International Journal of Business and Risk Management, 2018, Vol. 1, No. 1, 17-27
Available online at http://pubs.sciepub.com/ijbrm/1/1/1

DOI:10.12691/ijbrm-1-1-3

Determinants of Tunisian Banks Profitability

Lamia Jamel[1,*], Sihem Mansour[2]

[1]Faculty of Economic Sciences and Management of Sousse, Department of Economics, Sousse University, Tunisia
[2]Higher Institute of Management of Sousse, Department of Finance, University of Sousse, Tunisia
*Corresponding author: lajamel@yahoo.fr

Abstract The purpose of the paper is to examine empirically the performance indicators of Tunisian banks. We use Net Interest Margin (NIM) and the Return on Assets (ROA) as profitability measures to determine the affect of bank-specific characteristics, regulatory policies, macroeconomic indicators, financial development indicators, and bank concentration and density, institutional constraints to competition and crisis on banking performance. We employ the generalized least squares (GLS) to estimate the panel model who measure the bank profitability. Thus, the profitability seems to have been positively influenced by the size, composition of assets, credit risk, concentration, market capitalization and the crisis if the profitability is measured by net interest margin (NIM) and Return On Assets (ROA).

Keywords: *Return On Assets, Net Interest Margin, bank profitability, financial crisis, generalized least squares panel estimator*

Cite This Article: Lamia Jamel, and Sihem Mansour, "Determinants of Tunisian Banks Profitability." *International Journal of Business and Risk Management*, vol. 1, no. 1 (2018): 17-27. doi: 10.12691/ijbrm-1-1-3.

1. Introduction

Given the rapid development of financial markets, banks are facing intense competition. The performance management standard appears to be insufficient to meet the needs of strategic development financial institutions [1].

Bank profitability is usually explained by multiplies measurement who is expressed as a function of internal and external determinants. The internal determinants include bank-specific characteristics variables. The external variables reflect environmental variables that are expected to affect the profitability of financial institutions [2,3].

According to Chandler [4], performance is an association between the functional efficiency and strategic effectiveness. Thus, functional performance is to improve products, services, production processes and marketing and human resources management.

Bank performance is simply the result of a series of reforms and restructuring program and appropriate development of all banking systems. But next to the quest for performance we notice the presence of financial turmoil (financial crisis) that can influence and impact the programs to maximize the efficiency of banks. Moreover, the existence of country-specific crises allows the transmission of them to other countries mainly because of dependence between different economies.

The problem of measuring the performance of banks has been developed in the literature of financial theory. Thus, bank's profitability may be influenced by internal factors and external factors [5,6,7,8].

In our study, we will identify the determinants of banking Profitability Before and during the Financial Crisis of 2007. In this line, it raises the question: *What are the main determinants of bank profitability in Tunisia before and during the financial crisis of 2007?*

To answer this question, first, we begin our essay with a review of literature about the determinants of performance of financial institutions. In the next section we will analyze empirically the determinants of banking performance in Tunisia while presenting the research methodology and the models chosen. Then, we will interpret the results of the estimation of the models that measures the performance of banks.

2. Literature Review

A number of studies have examined various industries, commodities and products using profitability measures and multiple regression methods. The following highlight some of these studies: Zingales [9], McDonald [10], Ahmed and Khababa [11], Todani [12], Kambhampati and Parikh [13], Grimes and Barkan [14], Abor [15] and Lim and Lovell [16].

Following early work examined by Sealey and Lindley [17], Aigner and al. [18], Short [19] and Bourke [20], a number of more recent studies have attempted to identify some of the major determinants of bank profitability. The respective empirical studies have focused their analyses either on cross-country evidence or on the banking system of individual countries.

The studies by Molyneux and Thornton [21], Demirguc-Kunt and Huizinga [7], Abreu and Mendes [22], Staikouras and Wood [23], Goddard et al. [24], Athanasoglou et al. [25], Micco et al. [26] and Pasiouras and Kosmidou [27] investigate a panel data set. The studies by Berger et al. [28], Berger [29], Mamatzakis and

Remoundos [30] and Athanasoglou et al. [31] focus their analyses on single countries. The empirical results of these above-mentioned studies do vary, which is to be expected, given the differences in their datasets, time periods, investigated environments, and countries. However, we found some mutual elements that we used to categorize further the determinants of banking profitability.

The empirical results obtained by many author [3,29,32,33] can demonstrate that bank-specific characteristics, in particular, bank size and credit risk have a positive and significant impact on the net interest margin and the efficiency. Thus, for the impact of macro-economic and financial indicators in the performance of banks, Ben Naceur and Goaied [34] concluded that these variables have a significant impact on the net interest margin for the variation inflation. However, inflation shocks appear to be mostly gone by the rates creditors.

Accounting-based studies of banking profitability use comprehensive information from financial statements to identify the determinants of bank profitability, as measured by return on assets (ROA) or return on equity (ROE) or Net Interests Margin (NIM). The studies focusing on an individual country [34] or a geographical region [35] have examined bank-specific factors of profitability (e.g., size, growth of income, credit risk and control of expenses), while the studies encompassing multiple countries [3,36,37,38]) have considered external factors (e.g., inflation, concentration, and GDP per Capita) in addition to a few internal factors of profitability.

Pilloff and Rhoades [39] discussed the positive relationship between the size and banking profitability. The size of bank was affected by the operating efficiency. Molyneux and Seth (1998), Ramlall [40] and Sufian [41] founded the positive impact of the size of bank on banking profitability because the larger banks were more profitable than smaller banks.

Thus, the empirical evidence discusses the negative relationship between the size of bank and the banking profitability [42,43]. Ramlall [40] stated the positive relationship of operating efficiency and negative relationship of credit risk.

The high debtor turnover period and the high real interest rates for banks aggravate the banks to liquidate [44]. Then, Kosmidou [41] discuss the positive relationship of operating efficiency because if the operating efficiency is high then it gives the assurance of increment in profitability. Ben Naceur and Goaied [45] stated that the capital maintenance problem reflects the negative profitability. The capitals highly significantly affect the profitability and empower the banks to build a strong position in market [31].

The ratio to operating income to the total assets shows the efficient asset exploitation and highly significant and positive impact on banking profitability [46]. Kunt and Detragiache [47] state that the weak macro-economic environment became a reason of low economic growth and high inflation which show the economic immovability and diseconomies of scale. The economic growth and the rate of inflation are positively related to profitability [48].

The results of Bourke [20] Molyneux and Thornton [21], Demirguc-Kunt [7] and Staikouras and Wood [23] show that bank concentration ratio have a positive and statistically significant relationship with bank profitability.

Most of the literature suggests that the financial crisis has only one negative effect on bank performance. In this line, the financial crisis has developed since the summer of 2007 took place in three stages, markets, banks and the real economy. It was, indeed, gone from a market problem (the subprime) to a financial crisis and a banking crisis and finally the macro-economic impact [1,49].

3. Data and Empirical Model

In this section, we identify the sources of our data. We present the data itself and describe the regression model. Finally, we investigate the effects of internal factors, external factors and the financial crisis of 2007 on banking profitability in Tunisia.

