

The Determinants of Commercial Bank Interest Margin and Profitability: Evidence from Tunisia

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Abstract

This paper investigates the impact of banks' characteristics, financial structure and macroeconomic indicators on banks' net interest margins and profitability in the Tunisian banking industry for the 1980-2000 period. 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. Size is found to impact negatively on profitability which implies that Tunisian banks are operating above their optimum level. On the other hand, we found that macroeconomic variables have no impact on Tunisian bank's profitability. Turning to financial structure and its impact on banks' interest margin and profitability, we find that 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. On the ownership side, we reach the conclusion that private banks tend to perform better than state owned ones. Finally, interest rate liberalization has contrasting effect on net interest margins. In fact, partial liberalization has a negative impact on the interest margin whereas complete liberalization strengthens the ability of Tunisian banks to generate profit margins.

Keywords: bank interest margin, bank profitability, panel data, Tunisia.

JEL Classification : G18, G21; O16

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1 - Introduction

Restructuring of the commercial banking system in Tunisia began in 1987, and was intended to enhance 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. It is reasonable to assume that all of the above changes pose great challenges to Tunisian Banks as the environment in which they operate has changed rapidly.

This research paper was initiated by a series of questions: Why are some commercial banks more successful than others? To what extent are discrepancies in banks' 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 these 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 Demergüç-Kunt and Huizinga (2001) and Demergüç-Kunt et al. (2004) 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, profitability measures and ignore macroeconomic indicators), we provide statistics on size and decomposition of banks' interest margin and profitability. Second, the paper uses panel data regression analysis³ to find the underlying determinants of Tunisian banking industry performance. To this end, a

³ Two empirical models are considered: fixed effect models and random effect models. Ben Naceur and Goaid (2001) use only the fixed effect models.

comprehensive set of internal characteristics is included as determinants of banks' net interest margin and profitability. These internal factors include equity, overhead, and interest bearing assets. Third, while studying the impact of banks' 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 Goaied, 2001). In other words, the paper will test some hypotheses pertaining to the financial reform that affected the profitability of the Tunisian banking sector such as the increase of concentration, the development of the stock market and economic growth using the methodology described in Demergüç-Kunt and Huizingha (2001), Demergüç-Kunt et al. (2004) and Allen et al. (2004).

The remainder of the paper is organized as follows. A brief review of the relevant literature is presented in section 2. The Tunisian banking sector is described in section 3. Section 3 presents the hypotheses to be tested, drawing on the literature review and the Tunisian banking evolution. The empirical models we employ are described in section 4, along with a description of the data used in the study. Section 5 concludes our study.

2 - Related Literature

A number of studies have examined the determinants of banks' interest margin and profitability in many countries around the world. Most of the studies consider internal factors (i.e., bank's specific characteristics) and external factors (i.e., financial industry and economic environment) and examine either a particular country or a number of countries. In this literature review we will focus on Tunisia and MENA countries but also on Demergüç-Kunt and Huizingha (2001) and Demergüç-Kunt et al. (2004) papers which constitute our sources of inspiration for the methodology used in this study.

Single countries studies such as Ben Naceur and Goaied (2001) investigate the determinants of the Tunisian banks' performances during the period 1980-1995. They indicate that the best performing

banks are those who have successfully improved 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. Following both the dealership model and the micro-model, Ben-Khediri et al. (2005) implement both parametric and non-parametric tests and panel data analysis to investigate a variety of determinants in Tunisia: the bank-specific, the regulatory and the macroeconomic component. Results seem to show that the more profitable banks are those with lower operating costs, greater size of operations and higher leverage ratio. Furthermore, it indicates that bank specific- variables and regulatory changes are the most relevant factors in explaining Tunisian banks' interest differential. Finally, macroeconomic variables do not seem to influence the bank margins.

In other single country studies, Barajas et al. (1999) document significant effects of financial liberalization on banks' 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. Afanasieff et al. (2002) make use of panel data techniques to uncover the main determinants of the bank interest spreads in Brazil. The results suggest that macroeconomic variables are the most relevant elements to explain bank interest spread in Brazil. Guru et al. (2002) attempt to identify the determinants of successful deposit banks in Malaysia. 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.

