

# **THE DETERMINANTS OF THE TUNISIAN BANKING INDUSTRY PROFITABILITY: PANEL EVIDENCE**

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## **ABSTRACT**

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This paper investigates the impact of bank's characteristics, financial structure and macroeconomic indicators on bank's net interest margins and profitability in the Tunisian banking industry for the 1980-2000 period.

First, individual bank characteristics explain a substantial part of the within-country variation in bank interest margins and net profitability. High net interest margin and profitability tend to be associated with banks that hold a relatively high amount of capital, and with large overheads. Other important internal determinants of bank's interest margins bank loans which have a positive and significant impact. The size has mostly negative and significant coefficients on the net interest margins. This latter result may simply reflect scale inefficiencies.

Second, the paper finds that the macro-economic indicators such inflation and growth rates have no impact on bank's interest margins and profitability.

Third, turning to financial structure and its impact on bank's interest margin and profitability, we find that concentration is less beneficial to the Tunisian commercial banks than competition. Stock market development has a positive effect on bank profitability. This reflects the complementarities between bank and stock market growth. We have found that the disintermediation of the Tunisian financial system is favourable to the banking sector profitability.

**Key words:** bank interest margin, bank profitability, panel data, Tunisia.

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## **I. Introduction**

Restructuring of the commercial banking system in Tunisia begun in 1987, and was intended to instil competition in the banking sector, mobilize savings and lead to a more efficient allocation of resources. Reforms were articulated around five axes: liberalization of interest rates and credit allocation, introduction of new indirect monetary policy,

strengthening prudential regulation, opening the financial sector to foreign financial institutions and promotion of the equity market. All these developments would certainly have implications on the interest margin and profitability of the Tunisian banking industry.

This research paper was initiated by a series of question: Why are some commercial banks more successful than others? To what extent are discrepancies in bank's profitability due to variation in endogenous factors under the control of bank management and to what extent, do external factors impact the financial performance of these banks? Answers to the questions would be helpful to identify the determinants of successful Tunisian commercial banks in order to formulate policies for improved profitability of these institutions.

This paper follows in the footsteps of Abreu and Mendes (2002), Demergüç-Kunt and Huizingha (1999) and Ben Naceur and Goaid (2001) among others. It extends the existing literature several ways.

First, using bank level data for Tunisia in the 1980-2000 period (Ben Naceur and Goaid, 2001 use only the 1980-1995 period), we provide statistics on size and decomposition of bank's interest margin and profitability. Second, the paper uses regression analysis (panel data with random effects) to find the underlying determinants of Tunisian banking industry performance. To this end, a comprehensive set of internal characteristics is included as determinants of bank's net interest margin and profitability. These internal factors include equity, overhead, and interest bearing assets. Third, while studying the impact of bank's characteristics on their performance, we include macroeconomic (inflation and growth) and financial structure indicators (bank and market size, and concentration) to control for the effect of external factors (not included in Ben Naceur and Goaid, 2001).

The remainder of the paper is organized as follows. A brief review of relevant literature is presented in section II. The empirical models we employ are described in section III, along with a description of the data used in the study.

## **II. The Determinants of Bank Performance: Literature Review**

Studies on the determinants of bank's interest margin and profitability have focused whether on a particular country (Berger, 1995; Guru et al., 2002; Barajas et al., 2001; Ben Naceur and Goaid, 2001) and on a panel of countries (Abreu and Mendes, 2002; Demergüç-Kunt and Huizingha, 1999).

## ***II.1 Single country studies***

As most of the studies on bank performance are conducted in the US and emerging markets, we will divide our presentation in two parts: US evidence and emerging market studies.

The empirical evidence in the US is due to Berger (1995), Neeley and Wheelock (1997) and Angbazo (1997). Berger (1995) examines the relationship between the return on equity and the capital asset ratio for a sample of US banks for the 1983-1992 time period. Using the Granger causality model, he shows that the return of equity and capital to asset ratio tend to be positively related. Neeley and Wheelock (1997) explore the profitability of a sample of insured commercial banks in the US for the 1980-1995 period. They find that bank performance is positively related to the annual percentage changes in the state's per capita income. Anghazo (1997) investigates the determinants of bank net interest margins for a sample of US banks for 1989-2003 period. The results for the pooled sample documents that default risk, the opportunity cost of non-interest bearing reserves, leverage and management efficiency are all positively associated with bank interest spread.