3.1. Data

In this study we employed the performance indicator of 11 banks of Tunisia listed in the Stock Exchange of Tunisia (SET) covered the period of 1999-2016. The list of banks included in this study is provided in **the Appendix 1**. The balance sheet data is collected from Statistical Bulletin of The Stock Exchange of Tunisia (SET), websites of the banks, The Tunisian Professional Association of Banks and Financial (TPABF), The International Country Guide Risk (ICRG), The World Development Indicators (WDI), The Central Bank of Tunisia and The National Statistics Institute (NSI). The regression analysis is used to identify the main determinants of performance among the various indicators exploited. The descriptive statistics applies to find the mean, the maximum, the minimum and standard deviation, Skweenes and Kurtosis of those variables. The Pearson correlation tests applied to deal with the problems of autocorrelation respectively.

3.2. Methodology and Empirical Model

Kosmidou et al. [50], Dietrich and Wanzenried [51], Ben Naceur and Omran [3], Olson and Zoubi [2], Ali et al. [52] and others have argued that return on assets (ROA), return on equity (ROE) and net interest margin (NIM) are those most useful measure of profitability over time because assets have a direct effect on both income and expenses. However, the ROA and the NIM may be an equally important measure of profit in many instances. Since the nature of the estimation is defined as a regression on panel data because of the two dimensions, temporal and individual. The model explaining the ROA and the NIM is estimated using a generalized least squares panel estimator.

In our empirical validation we used a linear equation [3] of the following formula:

$$perf_{it} = f(B_{ijt}, R_{it}, M_t, F_t, I_t, C_t, Cr_t, VI_t)$$

When,

- Per_{it}: Represent the measure of performance of the bank i at the moment t (measured by the net profit of interest and the efficiency on assets).

- $\boldsymbol{B}_{ijt}$: It is the vector of variables j that represents the bank-specific characteristics of the bank i at the moment t.
- $\boldsymbol{R}_{it}$: It is a vector of the financials regulations indicators of the bank i at the moment t.
- $\boldsymbol{M}_{t}$: It is vector of macro-economic indicators in Tunisia at the moment t.
- $\boldsymbol{F}_{t}$: It is vector of indicators relative to the institutional constraints to the competition at the moment t.
- $\boldsymbol{I}_{t}$: It is vector financial development indicators at the moment t.
- $\boldsymbol{C}_{it}$: It is vector variables of measure of the density and the concentration of the bank i at the moment t.
- $\boldsymbol{Cr}_{it}$: It is a dummy variable relative to the financial crisis of 2007.
- $\boldsymbol{VI}_{it}$: It is a variable of interaction that explained in paragraph (**3.2.9**).

The basic framework for panel models is:

$$\begin{aligned} ROA_{it} &= \alpha_0 + \alpha_1 EQUITY_{it} + \alpha_2 CREDIT\_RISK_{it} \\ &+ \alpha_3 LNSIZE_{it} + \alpha_4 RESERVES\_COST_{it} + \\ &\alpha_5 GDPCAP_{it} + \alpha_6 INF_{it} + \alpha_7 LAW_{it} + \alpha_8 COR_{it} + \\ &\alpha_9 CONC_{it} + \alpha_{10} DENS_{it} + \alpha_{11} MARKET\_CAP_{it} + \\ &\alpha_{12} CREDIT\_PRIVATE_{it} + \alpha_{13} CRISIS_{it} + \\ &\alpha_{14} EQUITY * DENS_{it} + \varepsilon_{1t} \end{aligned} \quad (1)$$

$$\begin{aligned} NIM_{it} &= \beta_0 + \beta_1 EQUITY_{it} + \beta_2 CREDIT\_RISK_{it} \\ &+ \beta_3 LNSIZE_{it} + \beta_4 RESERVES\_COST_{it} + \\ &\beta_5 GDPCAP_{it} + \beta_6 INF_{it} + \beta_7 LAW_{it} + \beta_8 COR_{it} + \\ &\beta_9 CONC_{it} + \beta_{10} DENS_{it} + \beta_{11} MARKET\_CAP_{it} + \\ &\beta_{12} CREDIT\_PRIVATE_{it} + \beta_{13} CRISIS_{it} + \\ &\beta_{14} EQUITY * DENS_{it} + \varepsilon_{2t} \end{aligned} \quad (2)$$

The above model signifies the performance equation. It defines the relationship of profitability with bank-specific characteristics (EQUITY, CREDIT_RISK and LNSIZE), the variables of the financial regulations (RESERVES_COST), the macroeconomic variables (GDPCAP and INF), the variables relative to the institutional constraints in the competition (LAW and COR) the variables concerning the density and the concentration of banks (CONC and DENS), the indicators of the financial development (MARKET_CAP and CREDIT_PRIVATE), the dummy variable (CRISIS) and the variable of interaction (EQUITY*DENS). The beta values (β_1,…, β_{14}) and the alpha values (α_1, …, α_{14}) represents the proportionate change in dependent variable due to independent variables.β_0 and α_0 represents constant and $\boldsymbol{\varepsilon_{1t}}$ and $\boldsymbol{\varepsilon_{2t}}$ represents the error term. Further it is clearly define in **the Appendix 2** which imply the abbreviation, proxies and expected relationship of the variables.

3.2.1. Performance Measure

We measure the banking profitability by the ROA and the NIM:

- ROA (Return On Assets): It is the efficiency on the asset that indicates the report between the net income and the total of assets. It expresses the economic profitability [7].
- NIM (Net Interest Margin): It is the net profit of interest that indicates the report between the net income of the interests and the total of assets.

3.2.2. Bank-specific Characteristics

- EQUITY: This refers to the book value of equity divided by total assets (EQUITY). Some theories [29] suggest that well-capitalized banks are subject to less expected bankruptcy costs and hence lower cost of capital. According to this view, higher bank equity ratios may influence bank performance positively when loan rates do not vary much with bank equity.
- CREDIT_RISK: It is the report between the total of the credits and the active total. If this ratio is raised, it is associated with the highest net profits of interest. So, this ratio allows the improvement of the banking income because the loans are the most risky.
- LNSIZE: It is the Logarithm of the active total. The size could be an important determiner of the banking performance in case the size increases the profitability of a bank. However, the size could have a negative impact when banks become extremely big and further to bureaucratic reasons.

3.2.3. The Financial Regulation Indicators

- RESERVES_COST: To the extent that reserve holdings are not remunerated or remunerated at less-than-market rates, these regulations impose a burden on banks. Thus, we will test whether reserve requirements impact negatively bank net interest margins and performance. This variable is the report between the unproductive assets of interests and the total asset. This ratio allows deducting the impact of the assets which do not generate interests in the banking performance.

3.2.4. The Macroeconomic Indicators

- GDPCAP: It is the growth rate of the Gross domestic product (GDP) per capita. The economic growth measured by the GDP can play a role dominating in the increase of the profitability of banks.
- INF: It is the inflation rate. Previous studies brought reported a positive association between the inflation and the banking profitability. High inflation rates are generally associated to the interest rates of loans and thus, high income.

We use two proxies for macro-economic environment: inflation (INF) and the growth rate of GDP per capita (GDPCAP). Previous studies have reported a positive association between inflation and bank profitability. High inflation rates are generally associated with high loan interest rates, and therefore, high incomes. However, if inflation is not anticipated and banks are sluggish in adjusting their interest rates, there is a possibility that bank costs may increase faster than bank revenues and hence adversely affect bank profitability. The GDPCAP is expected to have a positive impact on bank's performance according to the well-documented literature on the association between economic growth and financial sector performance.