In a comprehensive study, Demerguç-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 in developing countries, while the opposite prevails in developed countries. In another related paper, Demergüç-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. In the same vein, Demergüç-Kunt et al. (2004) investigates the impact on bank regulations, concentration, and institutions on bank net interest margins and overhead expenditures using bank level data across 72 countries while controlling for a large array of macroeconomic, financial, and bank specific characteristics. In brief, four findings should be emphasized. First, individual bank characteristics explain a substantial part of the within-country variation in financial intermediary costs. Second, bank regulations help explain the cost of financial intermediation. Tighter regulations on bank entry, restrictions on bank activities, and regulations that inhibit the freedom of bankers impact favourably on bank net interest margins. Third, the evidence on the relationship between concentration and net interest margins is mixed, which is unsurprising given the conflicting predictions from theory. In a panel country setting and based on Demergüç-Kunt and Huizingha (1999), Hassan and Bashir (2003) examine the determinants of Islamic banks' performance across eight Middle Eastern countries for 1993-1998 period. A number of internal and external factors 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 ones. There

is also evidence that taxation impacts negatively bank profitability. Finally, macroeconomic setting and stock market development have a positive impact on profitability.

3 - The Tunisian banking sector: An overview

The commercial banks (14 institutions) dominate the financial sector with 64 percent of total assets of financial institutions, and the state-controlled banks dominate the banking sector (the state controls the three largest banks and more than half the banking system's asset). These banks are allowed to collect deposits of any maturity, provide short-and-medium-term credit and may engage in long-term credit operations. The extension of their networks gives them an operational advantage with respect to development banks. The development banks (6 institutions) represent only 4 percent of total financial assets and suffer from high levels of Non Performing Loans (NPL)⁴. They are joint ventures between the Tunisian government and governments of other Arab states. The initial mission was to finance investment projects over the medium and long term and to participate in the capital of private firms. Their importance in the financial sector decreased gradually because of the wider scope of activity permitted to commercial banks by the 1994 amendments to the banking law (commercial banks are allowed to grant medium-and-long-term credits) and the development of non bank financial markets (the increase in the activity of the stock exchange after the 1994 reform). Offshore banks (8 institutions) represent less than 5 percent of total assets of financial institutions and were initially created to provide financial services to offshore companies. They also extend limited loans in foreign currency to Tunisian residents and their ability to raise deposits from residents is strictly limited. The security market is still small relative to the banking industry and constitutes only a small portion of financial system's

⁴ BDET and BNDT, two Tunisian development banks, have merged in 2000 with the commercial bank STB (See the list of the ten commercial banks, which constitute the individual cross-sectional units in the sample with the corresponding abbreviation (French initials) in the appendix).

assets. The number of firms listed on the Tunisian Stock Exchange (TSE) increased from 13 to 44 between 1990 and 2002. Despite a sharp increase of volume in trading and capitalization, in 2000, market capitalization represented only 14 percent of GDP and the annual value of trading amounted to 4 percent of GDP, which is very small, compared to other emerging markets. Moreover, the bond market is dominated by government securities, which represent over 85 percent of outstanding bond instruments and the secondary market is in its infancy. The other main bond issuers are banks and leasing companies. Finally, non-bank financial institutions (insurance companies, pension funds, collective investment institutions and investment companies) play a relatively small role in the Tunisian economy. Their assets represent only 22 percent of GDP.

Table 1 Structure of the financial system in 2000

Type of institution	Assets in millions of DT	% in total assets	Nbr.of institutions	As a % of GDP
Commercial banks	19612.5	63.6	14	72.8
Development banks	1118.6	3.6	6	4.2
Offshore banks	1429.6	4.6	8	5.3
CCP	1000	3.2	1	3.7
CENT	800	2.6	1	3.0
Leasing	860.7	2.8	9	3.2
Factoring	29.7	0.1	2	0.1
SICAV	1398	4.5	28	5.2
SICAF	469	1.6	85	1.7
SICAR	207	0.9	26	0.8
Insurance companies	1300	4.2	16	4.8
Brokerage houses	n.a	n.a	26	n.a
Pension funds	2500	8.1	2	9.3
Total	30819.1	100	366	114,5

Source: IMF [2002].

On the whole, while significant progress has been realised during the 1990's to reform the financial sector, residual weakness will need to be tackled before fully liberalizing the capital account. According to the IMF [2002], the authorities need to implement several measures in order to strengthen the financial sector. The most important factors are reducing the extent of state-ownership in the banking sector and removing obstacles to the establishment of foreign financial institutions, undertaking a review of provisioning policies by encouraging a better provisioning through removing limits on tax deductibility which can be facilitated by the current level of profitability, strengthening the supervisory frameworks through expanded training and the promotion of greater functional independence, conducting a study aimed at implementing a deposit insurance mechanism, accepting any government and private commercial papers that satisfy minimum credit worthiness criteria as collateral for the Central Bank refinancing operations, and by accepting a firm commitment to market funding of the fiscal deficit.