The main Studies on the determinants of bank's performance in emerging countries were carried out in Colombia (Barajas et al.,1999), Brasil (Afanasieff et al., 2002), Malaysia (Guru et al., 2002) and Tunisia (Ben Naceur and Goaid, 2001). Barajas et al. (1999) document significant effects of financial liberalization on bank's interest margins for the Colombian case. Although the overall spread has not declined after financial reform, the relevance of the different factors behind the bank spreads were affected by such measures. Another change linked with the liberalization process was the increase of the coefficient of loan quality after the liberalization. Afanasieff et al. (2002) make use of panel data techniques to uncover the main determinants of the bank interest spreads in Brazil. A two-step approach due to Ho and Saunders (1981) is used o measure the relative impact of the micro and macro factors. The results suggest that macroeconomic variables are the most relevant elements to explain bank interest spread in Brazil. Ben Naceur and Goaid (2001) investigate the determinants of the Tunisian bank's performances during the period 1980-1995. They indicates that the best performing banks are those who have struggled to improve labour and capital productivity, those who have maintained a high level of deposit accounts relative to their assets and finally, those who have been able to reinforce their equity. Guru et al. (2002) attempt to identify the determinants of successful deposit banks in order to provide practical guides for improved profitability performance of these institutions. The study is based on a sample of seventeen

Malaysian commercial banks over the 1986-1995 period. The profitability determinants were divided in two main categories, namely the internal determinants (liquidity, capital adequacy and expenses management) and the external determinants (ownership, firm size and external economic conditions). The findings of this study revealed that efficient expenses management was one of the most significant in explaining high bank profitability. Among the macro-indicators, high interest ratio was associated with low bank profitability and inflation was found to have a positive effect on bank performance.

## ***II.2 Panel country studies***

The panel country studies were focused on European companies (Molyneux and Thornton, 1992; Abreu and Mendes, 2002), MENA countries (Bashir, 2000), and developed and developing countries (Demergüç-Kunt and Huizingha 1999, 2001).

Molyneux and Thornton (1992) were the first to explore thoroughly the determinants of bank profitability on a set of countries. They use a sample of 18 European countries during the 1986-1989 period. They find a significant positive association between the return on equity and the level of interest rates in each country, bank concentration and government ownership. Abreu and Mendes (2002) investigate the determinants of bank's interest margins and profitability for some European countries in the last decade. They report that well capitalized-banks face lower expected bankruptcy costs and this advantage "translate" into better profitability. Although with a negative sign in all regressions, the unemployment rate is relevant in explaining bank profitability. The inflation rate is also relevant.

Bashir (2000) examines the determinants of Islamic bank's performance across eight Middle Eastern countries for 1993-1998 period. A number of internal and external factor were used to predict profitability and efficiencies. Controlling for macroeconomic environment, financial market situation and taxation, the results show that higher leverage and large loans to asset ratios, lead to higher profitability. The paper also reports that foreign-owned banks are more profitable than the domestic one. There is also evidence that taxation impacts negatively bank profitability. Finally, macroeconomic setting and stock market development have a positive impact on profitability.

In a comprehensive study Demergüç-Kunt and Huizingha (1999) examine the determinants of bank interest margins and profitability using a bank level data for 80 countries in the 1988-

1995 period. The set of variables includes several factors accounting for bank characteristics, macroeconomic conditions, taxation, regulations, financial structure and legal indicators. They report that a larger ratio of bank assets to GDP and a lower market concentration ratio lead to lower margins and profits. Foreign banks have higher margins and profits than domestic banks on developing countries, while the opposite prevail in developed countries. On an another linked paper, Demerguç-Kunt and Huizingha (2001) present evidence on the impact of financial development and structure on bank profitability using bank level data for a large number of developed and developing countries over the 1990-1997 period. The paper finds that financial development has a very important impact on bank performance. Specifically, the paper reports that higher bank development is related to lower bank performance (Tougher competition explains the decrease of profitability). Stock market development on the other hand, leads to increased profits and margins for banks especially at lower levels of financial development, indicating complementarities between bank and stock-market.