3.2.5. The Indicators of the Institutional Constraints to the Competition

Most of the empirical results suggest that the best institutions stimulate the competition everywhere in the economy. These studies plan that the better institutional environment will have a negative impact on the net margins of interest. However, Bianco and al. [53] support that the effect of global institutional quality on net margins of interest is not clear in theory. As a consequence, the impact of better institutions on net margins of interest could be ambiguous. We test empirically the incidence of global institutional development on net margins of interest and on economic profitability.

For more quality control of institutions, we also include two additional variables of the database ICRG in our regressions. The first one is the index of the law and order (LAW) which extends from 0 to 6, where 0 indicate that the law is ignored and the high large number indicates the best execution of the law. The second variable is the index of the corruption (COR), which extends of 0 in 6 where the value 0 indicates that the corruption is high and the value 6 indicates that the corruption is weakness.

- LAW: It is an index tuned by the International Country music Risk Guide (ICRG). (The low indications indicate that the law is ignored and the high scores indicate a better legal application).
- COR: It is an index of corruption within the country (Tunisia).

3.2.6. The Density and the Concentration of Banks Indicators

- CONC: It is the report between the total asset and the total of the asset of three big banks in Tunisia.
- DENS: It is the report between the total of the deposits and the surface (Km^2).

3.2.7. The Financial Development Indicators

- MARKET_CAP: It is the report between the market capitalization and the gross domestic product. This measure is used to determine the market share of every bank.
- CREDIT_PRIVATE: It is the report between the private credits and the gross domestic product. This indicator is used to measure the importance of financing of banks in the economy.

3.2.8. The Dummy Variable

- CRISIS: is a dummy variable that takes the value 1 when the year corresponds to a period of crisis and the value 0 if the year is before or after the period of crisis.

3.2.9. The Variable of Interaction

- EQUITY*DENS: The variable of interaction is used to determine the threshold of the own capital which allows the bank to maximize its density. So, it is necessary to calculate the optimal level of own capital from the which the variable density will have a negative impact on the variable ROA and a negative impact on the variable NIM which are two measures of the performance. This variable is equal to EQUITY*DENS.

The theoretical calculation of this threshold is determinate in two stages:

Stage 1: Determine the first transitive of the model estimated according to one of both variables which compose the variable of interaction. In our case, we calculate the first transitive of the first measure of performance (ROA) by the EQUITY variable.

$$\frac{\partial \widehat{ROA}}{\partial \widehat{EQUITY}} = \hat{\alpha}_1 + \hat{\alpha}_{14}\,\widehat{DENS} \tag{3}$$

Stage 2: In the second stage, we are going to determine the value of the DENS which cancels the transitive calculated in the first stage. Thus, we suppose that the equation 3 is equal to zero:

$$\frac{\partial \widehat{ROA}}{\partial \widehat{EQUITY}} = \hat{\alpha}_1 + \hat{\alpha}_{14}\,\widehat{DENS} = 0. \tag{4}$$

Then,

$$\overline{DENS} = \frac{-\hat{\alpha}_1}{\hat{\alpha}_{14}}. \tag{5}$$

From the value calculated by the variable DENS, the variable EQUITY will have an impact on the banking performance measured by the ROA that is positive or negative. This impact is determined from the result of the estimation of the model ROA. We did not take into account the variable of interaction in the model NIM because it is not significant and it has a relative impact on the banking performance (The Table 4).

4. Empirical Results

Within the framework of this paper, we are going to present a descriptive statistics analysis of the various variables used during the estimation of the two models of measure the banking performance.

First of all, the number of the observations is limited to 191 observations concerning the two models. The Appendix 3 summarizes all the descriptive statistics (Average, maximal value, minimal value, the standard deviation, the Skewness and the Kurtosis) relative to variables used in the different estimation of the variable ROA and the variable NIM, which measures the banking performance. The variable NIM represents the net margin of interest which is the difference between the received interests (the interests received on the granted credits) and the perceived interests (the interests perceived on the collected deposits).

First of all, we are going to specify the type of estimation who is a regression on data of panel. Our choice is justified by the presence of a double dimension at the level of the used data; the first is the temporal (a period of 18 years) and the second is individual (our sample consists of 11 Tunisian banks quoted in the Stock Exchange of Tunisia).

In this paper, we made a test of the correlation between the various used variables. The appendix 4 summarizes the results relative to the correlation. So, the results show that almost the majority of the coefficient of correlation of Pearson does not exceed the limit of tolerance of (0.7), so

he does not cause problems during the estimation of both models ROA and NIM.

In our research work we are going to proceed to an estimation of a regression on data of panel of the model adopted for the measures of the banking performance (ROA and NIM) while specifying the various statistical tests made during this study.

The problem during the estimation it is the choice of the method of estimation. So, the approached solution of this type of problem it is the Hausman test that allows choosing between the estimation of a model with fixed effects or the estimation of a model with random effects. If the probability of this test (Prob > chi2) is superior to 10% then the model with random effects is preferred to the model with fixed effects. Thus, If the probability of this test (Prob > chi2) is inferior to 10% then the model with fixed effects is preferred to the model with random effects. The all results of this test are presented in Table 1 and Table 2.