Table 2 Some statistics on the Tunisian banks in 2000

Banks	Market Capitalization in millions of DT	Ownership	Foreign Ownership in %	Specialisation
AB	134.2	Private	0	No
ATB	101.5	Private	64.24	No
BH	172.5	State	0	Real estate
BIAT	224	Private	0.21	No
BNA	149	State	0	Agriculture
BS	160.8	State	13.43	No
BT	234.5	Private	17.91	No
STB	197.8	State	3.74	No
UBCI	231	Private	50	No
UIB	83.3	State	0	No

The Tunisian listed commercial banks are the biggest companies in the TSE. Nine out of the ten biggest firms in the TSE come from the banking industry. Besides, fifty percent of the banks are state-owned and only two have significant foreign participation in capital (ATB and UBCI). Only two banks are specialised (BNA in agriculture and BH in real estate). Comparing the Banking sector to other sectors in the TSE, some comments must be made. First, the banking sector is one of the most represented sectors in the TSE (ten of fourteen banks are listed in the TSE). Second, banks are one of the least liquid sectors in the TSE (the turnover rate⁵ is 7.17 percent in the banking sector compared to the 21.53 percent average rate in the TSE in 2001). Third, banks represent fifty percent of the total market capitalisation and more than twenty percent of the number of listed companies in the TSE in 2000.

4 - Hypothesis Testing

Drawing on the literature review and the overview of the Tunisian banking sector, one could draw some general hypotheses extracted from the banking literature and others pertaining to the development of the banking sector in Tunisia.

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.

H1: All else equal, we expect that firms with greater overhead will have poorer performance measured by net-interest and profitability ratios.

Bank loans (BLOAN) are expected to be the main source of income and are expected to have a positive impact on bank performance. Assuming no change in other factors, 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

⁵ The turnover rate is computed as the ratio of exchanged capital over total market capitalisation.

ratio, then profits may decrease. In addition, as bank loans are the principal source of income, we expect that non-interest bearing assets (NIBA) to impact negatively on profits.

H2: All else equal, we expect that non-interest bearing assets will be negatively related to bank's interest margin and profitability.

H3: Alternatively, we expect that bank loans will be positively related to bank's efficiency and profitability.

To isolate the effects of banks' characteristics on performance, it is necessary to control for other factors that have been used as determinants of bank profitability. We investigate two types of reforms in Tunisia that could have affected the Tunisian banking sector performance: macro-reforms and financial reforms.

Real GDP per capita growth (GROWTH) has been used to account for economic reforms. The GDP per capita growth is expected to have a positive impact on banks' performance according to the well-documented literature on the association between economic growth and financial sector performance.

H4: All else equal, we expect that economic growth will have a positive impact on bank's interest margin and profitability.

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.

H5: All else equal, we expect that stock market development will have a negative impact on bank's interest margin and profitability in case of substitutability between banks and the stock market.

Alternatively, we expect, in the case of complementarities between bank and equity market, a positive impact.

H6: All else equal, we expect that the size of the banking sector will have a positive incidence on bank's interest margin and profitability.

During the past few years, Tunisian banks tried to strengthen their position in the domestic market and acquire a size, partly through M&As, that should exploit economies of scale and have easier access to international financial markets. 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 a decrease in the interest rate by the Fed, compared to banks in less concentrated markets. Alternatively, Smirlock (1985) finds that interest rate spreads are narrower in concentrated banking industry. Berger (1995) concludes that the relationship between bank concentration and performance in the US depend critically on what other factors are held constant. Other researchers (Bourke (1989). and Molyneux and Thornton (1992)) argue instead that increased concentration is not the result of managerial efficiency, but rather reflects increasing deviations from competitive market structures, which lead to monopolistic profits. Consequently, concentration should be positively related to bank profitability.

H7: All else equal, we expect that the banking sector concentration will have a positive effect on bank's interest margin and profitability.

The Tunisian authorities have, in the meantime, implemented several measures in order to strengthen the banking sector. The most important are those who could have impacted on bank's performance, namely the reduction of the extent of state-ownership in the banking sector, the removal of obstacles to the establishment of foreign financial institutions, the strengthening of the supervisory framework and the liberalization of interest rates.

