performance of banks. This is in agreement with the hypothesis of the ES. Indeed, the monopoly of large banks constitutes an obstacle with profitability and banking performance.

In our regression the effect of quotation is positive and significant for the NIM what confirms, according to this criterion, advantage that gets the fact of being quoted in stock exchange for a bank gets by generating profits which cover the expenses attached to quotation on the stock market (report, information, communication..) and lead to higher performances in terms of interests margin.

The growth rate of GDP is associated positively with banks performance. This result goes with those of Demirgüç-Kunt and Huizinga (1999) and Dietrich and Wanzenried (2014) and confirms that Tunisian banks took advantage of the restructuring of the state economy by financial reforms and liberalization of the sector and thus operate in a favorable environment. The negative effect of inflation on banking performance, in corroboration with Ben Naceur and Kandil (2009), can be explained by the fact that inflation increases uncertainty on the future, but the households are generally showers at the risk, therefore inflation would reduce the credit application, and since the principal activity of the trade banks is the granting of credit, the fall in credit demand leads to a fall of credits and thus a reduction in the performance.

Finally, the negative effect of the risk index, on the performance confirms the theory of balanced markets which predicts a strong relation between risk and profitability. Banks which manage well their credit risk will have a raised score, they are consequently most careful as regards risk management, but they are going to have less profitability. Therefore the most powerful banks are those with low scores of risk index.

## 6. CONCLUSION

Using the linear model of Bourke (1989) with random effects, and following the methodology adopted by Dermiguc-Kunt, and Huizinga (1999), Dietrich and Wanzenried (2011), we have test the statistical effect of various variables, retained as determinants of the banking performance, on its different facets, in reference to the measures suggested by the theory, and to appreciate the consequences of a modification of these determinants on

**Table 3: Matrix correlation between the variables**

| Variables | NIM/TA | LIQU  | ROA  | ROE  | LNTA  | EFF   | CAR   | CONC  | CE    | INF  | PRIV  | COT  | IRISK |
|-----------|--------|-------|------|------|-------|-------|-------|-------|-------|------|-------|------|-------|
| NIM/TA    | 1      |       |      |      |       |       |       |       |       |      |       |      |       |
| LIQU      | -0.53  | 1     |      |      |       |       |       |       |       |      |       |      |       |
| ROA       | 0.079  | -0.1  | 1    |      |       |       |       |       |       |      |       |      |       |
| ROE       | -0.06  | 0.12  | 0.21 | 1    |       |       |       |       |       |      |       |      |       |
| LNTA      | -0.29  | 0.45  | 0.17 | 0.12 | 1     |       |       |       |       |      |       |      |       |
| EFF       | 0.31   | -0.2  | -0.0 | -0.0 | -0.33 | 1     |       |       |       |      |       |      |       |
| CAR       | 0.45   | -0.08 | 0.19 | -0.1 | -0.44 | 0.14  | 1     |       |       |      |       |      |       |
| CONC      | 0.11   | -0.2  | -0.0 | -0.0 | -0.14 | 0.42  | 0.20  | 1     |       |      |       |      |       |
| CE        | 0.18   | -0.2  | 0.11 | 0.07 | -0.16 | 0.43  | 0.15  | 0.31  | 1     |      |       |      |       |
| INF       | -0.28  | 0.29  | -0.0 | 0.02 | 0.20  | -0.53 | -0.20 | -0.52 | -0.08 | 1    |       |      |       |
| PRIV      | 0.003  | 0.15  | 0.03 | 0.04 | 0.19  | 0.17  | -0.09 | -0.01 | -0.02 | 0.05 | 1     |      |       |
| COT       | -0.10  | 0.40  | 0.14 | 0.11 | 0.08  | -0.02 | -0.44 | -0.01 | 0.00  | -0.0 | 0.33  | 1    |       |
| RISK      | -0.01  | -0.0  | 0.05 | -0.1 | 0.33  | -0.33 | 0.01  | 0.03  | -0.04 | 0.01 | -0.04 | 0.22 | 1     |