Table 1. The estimation of the variable ROA

Dependent variable: ROA	Period of estimation : 1999 – 2016						
Explicative variables	Estimation 1	Estimation 2	Estimation 3	Estimation 4	Estimation 5	Estimation 6	Estimation 7
EQUITY	0.0951177 (3.89)*	0.0929749 (3.76)*	0.1013324 (4.11)*	0.0845587 (4.22)*	0.1300105 (3.50)*	0.1500106 (3.87)*	0.0387624 (1.87)***
CREDIT_RISK	-0.0017281 (-0. 19)	-0.002059 (-0.22)	-0.0005547 (-0.06)	-0.0044463 (-0.50)	0.0006451 (0.06)	0.0024342 (0.24)	-0.0216145 (-2.30)**
LNSIZE	0.0064628 (2.46)**	0.0060251 (2.14)**	0.0083292 (2.78)*	0.008572 (2.32)**	0.008799 (2.29)**	0.0077938 (2.02)**	0.0025264 (0.65)
RESERVE_COST	0.0846134 (1.76)***	0.087144 (1.72)	0.0312022 (0.56)	-0.0017215 (-0.03)	0 0549626 (0.83)	0.0524818 (0.79)	-0.0037568 (-0.07)
INF		-0.0245784 (-0.16)	-0.0087746 (-0.06)	-0.0110413 (-0. 07)	-0.006751 (-0.04)	-0.1436964 (-0.80)	-0.1026683 (-0.59)
GDPCAP		-0.0441281 (-0.76)	0.0015323 (0.03)	0.0045118 (0.06)	-0.0180343 (-0.24)	-0.030237 (-0.40)	-0.0508498 (-0.68)
LAW			-0.0164697 (-0.14)	-0.0147352 (-0.11)	-0.0497334 (-0.39)	-0.0123885 (-0.10)	-0.0403943 (-0.31)
COR			0.1402311 (2.37)**	0.1449664 (2.20)**	0.1252847 (1.96)**	0.104631 (1.62)	0.1239801 (1.92)***
CONC				-0.0085842 (-0.36)	0.0241356 (0.79)	0.0345904 (1.12)	0.0097884 (0.37)
DENS				-0.0001068 (-0.32)	-0.0001649 (-0.42)	-0.0006628 (-1.35)	-0.0015902 (-3.20)*
MARKET_CAP					0.0237105 (0.25)	0.0006818 (0.01)	0.0663777 (0.76)
CREDIT_PRIVATE					-0.0040461 (-0.11)	0.0082325 (0.23)	-0.0059898 (-0.19)
CRISIS						0.0078398 (1.69)***	0.0056304 (1.37)
EQUITY*DENS							-0.0169598 (-4.14)*
CONSTANT	-0.1008835 (-2.47)**	-0.091417 (-2.11)**	-0.1493807 (-2.77)*	-0.1442041 (-2.23)**	-0.1564651 (-2.34)*	-0.142485 (-2.13)**	-0.0313031 (-0.47)
Number of obs	191	191	191	191	191	191	191
Fisher Probability	Prob > F = 0.0027	Prob > F = 0.0104	Prob > F = 0.0027	Prob > F = 0.0073	Prob > F = 0.0204	Prob > F = 0.0131	Prob > F = 0.0014
The probability of chi2()[a]	Prob > chi2 = 0.0020	Prob > chi2 = 0.0079	Prob > chi2 = 0.0013	Prob > chi2 = 0.0028	Prob > chi2 = 0.0015	Prob > chi2 = 0.0024	Prob > chi2 = 0.0000
The probability of Hausman test	Prob>chi2 = 0.3437	Prob>chi2 = 0.6172	Prob>chi2 = 0.7171	Prob>chi2 = 0.8462	Prob>chi2 = 0.0000	Prob>chi2 = 0.0000	Prob>chi2 = 0.8134
Type of regression	Model with random effects	Model with random effects	Model with random effects	Model with random effects	Model with fixed effects	Model with fixed effects	Model with random effects
The test of auto-corrélation (P > F)[b]	0.0583	0.0604	0.0763	0.0807	0.0816	0.0738	0.0217

Value significant in a threshold of: (*) 1%; (**) 5% et (***) 10%.

[a] The test of Wall is used to test the correlation between the explanatory variables and the residues. We compare the probability of (Prob > chi2) with a 5% threshold with H0: absence of correlation between variables used and residues. If (Prob > chi2) < 5%, then we accept H0.

[b] For the test of auto-correlation, we compare the probability of Fisher with a 5% threshold with H0: absence of excellent auto-correlation. If (P > F) < 5 %, then we reject H0.

Table 2. The estimation of the variable NIM

The estimation of the variable NIM	Period of estimation : 1999 – 2016						
Explicative variables	Estimation 1	Estimation 2	Estimation 3	Estimation 4	Estimation 5	Estimation 6	Estimation 7
EQUITY	0.0333595 (1.89)***	0.0348131 (1.99)**	0.0350383 (2.00)**	0.037144 (2.11)**	0.0339706 (2.02)**	0.0360787 (2.15)**	0.046264 (2.45)**
CREDIT_RISK	-0.0003674 (-0.10)	0.0002267 (0.06)	0.0007527 (0.20)	0.0150505 (-0.12)	0.0028307 (0.71)	0.0035462 (0.88)	0.0084415 (1.50)
LNSIZE	0.0029741 (1.88)***	0.0023837 (1.49)	0.0032056 (1.93)***	0.0632559 (1.38)	0.0022705 (1.32)	0.0021284 (1.24)	0.0026214 (1.48)
RESERVE_COST	-0.0306626 (-1.14)	-0.020092 (-0.74)	-0.0402861 (-1.39)	0.1438087 (-1.04)	0.0223804 (0.71)	0.0227512 (0.72)	0.0253635 (0.80)
INF		0.0840433 (1.95)***	0.0716481 (1.62)	-0.0337552 (1.51)	0.0664302 (1.53)	0.0248433 (0.44)	0.0206747 (0.36)
GDPCAP		-0.0314649 (-1.41)	-0.0352859 (-1.53)	-0.1034872 (-1.46)	-0.0154011 (-0.61)	-0.0209455 (-0.82)	-0.0177435 (-0.68)
LAW			0.0432929 (0.94)	-0.1088827 (0.88)	0.0375787 (0.80)	0.045302 (0.95)	0.0527523 (1.09)
COR			0.0480371 (1.43)	0.037609 (1.54)	0.0370001 (1.16)	0.0402722 (1.26)	0.0404934 (1.28)
CONC				-0.0504308 (0.27)	-0.0049502 (-0.47)	-0.000824 (-0.07)	-0.0011074 (-0.10)
DENS				-0.0015498 (0.84)	-0.0000675 (-0.34)	-0.0001843 (-0.83)	0.0000569 (0.19)
MARKET_CAP					0.0313006 (0.96)	0.0314535 (0.97)	0.027561 (0.84)
CREDIT_PRIVATE					0.043108 (3.49)*	0.0444351 (3.57)*	0.0456443 (3.64)*
CRISIS						0.0025536 (1.19)	0.0027144 (1.27)
EQUITY*DENS							-0.0033349 (-1.18)
CONSTANT	-0.0141705 (-0.58)	-0.0083118 (-0.34)	-0.0347612 (-1.22)	-0.8305598 (-0.92)	-0.026954 (-0.95)	-0.0265643 (-0.94)	-0.0393993 (-1.30)
Number of obs	191	191	191	191	191	191	191
Fisher Probability	Prob > F = 0.0020	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000	Prob > F = 0.0000
The probability of chi2()[a]	Prob > chi2 = 0.1178	Prob > chi2 = 0.0409	Prob > chi2 = 0.0239	Prob > chi2 = 0.0359	Prob > chi2 = 0.0001	Prob > chi2 = 0.0001	Prob > chi2 = 0.0000
The probability of Hausman test	Prob>chi2 = 0.7965	Prob>chi2 = 0.9966	Prob>chi2 = 0.9993	Prob>chi2 = 0.9673	Prob>chi2 = 0.8831	Prob>chi2 = 0.8342	Prob>chi2 = 0.1249
Type of regression	Model with random effects	Model with random effects	Model with random effects	Model with random effects	Model with random effects	Model with random effects	Model with random effects
The test of auto-corrélation (P > F)[b]	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Value significant in a threshold of: (*) 1%; (**) 5% et (***) 10%.

[a] The test of Wall is used to test the correlation between the explanatory variables and the residues. We compare the probability of (Prob > chi2) with a 5 % threshold with H0: absence of correlation between variables used and residues. If (Prob > chi2) < 5 %, then we accept H0.

[b] For the test of auto-correlation, we compare the probability of Fisher with a 5% threshold with H0: absence of excellent auto-correlation. If (P > F) < 5 %, then we reject H0.

Furthermore, we proceeded to the other tests to show the validity of our models and to justify the significance of the estimations. We tested the correlation between the explanatory variables and the residues. This type of test is based on the value of (Prob > chi2). If this probability is lower than 5%, thus we accept H_0 who verifies the absence of correlation between residues and explanatory variables. If this probability is superior to 5 %, in that case there is a problem of correlation between residues and explanatory variables that we have to correct it. The type of this test was developed in Table 1 and Table 2.