### **III. Empirical methodology and sample data**

#### ***III.1 Data sources and variable definition***

The data used in the empirical work were extracted from the Central bank data base. The sample include the main deposit banks in Tunisia (10 banks) over the period 1980-2000. As all the banks in our sample are observed in the entire period, we will use in our empirical work balanced panel data.

The empirical test is concerned with the determinants of interest margin and profitability of the Tunisian deposit banks. We use capital ratio, overhead, loan and liquidity ratios as proxies for internal indicators. Meanwhile macro-economic measures and financial structure indicators are used as external factors. A linear equation relating the performance measures to a variety of factors is displayed in equation 1:

$$\text{Per}_{ij,t} = f(\text{BC}_{ij,t} + M_t + \text{FS}_t) \quad (1)$$

Where:  $\text{Per}_{ij,t}$  represents two alternative performance measures for the firm  $j$  during the period  $t$ ;  $\text{BC}_{ij,t}$  are bank variables for bank  $j$  at time  $t$ ;  $M_t$  are macro-economic variables;  $\text{FS}_t$  are measures of financial structure indicators.

Although the primary focus of this paper is the relationship between net interest margins and profitability, and bank's characteristics indicators, the inclusion of macro-economic variables and financial structure indicators is intended to control for cyclical factors that might impact bank profitability in Tunisia.

Two measures of performance are used in the study: the net interest margin (NIM) and the return of assets (ROA). The NIM variable is defined as the net interest income divided by total assets. ROA is a ratio computed by dividing the net income over total assets. NIM and ROA have been used in most banks' performance studies. ROA measures the profit earned per dollar of assets and reflect how well bank management use the bank's real investments resources to generate profits while NIM is focused on the profit earned on interest activities.

Five bank's characteristics indicators are used as internal determinants of performance. They comprise the ratio of overhead to total assets (OVERHEAD), the ratio of equity capital to total assets (CAP), the ratio of bank's loans to total assets (BLOAN), the ratio of non-interest bearing assets to total assets (NIBA) and the log of bank assets (LNSIZE).

The ratio of overhead to total assets is used to provide information on variation in bank costs over the banking system. It reflects employment as well as the total amount of wages and salaries. OVERHEAD is expected to have a negative impact on performance because efficient banks are expected to operate at lower costs.

Bank loans are expected to be the main source of income and are expected to have a positive impact on bank performance. Other things constant, the more deposits are transformed into loans, the higher the interest margin and profits. However, if a bank needs to increase risk to have a higher loan-to-asset ratio, then profits may decrease. In addition, as bank loans are the principal source of income, we expect that non interest bearing assets impact negatively on profits.

We also expect that the higher equity-to-asset ratio, the lower the need to external funding and therefore higher profitability. It also a sigh that well capitalized bank face lower costs of going bankrupt and then cost of funding is reduced.

The size of the bank is also included as an independent variable to account for size related economies and diseconomies of scale. In most of the finance literature, the total assets of the banks are used as a proxy for bank size. However, since the other dependent variables in the

models such as ROA were deflated by total assets it would be appropriate to log total assets before including it in the models.

To isolate the effects of bank's characteristics on performance, it is necessary to control for other factors that have been used as determinants of bank profitability. Two sets of control variables are expected to influence banks' performance: the macro-economic and the financial structure indicators.

Two macro-economic variables are used: inflation (INF) and GDP per capita growth (GROWTH). 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 are not anticipated and banks are sluggish in adjusting their interest rates then there is a possibility that bank costs may increase faster than bank revenues and hence adversely affect bank profitability. The GDP per capital growth 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.

We also examine how the performance of the banking sector is related to the relative development of the banks and stock markets. Relative size (RSIZE) is calculated as the ratio of the stock market capitalization to total assets of deposit money banks. In addition, we use stock market capitalization divided by GDP (MCAP) as a proxy of financial market development and as a measure of the size of the equity market. The size of the banking sector (SBS) is measured by the ratio of total assets of the deposit banks to GDP and is intended to measure the importance of bank financing in the economy. MCAP and SBS may also indicate the complementarities or substitutability between bank and equity market financing. Both variables are expected to influence positively bank performance. Bank concentration (CONC) equals the fraction of bank assets held by the three largest commercial banks in the country. Most of the evidence on bank structure and performance is devoted to the US banking industry, providing generally conflicting results. Some evidence indicates that banks in highly concentrated local markets charge higher rates on loans, pay lower rates on deposits, and are slower to reduce rates in response to Federal Reserve decrease in interest rates than banks in less concentrated markets. Alternatively, Smirlock (1985) finds that interest rate spreads are narrower in concentrated banking industry, while Keeley and Zimmerman (1985) find more mixed evidence. Berger (1995) concludes that the relationship between bank concentration and performance in the US depend critically on what other factors are held constant.