NIM: Net interest margin, ROA: Return on assets, ROE: Return on equity

**Table 4: Hausman test**

| Model          | k | Chi-square (k)<br>à 95% | Hausman (H)     | Fixed effect/<br>random effect |
|----------------|---|-------------------------|-----------------|--------------------------------|
| M <sub>1</sub> | 8 | 15.51                   | 4.33 (0.826)*   | Random effect                  |
| M <sub>2</sub> | 8 | 15.51                   | 14.42 (0.1715)* | Random effect                  |
| M <sub>3</sub> | 8 | 15.51                   | 7.90 (0.443)*   | Random effect                  |
| M <sub>4</sub> | 8 | 15.51                   | 2.61 (0.956)*   | Random effect                  |

**Table 5: Determinants of the Tunisian banks' performance (1997-2012)**

| Model              | M <sub>1</sub>           | M <sub>2</sub>         | M <sub>3</sub>           | M <sub>4</sub>          |
|--------------------|--------------------------|------------------------|--------------------------|-------------------------|
| Variables          | MIN                      | LIQU                   | ROA                      | ROE                     |
| Size               | -1.57 e-02<br>(-5.54)*** | 2.68 e-02<br>(1.11)    | -2.61 e-02<br>(-3.03)*** | 0.14<br>(1.56)          |
| EFF                | 1.34 e-03<br>(0.05)      | -1.32<br>(-6.07)***    | -2.07 e-02<br>(-0.23)    | -0.64<br>(-0.68)        |
| CAR                | 5.53 e-02<br>(8.54)***   | 1.03<br>(18.86)***     | 9.74 e-02<br>(4.95)***   | -0.15<br>(-0.74)        |
| CON                | -0.1611<br>(-3.20)***    | -1.78<br>(-3.88)***    | -0.45<br>(-2.03)**       | -2.00<br>(-0.88)        |
| RISK               | -9.71 e-06<br>(-0.04)    | -1.35 e-03<br>(-0.79)  | -5.57 e-04<br>(-1.08)    | -1.12 e-02<br>(-2.03)** |
| PRIV               | 8.47 e-03<br>(2.09)**    | 7.82 e-02<br>(2.57)*** | 3.37 e-03<br>(0.38)      | 6.78 e-02<br>(0.71)     |
| COT                | 4.59 e-02<br>(5.30)***   | 4.42 e-02<br>(0.67)    | 2.05 e-02<br>(0.91)      | 0.19<br>(0.81)          |
| INF                | -1.03 e-03<br>(-0.77)    | -3.32 e-03<br>(-0.27)  | -7.52 e-03<br>(-1.3)     | -7.33 e-02<br>(-1.23)   |
| CE                 | 4.033<br>(2.14)**        | 14.19 e-03<br>(0.03)   | 0.63<br>(2.73)***        | 5.30<br>(2.23)**        |
| Constant           | 0.291<br>(5.40)***       | 0.92<br>(1.97)**       | -0.12<br>(-0.71)         | 1.46 e-03<br>(0.00)     |
| n                  | 270                      | 270                    | 270                      | 270                     |
| R <sup>2</sup>     | 45.43                    | 81.10                  | 64.92                    | 39.77                   |
| X <sup>2</sup> (9) | 206.07                   | 672.33                 | 50.09                    | 13.13                   |

\*\*\*Significant in 1%, \*\*Significant in 5%, \*significant in 10%. The z-statistics are in italics between brackets

the activity of banks. Our results showed that capitalization, privatization and quotation are two significant variables which contribute positively to the performances. The same applies to the degree of concentration and size with negative effects. More surprisingly, efficiency and risk index do not seem to improve banks performance.

As for the macroeconomic determinants, the performance of the Tunisian banks, some is its methodology of measure, accepts the business cycle and negatively the inflationary climate which seems to be at the origin of the increase in the structure expenditure which blocks the realization of interest margins and banking profits. Besides, following the performance indicators' progress during the period of study lets notice that the financial reforms didn't succeed to improve Tunisian banks performance. On the practical dimension, this study is helpful for bankers in their decision making to increase the bank financial performance.

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