Then, we proceeded to tests of excellent auto-correlation of every estimated model. This test is based on the interpretation of the value of probability (Prob > F). This value is compared with a 5 % threshold. If this probability is lower than 5 %, thus we reject H0 that is we reject the hypothesis of absence of the auto-correlation of the first order. In that case, we are going to correct this problem of presence of auto-correlation (Table 1 and Table 2). The solution of this test is presented in Table 3

We made the test of normality of residues. Indeed, if residues are distributed normally then we can admit that these are distributed identically independently. Therefore, our estimation presents no problem of heterosciedasticity (Appendix 5).

To pursue our analysis, we go, then, present the resultant of the estimation of the model of measure of the banking performance by using the Software STATA 11. We estimated the variables ROA and NIM which measures the performance of the Tunisian banks (Table 1 and Table 2). So, we estimated the two variables by basing itself on 7 estimations for each of both variables.

The test of significance of the models is based on the probability of Fisher. We noticed that all the values of the probability of Fisher are lower than 5 % in all the estimations of both models. Thus, we can counter that five estimations of every model are globally significant.

By observing the Table 1 which summarizes all

estimations relative to the first model (ROA), we notice that there are seven significant variables with different thresholds. The first one, it is the variable EQUITY, is statistically significant and positive in a 1% threshold in the first six estimations and in a 10% threshold in the last estimation. In this frame, the variable EQUITY has a positive impact on the economic profitability of the Tunisian banks. To supply a fair remuneration to the shareholders, the banks have profit to supply an important profitability to compensate for the additional risks.

The variable CREDIT_RISK is statistically significant and negative in a 5% threshold only in the last estimation. This confirms the literature, because the credit risk has an impact on the banking profitability.

The variable LNSIZE is statistically significant and positive. The size of the Tunisian banks affects their performances expressed by the variable ROA. Thus, the impact of the size on the profitability of banks is relevant that is it exist an optimal level of the banking assets which allows affecting a maximum level of profitability.

The financial regulations and the financial reform, which are adopted and applied by Tunisia for the banking system, are presented by the variable RESERVE-COST. This variable is statistically significant and positive. So, the results suggest that more the reserve is important more the profitability is raised. The results also confirmed the argument that the cost of opportunity of the preservation of reserves, which can be considered as an implicit tax, seems to influence positively the performance of banks.

For the variables relative to the institutional constraints in the competition, we noticed that only the variable (COR) which is significant. So, this variable is statistically significant and positive. In this frame if the degree of corruption increases, there will be a positive impact on the profitability of the Tunisian banks.

The level of the competition of the Tunisian banks can be summarized as regards the level of collections of the deposits with the customers. So, this aspect is explained by two variables which are DENS and CONC. In fact, only the variable DENS is statistically significant and negative. In that case, the level of the collected deposits has a negative impact on the profitability of the Tunisian banks. So, more the level of the deposits increases more the amount of the interests to be paid is important. These interests are expenses payable by banks for the profit of their customers.

Finally, we noticed that the variable CRISIS is statistically significant and positive at the 5%. Thus, the financial crisis of 2007 has a positive impact on the performance of Tunisian banks measured by the net interest margin. The positive impact of the crisis is justified by several reasons namely control policy required by the Central Bank of Tunisia, the Tunisian financial market independent of other international markets, the proper management of banking risks and the absence of capital flows abroad.

Table 3. The estimated autocorrelation coefficient

	Estimation 1	Estimation 2	Estimation 3	Estimation 4	Estimation 5	Estimation 6	Estimation 7
The results of the test	Accept H_0	Accept H_0	Accept H_0	Accept H_0	Accept H_0	Accept H_0	Reject H_0
The estimated autocorrelation coefficient (ROA)[a]	-	-	-	-	-	-	0.05477114
Type of regression	GLS Regression	GLS Regression	GLS Regression	GLS Regression	GLS Regression	GLS Regression	GLS Regression with AR(1) disturbances
The results of the test	Reject H_0	Reject H_0	Reject H_0	Reject H_0	Reject H_0	Reject H_0	Reject H_0
The estimated autocorrelation coefficient (NIM)	0.72799438	0.71122436	0.69873727	0.68075979	0.67241315	0.65858053	0.63487418
Type of regression	GLS Regression with AR(1) disturbances	GLS Regression with AR(1) disturbances	GLS Regression with AR(1) disturbances	GLS Regression with AR(1) disturbances	GLS Regression with AR(1) disturbances	GLS Regression with AR(1) disturbances	GLS Regression with AR(1) disturbances

[a] If we accept H_0, then we haven't an estimated autocorrelation coefficient.

Table 4. The calculation of the value of the Threshold

Models	The first transitive by the variable EQUITY	The value of the threshold	Interpretation
ROA	$\frac{\partial \widehat{ROA}}{\partial \widehat{EQUITY}} = \hat{\alpha}_1 + \hat{\alpha}_{14}\widehat{DENS} = 0.0387624 + (-0.0169598) * \widehat{DENS}$	$\overline{DENS} = \frac{-\hat{\alpha}_1}{\hat{\alpha}_{14}} = \frac{-0.0387624}{-0.0169598} = 2{,}28$ $Total\ of\ Deposit\ calculate\ by\ the\ Threshold = 2.28 * 163600 = 373008\ TND$	The variable EQUITY has a positive impact on the banking performance when the value of the variable DENS is superior or equals in (2.28*The surface (km^2)). That is the total of the deposits is equal in (2.28*The surface (km^2)). If not, it will have a negative impact on the banking profitability (ROA). Then, the effect consisted of the variable of interaction is determined by the value of the coefficient has $\widehat{\alpha}_{14}$.
NIM	$\frac{\partial \widehat{NIM}}{\partial \widehat{EQUITY}} = \hat{\beta}_1 + \hat{\beta}_{14}\widehat{DENS} = 0.046264 + (-0.0033349) * \widehat{DENS}$	$\overline{DENS} = \frac{-\hat{\alpha}_1}{\hat{\alpha}_{14}} = \frac{-0.046264}{-0.0033349} = 13{,}87$ $Total\ of\ Deposit\ calculate\ by\ the\ Threshold = 13.87 * 163600 = 2269132\ TND$	The variable EQUITY has a positive impact on the banking performance when the value of the variable DENS is superior or equals in (13.87 *The surface (km^2)). That is the total of the deposits is equal in (13.87*The surface (km^2)). If not, it will have a negative impact on the banking profitability (NIM). Then, the effect consisted of the variable of interaction is determined by the value of the coefficient has $\hat{\beta}_{14}$.

The variable of interaction EQUITY*DENS is statistically significant and negative. The impact of this variable on the performance (ROA) is explained in the Table 4.

So let us note, as variable GDPCAP, INF, LAW, CONC, MARKET_CAP and CREDIT_PRIVATE has no impact on the banking performance.

The Table 2 summarizes all estimations of the second model NIM. We notice that there are four significant variables with different thresholds. The variable EQUITY has a statistically significant and positive impact on the profitability of the Tunisian banks measured by the net interest margin (NIM). To supply a fair payment to the shareholders, the banks have profit to supply an important profitability to compensate for the additional risks.