### III.2 Econometric modeling

In this study, fixed effects as well as random effects models are considered. The fixed effects model is simpler to conduct and is defined according to the following regression model:

$$(1) \quad y_{it} = \alpha_i + \beta'X_{it} + \varepsilon_{it} \quad i = 1, \dots, N; t = 1, \dots, T_i$$

$y_{it}$  indicates the dependent variables while  $X_{it}$  determines the vector of  $k$  explanatory variables.  $\alpha_i, i = 1, \dots, N$ , are constant coefficients specific to each country. Their presence assumes that differences across the considered banks appear by means of differences in the constant term. These individual coefficients are estimated together with the vector of coefficients  $\beta$ .

In order to validate the fixed effects specification, the question is to prove, according to the empirical application, that the individual coefficients  $\alpha_i, i = 1, \dots, N$ , are not all equal. This corresponds to the following joint null hypothesis:

$$(2) \quad H_0 : \alpha_1 = \dots = \alpha_N = \alpha$$

It is rather the acceptance of the alternative hypothesis which is interesting if we want to differentiate between the situations in each bank considered in the sample and confirm the existence of significant heterogeneity across banks. The appropriate statistic of the test is a Fisher distributed one with  $\left( N-1, \sum_{i=1}^N T_i - N - k \right)$  degrees of freedom under the null hypothesis and is defined as follows:

$$(3) \quad F = \frac{SSR_0 - SSR_1}{SSR_1} \frac{\sum_{i=1}^N T_i - N - k}{N - 1}$$

where  $SSR_0$  and  $SSR_1$  are, respectively, the sum of squared residuals provided by the estimation of the constrained model (under the null hypothesis that is no individual specific coefficients are considered) and the sum of squared residuals relative to the fixed effects model (equation (1)).



In the random effects case, the model is defined as follows:

$$(4) \quad y_{it} = \beta' X_{it} + \varepsilon_{it} \quad i = 1, \dots, N; t = 1, \dots, T_i$$

where  $\varepsilon_{it} = \mu_i + v_{it}$  reflect the error component disturbances. The individual specific effects are random and distributed normally ( $\mu_i \rightarrow \text{IIN}(0, \sigma_\mu^2)$ ). They are independent of the residual terms  $v_{it}$  which are also distributed normally ( $v_{it} \rightarrow \text{IIN}(0, \sigma_v^2)$ ). The estimation of the model is conducted by the feasible generalized least squares method. First, convergent estimates of the variances  $\sigma_\mu^2$  and  $\sigma_v^2$  are needed. They are obtained by the following formulae:

$$(5) \quad \hat{\sigma}_v^2 = \frac{\sum_{i=1}^N \sum_{t=1}^{T_i} (\hat{v}_{it} - \hat{v}_i)^2}{\sum_{i=1}^N T_i - N - k}$$

$$(6) \quad \hat{\sigma}_\mu^2 = \frac{1}{N - k} \sum_{i=1}^N \left( \left( \bar{y}_i - \hat{\beta}_b' \bar{X}_i \right)^2 - \frac{1}{T_i} \hat{\sigma}_v^2 \right)$$

$\hat{v}_{it}$  are the residuals issued from the estimation of the fixed effects model (equation (1)) and  $\hat{v}_i$  are individual means of these residuals over each time period relative to each bank. Next, the first term in equation (6) indicates the residuals issued from the estimation of the unit means regression where  $\hat{\beta}_b^i$  are called the between estimators.