The variable LNSIZE is statistically significant and positive. The size of the Tunisian banks affects their performances expressed by the variable NIM. Thus, the impact of the size on the profitability of banks is relevant that is it exist an optimal level of the banking assets which allows reaching a maximum level of profitability. Furthermore, the increase of the level of assets can affect positively the net profit of the interests of the Tunisian banks.

The impact of the macro-economic factors on the banking performance was developed in the literature by many authors. Revel [54] was the first who suggested that the effect of inflation on bank profitability depends to act to increase spending at a higher rate of inflation. Perry [55] adds that the impact of inflation on banking performance depends on knowing that the inflation is fully anticipated. Most studies found that the rate of inflation have a positive impact on banking profitability [20,21,25,27]. However, Afanasieff and al. [32] and Ben Naceur and Kandil [56] found that the inflation have a negative impact on the net interest margin. In our study, we found that the inflation is statistically significant and positive.

The variable CREDIT_PRIVATE is statistically significant and positive. The impact positive of the variable CREDIT_PRIVATE justify the importance of the private credits in the maximization of the banking profitability.

So let us note, as variable CREDIT_RISK, RESERVE_COST, GDPCAP, LAW, COR, CONC, DENS, MARKET_CAP and CRISIS has no impact on the banking performance.

The variable of interaction EQUITY*DENS is statistically significant and negative. The impact of this variable on the performance (NIM) is explained in the Table 4.

Let us call back so, as Tunisia and mainly her financial market were weakly impacted by the turbulences of the international financial markets. This exposure is justifying by the existence of a solid macroeconomic situation in Tunisia. Furthermore, the financial crisis has an impact on the sector of the textile industries in Tunisia.

Thus, we can postulate that the financial crisis 2007-2009 has a relative impact on the performance of the Tunisian banks. This impact was justified by the determining factors of the banking performance. So, banks can reach a level of efficiency while basing itself on characteristics specific and appropriate for them for which to have a competitive advantage.

5. Conclusion

The study of the banking performance becomes identified by the presence of several factors to be known, the environment, the structure of the market and the banking regulations. These factors are considered as the determiners of the banking performance and they have to be to develop with the other factors such as the privatization, the liberalization, the governance and the crisis.

So, both measures of performance (ROA and NIM) which we used in our empirical study will be estimated by the General Last Squares (GLS). In this frame, we verified the hypothesis according to which the financial crisis affected the performance of the Tunisian banks. Thus, the rather important margin of interest what is justified by the level of the tuned credits and the level of the collected deposits. In fact, the part of investments with the international banks is reduced by 75% of the total of the reserves before the crisis to 39% at present.

Then, banks in Tunisia constitute the main source of funding of the economy. Besides, there are predictable evolutions which entail inevitably financial, technological, organizational and human significant investments. Furthermore, the impact of these changes decreases the profitability of banks. To finance them, it is necessary to envisage fusions between national banks or alliances or partnerships with foreign banks to realize economies of scale, to increase the productivity, to widen the banking ranges of products and services and to attract and motivate of the qualified personnel.

The improved performance by Tunisian banks largely reflects the prudential supervision exercised by the Central Bank of Tunisia. In addition, the downturn in global financial markets has not impacted the operation of the Tunisian Financial Market.

As for Tunisian banks, it should be noted that they are permitted to invest in international markets as foreign exchange non-residents. Note well that all Tunisian banks have a program to open new branches across the country to improve their performance.

References

[1] Zhang, YC, and Li, S.L. (2009). gh performance work practices and firm performance: Evidence from the pharmaceutical industry in China. *The International Journal of Human Resource Management* 20(11), 2331-2348.

[2] Olson, D., Zoubi, T.A. (2011). Efficiency and bank profitability in MENA countries. *Emerging Markets Review*, 12, 94-110.

[3] Ben Naceur, S., Omran, M. (2011). The effects of bank regulations, competition, and financial reforms on banks performance. *Emerging Markets Review*, 12, 1-20.

[4] Chandler, Alfred D. (1992). "Organizational Capabilities and the Economic History of the Industrial Enterprise."*Journal of Economic Perspectives*, 6 (3): 79-100.

[5] Akhavein, J.D., Berger, A.N., and Humphrey, D.B. (1997). Effects of bank megamergers on efficiency and prices: Evidence from the profit function. *Review of Industrial Organization*, 12, 95-139

[6] Demirgüç-Kunt, Asli and Vojislav Maksimovic, (1998), Law, Finance, and Firm Growth, *Journal of Finance* 53, 2107-2137.

[7] Demirguc-Kunt, A., and Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: some international evidence (English). *The World Bank economic review*. 13(2), 379-408.

[8] Bikker, J.A., and Hu, H. (2002), Cyclical patterns in profits, provisioning and lending of banks procyclicality of the new Basel capital requirements. *BNL Quarterly Review*, 221, 143-175.

[9] Zingales, L. (1998). Survival of the Fittest or the Fattest? Exit and Financing in the Trucking Industry. *The Journal of Finance*, 8(3), 905-938.

[10] McDonald, J. (1999). The Determinants of Firm Profitability in Australian Manufacturing. *The Economic Record*, 75(229), 115-26.

[11] Ahmed, A.M., and Khababa, N. (1999). Performance of Banking Sector in Saudi Arabia. *Journal of Financial Management & Analysis*, 12(2), 30.

[12] Todani, K. (2001). *Pricing Behavior in the U.S. Railroad Industry*: Lessons for South Africa.

[13] Kambhampati, U. and Parikh. A. (2003). Disciplining Firms: The Impact of Trade Reforms on Profit Margins in Indian Industry. *Applied Economics*, 35, 461-470.

[14] Grimes, G. and Barkan. P. (2006). Cost-Effectiveness of Railway Infrastructure Renewal Maintenance. *Journal of Transportation Engineering © ASCE*, 132(8), 601-608.

[15] Abor, J. (2008). *Determinants of the Capital Structure of Ghanaian Firms*. AERC Research Paper 176, African Economic Research Consortium, Nairobi, Kenya, March 2008.

[16] Lim, S. and Lovell. K. (2009). Profit and Productivity of U.S. Class I Railroads." *Managerial and Decision Economics* 30, 423-442.

[17] Sealey, C.W. and Lindley, J.T. (1977). Inputs, Outputs, and Theory of Production Cost at Depository Financial Institutions, *Journal of Finance*, 32, 1251-1266.

[18] Aigner, D., Lovell, C.A.K. and Schmidt, P. (1977). Formulation and Estimation of Stochastic Frontier Production Function Models, *Journal of Econometrics*, 6, 21-37.

[19] Short, B. (1979), The relation between commercial bank profit rates and banking concentration in Canada, Western Europe and Japan. *Journal of Banking and Finance*, 3(3), 209-219.

[20] Bourke, P. (1989), Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance*, 13(1), 65-79.

[21] Molyneux, P., and Thornton, J. (1992), The determinants of European Bank profitability. *Journal of Banking and Finance*, 16, 1173-1178.

[22] Abreu, M., and Mendes, V., (2002), *Commercial Bank Interest Margins and Profitability: evidence from E.U. Countries*. Working Paper Series, Porto.