The second stage consists in the estimation by ordinary least squares of the following transformed regression model:

$$(7) \quad y_{it} + \left( \sqrt{\hat{\theta}_i} - 1 \right) y_i = \beta' \left( X_{it} + \left( \sqrt{\hat{\theta}_i} - 1 \right) X_i \right) + \varepsilon_{it} + \left( \sqrt{\hat{\theta}_i} - 1 \right) \varepsilon_i$$

with:

$$(8) \quad \hat{\theta}_i = \frac{\hat{\sigma}_v^2}{\hat{\sigma}_v^2 + T_i \hat{\sigma}_\mu^2} \quad i = 1, \dots, N$$

Finally, a Hausman specification test is conducted in order to compare the two categories of specifications. It is proven that, under the null hypothesis, the two estimates

(equations (1) and (7)) could not differ systematically since they are both consistent. So, the test can be based on the difference. Under the null hypothesis, the Hausman statistic is asymptotically distributed as chi-square with k degrees of freedom and is written down as follows:

$$(9) \quad H = (\hat{\beta}_{GLS} - \hat{\beta}_F)' (\hat{V}(\hat{\beta}_F) - \hat{V}(\hat{\beta}_{GLS}))^{-1} (\hat{\beta}_{GLS} - \hat{\beta}_F)$$

where  $\hat{\beta}_F$  and  $\hat{\beta}_{GLS}$  are, respectively, the estimates of the fixed effects and random effects models.  $\hat{V}(\cdot)$  are the corresponding variance-covariance matrices of these estimated coefficients.

#### IV. Empirical findings

This section provides empirical evidence on the determinants of bank interest margins and profitability in the Tunisian Banking industry. A broad description of the characteristics of the variables used in the study is given in table 1 which reports their statistical means and standard deviation. Next, we report the results of regression of the net interest margin and return on asset variables, respectively. The tables include several specifications, with the basic specification including a set of bank characteristic variables. Subsequently, we add the macroeconomic variables and the financial structure variables. The estimation technique is the balanced panel data regressions.

**<INSERT TB 1 HERE>**

The first bank-level variable is the equity variable (CAP). Buser et al. (1981) argue in theory that banks generally have an optimal capitalization ratio and need to remain well-capitalized when they have a high franchise value. Berger (1995) and Dermerguç-Kunt and Huizingua (1999) find a positive relationship between bank performance and capitalization. Consistent with the previous evidence, we confirm the positive relationship whether we use interest margin or return on assets as a dependant variable and in all specifications. This may indicate that well-capitalized banks support lower expected bankruptcy costs for themselves and their costumers, which reduce their cost of capital.

Next, there is a positive and significant coefficient on the overhead to assets ratio variable (OVERHEAD) in the net interest margin and return on assets equations. The overhead variable has an estimated coefficient of 0.878 in the net interest equation, which suggest that 87.8% of a bank's overhead costs is passed on its depositors and lenders (in terms of lower deposit rates and/or higher lending rates).

In all net interest margin equation specifications, we see that the coefficient on bank loans (BLOAN) is positive and significant. This notably reflects that bank loans are interest-paying contrary to the cash, thereby increasing net interest margin. Conversely, non-interest bearing assets (NIBA) has no significant impact on net interest margin and return on assets, proving that bank profitability stems mainly from interest bearing assets.

Many researchers find that little cost saving can be achieved by increasing the size of the banking firm (Berger et al., 1987) and others report significant scale economies for banks whose asset size extends well into the billion range (Shaffer, 1985 and many others). In table 2, the size variable (LNSIZE) has mostly negative and significant coefficients on the net interest margins equations. This suggests that larger banks tend to lower margins and is consistent with models that emphasize the negative role of size arising from scale inefficiencies.

The macroeconomic indicators (i.e. inflation and economic growth) included in column 2, 3 and 4 of table 2 and 3 are insignificant in both spread and profit regressions. This may suggest that banks tend to not profit in inflationary environment. In addition, economic growth does not reflect any aspects of banking regulations and technology advance in the banking sector omitted from the regressions.

In table 2 and 3 we include two sets of financial market or structure variables. The first set, include the market concentration ratio and the second, financial structure variables in the sense that they measure the importance of bank and stock market finance and the financial development. These variables among other things may reflect any complementary or substitutability between bank and stock markets.

Turning to market concentration, we see that the concentration ratio has a negative and significant impact only on net interest margin. This result means that concentration is less beneficial in terms of profitability to the Tunisian commercial banks than competition.

The second set of financial structure variables has a more significant impact on bank profit as opposed to bank margins. According to Dermereuc-Kunt and Huizingua (1999), this may indicate that these variables have a smaller incidence on banks' loan and deposit costumers compared to the other clients.