[23] Staikouras, C., and Wood, G. (2004). The determinants of European bank profitability. *International Business and Economics Research Journal*, 3(6), 57-68.

[24] Goddard, J., Molyneux, P., and Wilson, J., (2004), The profitability of European banks: a cross-sectional and dynamic panel analysis. *Manchester School*, 72(3), 363-381.

[25] Athanasoglou, P., Delis, M., and Staikouras, C. (2006), *Determinants of bank profitability in the southern eastern European regio*n. Bank of Greece Working Paper No. 47.

[26] Micco, A., Panizza, U., and Yanez, M. (2007), Bank ownership and performance. Does politics matter? *Journal of Banking and Finance*, 31(1), 219-241.

[27] Pasiouras, F., Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, 21, 222-237.

[28] Berger, A., Hanweck, D., and Humphrey, D., (1987), Competitive viability in banking: scale, scope, and product mix economies. *Journal of Monetary Economics*, 20(3), 501-520.

[29] Berger, A.N. (1995), The profit-structure relationship in banking. Test of market power and efficient-structure hypotheses. *Journal of Money, Credit and Banking*, 27, 404-431.

[30] Mamatzakis, E., and Remoundos, P., (2003), Determinants of Greek commercial banks profitability, 1989-2000. *Spoudai*, 53(1), 84-94.

[31] Athanasoglou, P., Brissimis, S., and Delis, M. (2008), Bank-specific, industry specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions and Money*, 18(2), 121-136.

[32] Afanasieff, T., Lhacer, P., and Nakane, M., (2002), *The determinants of bank interest spreads in Brazil*, Working Paper. Banco Central di Brazil.

[33] Ben Naceur, S., and Goaied, M. (2001), The determinants of the Tunisian deposit banks'performance. *Applied Financial Economics*, 11(3), 317-319.

[34] Ben Naceur, S., and Goaied, M., 2008. The determinants of commercial bank interest margin and profitability: evidence from Tunisia. *Frontiers in Finance and Economics* 5, 106-130.

[35] Bonin, J. P., Hassan, I., and Wachtel, P. (2005). Bank performance, efficiency and ownership in transition countries. *Journal of Banking and Finance*, 29, 31-53.

[36] Hassan, M.K., and Bashir, A.H.M., (2003). *Determinants of Islamic Banking Profitability*. Paper Presented at the 10th ERF Annual Conference.

[37] Valverde, S. C., and Ferna´ndez, F. R. (2007). The determinants of bank margins. *Journal of Banking & Finance*, 31, 2043–2063.

[38] Poghosyan, T., 2010. Re-examining the impact of foreign bank participation on interest margins in emerging markets. *Emerging Markets Review*, 11, 390-402.

[39] Pilloff, S. J., and Rhoades, S. A. (2002). Structure and Profitability in Banking Markets. *Review of Industrial Organization*, 20, 81-98.

[40] Ramlall, I. (2009). Bank-Specific, Industry-Specific and Macroeconomic Determinants of Profitability in Taiwanese Banking System: Under Panel Data Estimation. *International Research Journal of Finance and Economics* (34), 160-167.

[41] Kosmidou, K. (2008). The determinants of banks'profits in Greece during the period of EU financial integration. *Managerial Finance*, 34 (3), 146-159.

[42] Sufian, F. (2009). Determinants of bank efficiency during unstable macroeconomic environment: Empirical evidence from Malaysia. *Research in International Business and Finance*, 23, 54-77.

[43] Spathis, C., Koasmidou, K., and Doumpos, M. (2002). Assessing Profitability Factors in the Greek Banking System: Amulticriteria methodology. *International Transactions in Operational Research*, 517-530

[44] Sayilgan, G., and Yildirim, O. (2009). Determinants of Profitability in Turkish Banking Sector: 2002-2007. *International Research Journal of Finance and Economics* (28), 207-214.

[45] Ben Naceur, S., and Goaied, M. (2002). The relationship between dividend policy,financial structure, profitability and firm value. *Applied Financial Economics,* 12, 843-849.

[46] Sufian, F., Habibullah, M.S. (2009). Bank Specific and Macroeconomic Determinants of Bank Profitability: Empirical Evidence from the China Banking Sector. *Frontiers of Economics in China*, 4 (2), 274-291.

[47] Kunt, A. D., and Detragiache, E. (1998). The Determinents of Banking Crises in Developing and Developed Countries. *International Monetary Fund (IMP Staff Papers)*, 45 (1), 81-109.

[48] Alexiou, C. and Sofoklis, V. (2009). Determinants of bank profitability: Evidence from the Greek banking sector. *In: Ekonomski anali*, 54(182), 93-118.

[49] Badreldin, A.M., (2009). *Measuring the Performance of Islamic Banks by Adapting Conventional Ratios (October 21,* 2009*)*. German University in Cairo Working Paper No. 16.

[50] Kosmidou, K., Pasiouras, F., Doumpos, M., and Zopounidis, C., 2004. Foreign versus domestic banks' performance in the UK: a multicriteria approach. *Computational Management Science* 1, 329–343.

[51] Dietrich, A., Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions & Money*, 21 (3), 307-327.

[52] Ali, K., Akhtar, M.F., Ahmed, H.Z. (2011). Bank-Specific and Macroeconomic Indicators of Profitability - Empirical Evidence from the Commercial Banks of Pakistan. *International Journal of Business and Social Science*, 2 (6), 235-242.

[53] Bianco M., Jappelli T., and Pagano M. 2001. "*Courts and Banks: Effects of Judicial Enforcement on Credit Markets*," CSEF Working Papers 58, Centre for Studies in Economics and Finance (CSEF), University of Salerno.

[54] Revell, J. (1979). *Inflation and financial institutions*. Financial Times, London.

[55] Perry, P. (1992). Do banks gain or lose from inflation. *Journal of Retail Banking*, 14(2), 25-30.

[56] Ben Naceur, S., and Kandil, M. (2009), The impact of capital requirements on banks 'cost of intermediation and performance: case of Egypt. *Journal of Economics and Business*, 61, 70-89.

Appendix 1. List of Tunisian banks included in this study

Bank	Denomination
AB	Amen Bank
ATB	Arab Tunisian Bank
ABT	Attijari Bank of Tunisia
AIBT	Arab International Bank of Tunisia
HB	Housing Bank
NAB	National Agricultural Bank
TB	Tunisian Bank
BTE	Bank of Tunisia and Emirates
TSB	Tunisian Society Bank
UBTI	Union Bank of Trade and Industry
IUB	International Union of Banks