The stock market capitalization to GDP ratio enters the return on assets equation positively, which suggest that a larger equity market per se gives banks the opportunity to increase their profitability. This may be due to the complementarity's effect between equity and debt funding. As stock markets enlarge, improved information availability increase the potential number of customers to banks by easing the identification and monitoring of borrowers. The increase of bank activity contributes to enhance profitability. In addition, the stock market capitalization to banking assets ratio (RSIZE) enters the return on equity equation positively, which suggest that a larger stock market relative to the banking sector increase bank profits and confirm the complementarity's effect. All the above results on financial structure mean that the move of the Tunisian financial system towards a more market based financial structure is profitable to the banking industry.

<INSERT TB 2 AND 3 HERE>

## **V. Conclusion**

This paper investigates the impact of bank's characteristics, financial structure and macroeconomic indicators on bank's net interest margins and profitability in the Tunisian banking industry for the 1980-2000 period.

First, individual bank characteristics explain a substantial part of the within-country variation in bank interest margins and net profitability. High net interest margin and profitability tend to be associated with banks that hold a relatively high amount of capital, and with large overheads. Other important internal determinants of bank's interest margins bank loans which have a positive and significant impact. The size has mostly negative and significant coefficients on the net interest margins. This latter result may simply reflect scale inefficiencies.

Second, the paper finds that the macro-economic indicators such inflation and growth rates have no impact on bank's interest margins and profitability.

Third, turning to financial structure and its impact on bank's interest margin and profitability, we find that concentration is less beneficial to the Tunisian commercial banks than competition. Stock market development has a positive effect on bank profitability. This reflects the complementarities between bank and stock market growth. We have found that the disintermediation of the Tunisian financial system is favourable to the banking sector profitability.

As a matter of policy implications, we need to draw several proposals at the bank and nation levels:

- At the bank level, the improvement of the profitability of Tunisian commercial banks need to be conducted by a reinforcement of the capitalization of banks through national regulation programs, by reducing the proportion of non-interest bearing assets to the benefit of bank loans and by reducing the size of large banks to optimal levels.
- At the nation level, we need to reduce concentration and spur competition, and to boost the development of the equity market in order to improve bank's profitability as bank and stock market was found to be complementary.

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**Table 1. Descriptive statistics of variables**

| <b>Variable name</b> | <b>Mean</b> | <b>Minimum</b> | <b>Maximum</b> | <b>Standard deviation</b> |
|----------------------|-------------|----------------|----------------|---------------------------|
| NIM                  | 0.022       | -0.004         | 0.048          | 0.008                     |
| ROA                  | 0.006       | -0.001         | 0.035          | 0.004                     |
| CAP                  | 0.056       | 0.012          | 0.146          | 0.026                     |
| BLOAN                | 0.683       | 0.392          | 0.965          | 0.124                     |
| NIBA                 | 0.198       | 0.029          | 0.527          | 0.083                     |
| OVERHEAD             | 0.018       | 0.008          | 0.029          | 0.005                     |
| GROWTH               | 4.323       | -2             | 7.8            | 2.522                     |
| INF                  | 6.605       | 2.7            | 14             | 2.755                     |
| SBS                  | 0.779       | 0.629          | 0.854          | 0.064                     |
| MCAP                 | 0.068       | 0.001          | 0.233          | 0.709                     |
| RSIZE                | 0.091       | 0.002          | 0.306          | 0.097                     |
| CONC                 | 0.536       | 0.449          | 0.575          | 0.035                     |

**Table 2. Determinants of Tunisian deposit banks' Net Interest Margins**

| Regressions                                    | (1)                 | (2)                 | (3)                   | (4)                   |
|------------------------------------------------|---------------------|---------------------|-----------------------|-----------------------|
| Constant                                       | 0.006<br>(0.797)    | 0.001<br>(0.045)    | 0.074***<br>(4.725)   | 0.072***<br>(4.884)   |
| CAP                                            | 0.080***<br>(4.059) | 0.075***<br>(3.792) | 0.033*<br>(1.647)     | 0.034*<br>(1.71)      |
| BLOAN                                          | 0.021***<br>(3.342) | 0.021***<br>(3.396) | 0.019***<br>(3.095)   | 0.021***<br>(3.399)   |
| NIBA                                           | -0.002<br>(-0.267)  | -0.001<br>(-0.096)  | 0.003<br>(0.416)      | 0.005<br>(0.660)      |
| OVERHEAD                                       | 0.878***<br>(8.140) | 0.848***<br>(7.557) | 0.743***<br>(6.792)   | 0.728***<br>(6.711)   |
| LNSIZE                                         | -0.001<br>(-1.253)  | -0.001*<br>(-1.742) | -0.03***<br>(-3.096)  | -0.003***<br>(-3.224) |
| INF                                            |                     | -0.001<br>(-1.087)  | 0.001<br>(1.087)      | 0.001<br>(1.317)      |
| GROWTH                                         |                     | 0.001<br>(0.701)    | 0.001<br>(0.279)      | 0.001<br>(0.466)      |
| CONC                                           |                     |                     | -0.121***<br>(-5.446) | -0.113***<br>(-6.051) |
| RSIZE                                          |                     |                     |                       | 0.001<br>(0.253)      |
| SBS                                            |                     |                     | 0.005<br>(0.598)      |                       |
| MCAP                                           |                     |                     | 0.001<br>(0.089)      |                       |
| Nb. observations                               | 210                 | 210                 | 210                   | 210                   |
| Adj R <sup>2</sup>                             | 0.33                | 0.34                | 0.43                  | 0.43                  |
| <b>Haussman test : Random vs Fixed effects</b> |                     |                     |                       |                       |
| $\chi^2$                                       | -1.36               | 1.17                | 0.69                  | 0.73                  |
| P-values                                       | 0.9284              | 0.9916              | 1                     | 0.998                 |

T-Student are in parentheses.

\*, \*\* and \*\*\* indicate significance levels of 10, 5 and 1 percent respectively.



**Table 3. Determinants of Tunisian deposit banks' Return on Assets**

| Regressions                                    | (1)                 | (2)                 | (3)                 | (4)                 |
|------------------------------------------------|---------------------|---------------------|---------------------|---------------------|
| Constant                                       | -0.008*<br>(-1.836) | -0.002<br>(-0.411)  | 0.017*<br>(1.745)   | 0.013<br>(1.467)    |
| CAP                                            | 0.055***<br>(4.596) | 0.049***<br>(4.178) | 0.031**<br>(2.373)  | 0.033**<br>(2.514)  |
| BLOAN                                          | 0.002<br>(0.506)    | 0.003<br>(0.721)    | 0.001<br>(0.045)    | 0.001<br>(0.228)    |
| NIBA                                           | -0.001<br>(-0.155)  | 0.001<br>(0.093)    | -0.026<br>(-0.493)  | -0.001<br>(-0.237)  |
| OVERHEAD                                       | 0.224***<br>(3.383) | 0.194***<br>(2.841) | 0.136*<br>(1.927)   | 0.128*<br>(1.822)   |
| LNSIZE                                         | 0.001**<br>(2.335)  | 0.001<br>(0.507)    | -0.001<br>(-1.161)  | -0.001<br>(-0.972)  |
| INF                                            |                     | -0.001*<br>(-1.706) | -0.001<br>(-0.865)  | -0.001<br>(-0.780)  |
| GROWTH                                         |                     | 0.001<br>(1.397)    | 0.001<br>(1.149)    | 0.001<br>(1.289)    |
| CONC                                           |                     |                     | -0.023<br>(-1.593)  | -0.015<br>(-1.227)  |
| RSIZE                                          |                     |                     |                     | 0.011***<br>(2.764) |
| SBS                                            |                     |                     | 0.003<br>(0.624)    |                     |
| MCAP                                           |                     |                     | 0.014***<br>(2.782) |                     |
| Nb. observations                               | 210                 | 210                 | 210                 | 210                 |
| Adj R <sup>2</sup>                             | 0.29                | 0.34                | 0.41                | 0.40                |
| <b>Haussman test : Random vs Fixed effects</b> |                     |                     |                     |                     |
| $\chi^2$                                       | 6.57                | 3.73                | 1.63                | 1.85                |
| P-values                                       | 0.2544              | 0.8105              | 0.9985              | 0.9936              |

T-Student are in parentheses.

\*, \*\* and \*\*\* indicate significance levels of 10, 5 and 1 percent respectively.