Appendix 2. The definition of variables retained in the models to be estimated

Variables	Definition	Sources
Two measures of the performance		
ROA	Net Income / total assets	BCT/APBTEF
NIM	(Interest received−interest paid)/ total earning assets	BCT/APBTEF
Bank-specific characteristics Indicators		
EQUITY	Equity / total assets	BCT/APBTEF
CREDIT_RISK	Net loans / total assets	BCT/APBTEF
LNSIZE	Logarithm of total real assets	BCT/APBTEF
The financial regulations indicaors		
RESERVE_COST	Non interest earning assets / total assets	BCT/APBTEF
Macroeconomic indicators		
INF	Inflation rate	WDI/INS
GDPCAP	GDP per capita	WDI/INS
Indicators of the institutional constraints to the competition		
LAW	Law and order: A score from de 0 to 6. Low scores indicate that the law is ignored and high scores indicate a better legal enforcement.	ICRG (International Country Risk Guide)
COR	Corruption: A score from 0 to 6. Low scores indicate that the corruption is high.	ICRG (International Country Risk Guide)
The density and the concentration of banks indicators		
CONC	Assets of three largest banks as a share of assets of all commercial banks	BCT/APBTEF
DENS	Total deposits of the banking sector divided by area (Km2)	BCT/APBTEF/INS
The financial development indicators		
MARKET_CAP	Stock Market Capitalization /GDP	BVMT/APBTEF
CREDIT_PRIVATE	Private credit by deposit money banks/GDP	BCT/APBTEF
The Dummy variable		
CRISIS	This variable takes the value 1 when the year corresponds to a period of crisis and the value 0 if the year is before or after the period of crisis.	Determined by the author
The variable of interaction		
EQUITY*DENS	(Equity / total assets)*(Total deposits of the banking sector divided by area (Km2))	BCT/APBTEF/INS

This table describes variables used in the regressions of measure of the performance of the Tunisian banks

Appendix 3. Descriptive statistics

Variable	Observation	Mean	Std Div	Min	Max	Skewness	Kurtosis
ROA	191	0.0084782	0.0134486	-0.1035052	0.0291264	-6.089171	48.32474
NIM	191	0.029945	0.0094386	0.0076826	0.0463254	0.0524549	2.296645
EQUITY	191	0.1225794	0.0982091	-0.0109848	0.5304657	2.76308	10.16911
CREDIT_RISK	191	0.7586595	0.1303528	0.4428743	1.836772	3.542313	34.46982
LNSIZE	191	14.6233	0.7952168	12.38582	15.74801	-1.124028	4.117797
RESERVE_COST	191	0.0532478	0.0263164	0.0216398	0.1153496	0.2999967	2.301219
INF	191	0.0320769	0.0075657	0.021	0.046	0.6050117	2.195106
GDPCAP	191	0.0430077	0.0187005	-.008	0.063	-1.559959	4.82739
LAW	191	0.1516089	0.0141354	.1393336	0.1926339	1.667072	5.766362
COR	191	0.1790535	0.0251984	.1517317	0.2226904	0.8876297	2.204204
CONC	191	0.2115568	0.1137965	0.012945	0.5309004	0.3350812	2.698075
DENS	191	12.30847	8.044793	0.3095829	37.73382	0.867978	3.437589
MARKET_CAP	191	0.0148137	0.0154985	0.0007742	0.1314626	4.288313	27.65377
CREDIT_PRIVATE	191	0.1009451	0.0744224	0.0084108	0.3852206	1.658974	6.158506
CRISIS	191	0.3846154	0.4882143	0	1	0.4743416	1.225
EQUITY*DENS	191	1.122451	0.6713187	-.1082256	3.542804	0.8713604	3.301037

Appendix 4. Pearson Correlation Coefficients

	EQUITY	CREDIT_ RISK	LNSIZE	RESERVE_ COST	INF	GDPCAP	LAW	COR	CONC	DENS	MARKET_ CAP	CREDIT_ PRIVATE	CRISIS	EQUITY* DENS
EQUITY	1.0000													
CREDIT_RISK	0.1587 (0.0583)***	1.0000												
LNSIZE	-0.7447 (0.0000)*	0.0475 (0.5733)	1.0000											
RESERVE_COST	-0.0573 (0.4968)	-0.2409 (0.0037)*	-0.2304 (0.0056)*	1.0000										
INF	-0.1067 (0.2045)	0.1002 (0.2336)	0.3129 (0.0001)*	-0.4001 (0.0000)*	1.0000									
GDPCAP	0.0611 (0.4686)	-0.1408 (0.0935)***	-0.2694 (0.0011)*	0.2987 (0.0003)*	-0.1164 (0.1664)	1.0000								
LAW	0.1140 (0.1750)	-0.2328 (0.0051)*	-0.4179 (0.0000)*	0.5553 (0.0000)*	-0.4665 (0.0000)*	0.1064 (0.2059)*	1.0000							
COR	0.0865 (0.3046)	-0.1832 (0.0285)**	-0.3440 (0.0000)*	0.5102 (0.0000)*	-0.3462 (0.0000)*	0.0270 (0.7848)	0.7396 (0.0000)*	1.0000						
CONC	-0.5494 (0.0000)*	-0.0608 (0.4710)	0.7611 (0.0000)*	-0.0125 (0.8818)	0.1599 (0.0565)***	-0.0554 (0.5112)	-0.1046 (0.2139)	-0.0683 (0.4179)	1.0000					
DENS	-0.4924 (0.0000)*	0.0846 (0.3151)	0.7975 (0.0000)*	-0.3173 (0.0001)*	0.3485 (0.0000)*	-0.2587 (0.0018)*	-0.4686 (0.0000)*	-0.4031 (0.0000)*	0.8032 (0.0000)*	1.0000				
MARKET_CAP	-0.0972 (0.2481)	0.1047 (0.2135)	0.3560 (0.0000)*	-0.4136 (0.0000)*	0.3383 (0.0000)*	-0.3628 (0.0000)*	-0.3057 (0.0002)*	-0.2133 (0.0105)**	0.2377 (0.0043)*	0.4304 (0.0000)*	1.0000			
CREDIT_PRIVATE	-0.4046 (0.0000)*	0.1347 (0.1088)	0.6894 (0.0000)*	-0.3372 (0.0000)*	0.3006 (0.0003)*	-0.4451 (0.0000)*	-0.3220 (0.0001)*	-0.2173 (0.0091)*	0.7311 (0.0000)*	0.8256 (0.0000)*	0.5438 (0.0000)*	1.0000		
CRISIS	-0.1612 (0.0544)***	0.1673 (0.0459)**	0.4637 (0.0000)*	-0.5174 (0.0000)*	0.6630 (0.0000)*	-0.2379 (0.0042)*	-0.6889 (0.0000)	-0.5230 (0.0000)*	0.1680 (0.0448)**	0.5450 (0.0000)*	0.4484 (0.0000)*	0.3903 (0.0000)*	1.0000	
EQUITY*DENS	-0.2799 (0.0007)*	0.2876 (0.0005)*	0.6852 (0.0000)*	-0.3079 (0.0002)*	0.2826 (0.0006)*	-0.2146 (0.0101)**	-0.4152 (0.0000)*	-0.3651 (0.0000)*	0.7061 (0.0000)*	0.8735 (0.0000)*	0.4549 (0.0000)*	0.7156 (0.0000)*	0.4536 (0.0000)*	1.0000

Value significant in a threshold of: (*) 1 %; (**) 5 % and (***) 10 %.

Appendix 5. Skewness/Kurtosis tests for Normality

Variables	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
Residu1 (ROA)	191	0.1110	0.0050	9.05	0.0108
Residu2 (NIM)	191	0.1326	0.0191	7.08	0.0290

The probability of Chi2 are less than 5% then the residuals are normally distribution and we have in the absence of a problem heterosciedasticity.