A rather interesting issue is whether the ownership status of a bank is related to its profitability. However, little evidence is found to support the theory that privately-owned institutions will return relatively higher economic profits. In their recent work Barth et al. (2004) claim that government ownership of banks is negatively related to bank efficiency. In contrast, Bourke (1989) and Moulineux and Thornton (1992), report that ownership type is irrelevant for explaining profitability. To test this hypothesis, we follow the literature's suggestion by using a dummy variable. Ownership status (OWN) is a dummy variable that take the value of 1 if the bank is state owned and 0 otherwise.

H8: All else equal, we expect that the state ownership of a bank will have a negative effect on bank's interest margin and profitability.

The introduction of capital adequacy ratio in 1988 and strengthening it in the following years have reduced the insolvency risks on banks in Tunisia. Berger (1995) mentioned that increasing equity alleviates the risk of insolvency and ultimately, the cost of borrowed funds. Besides, Golin (2001) considers the ratio of equity to total assets (CAP) as a measure of capital strength and it is expected that the higher the equity to the total assets ratio, the lower the need to external funding and, therefore, the higher the profitability of the bank.

H9: All else equal, we expect that capital regulation proxied by equity-to-asset ratio will have a positive impact on bank's interest margin and profitability.

The progressive liberalization of interest rates in Tunisia is intended to improve competition in the Tunisian banking sector. Therefore, we expect that bank's interest margin and profitability will be reduced affected by the reinforcement of competition between banks in fixing spreads.

H10: All else equal, we expect that interest rate liberalization will have a negative impact on bank's interest margin and profitability.

5 - Data and Empirical methodology

5.1 Data sources

The micro and macro data used in the empirical work were extracted from the Central bank database. The financial structure data were collected from the World Bank Indicators Database. The sample includes the main deposit banks in Tunisia (10 banks) over the period 1980-2000. It consists of 21 years of observation on 10 banks. As all the banks in our sample are observed for the entire period, we will use in our empirical work balanced panel data.

The quality of accounting in Tunisia has improved since the adoption of the new accounting reforms in 1997 but this evolution didn't have any side impact on the calculation of variables used in the modelling. The New Accounting System (NAS) fixes the principal accounting obligations of the Tunisian companies, and presents a conceptual framework intended to be used as a support and guide for the drawing up of accounting standards. A total of 15 accounting standards have been pronounced. The examination of the NAS emphasizes many innovations; the most important concern the distinction of assets and liabilities in current and non current elements, the inclusion of cash flows statement as an obligatory financial statement, the re-organization of the income statement, and the updating of certain accounting operations such as leasing, research and development activities, treatment of the fixed assets held by the national companies abroad. Besides, the NAS carried out a harmonization and a clarification of the terminology used in accounts' presentation and operation. The new nomenclature envisages seven classes of accounts. In brief, the merger of all the income accounts into one income statement and the change of the name of some items in the balance sheet statement have some impact on the calculation of our micro-variables that we have to take into consideration.

5.2 Variables definition

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:

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

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; 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 banks' 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 reflects how well bank management uses the banks' real investments resources to generate profits while NIM is focused on the profit earned on lending, investing and funding activities.

Five banks' characteristics indicators are used as internal determinants of performance. They comprise the ratio of overhead to total assets (OVERHEAD)⁶, the ratio of equity capital to total assets (CAP), the ratio of banks' loans to total assets (BLOAN), the ratio of non- interest bearing assets to total assets (NIBA) and the log of bank assets (LNSIZE).

⁶ Overhead is defined as the sum of salaries and other operating expenses.

One macro-economic variable is used: real GDP per capita growth (GROWTH) and it is provided by the Tunisian Central Bank.

We also examine how the performance of the banking sector is related to the relative development of 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. Bank concentration (CONC) equals the fraction of bank assets held by the three largest commercial banks in the country. Ownership status (OWN) is a dummy variable that take the value of 1 if the bank is state owned and 0 otherwise. To attest the progressive effect of interest liberalization we include two dummy variables: DUMILP which take a value of 1 after the partial liberalization date (1987) and 0 otherwise; DUMILT which take a value of 1 after the total liberalization date (1996) and 0 otherwise.

5.3 Econometric modeling

In this study panel data models are considered. To examine cross-section variation among techniques, two empirical models for each of the two dependent variables are considered: Fixed Effects Model (FEM) and Random Effects Model (REM)

The basic framework of this discussion is a regression model of the form:

$$(2) \quad Y_{it} = \alpha_i + X'_{it}\beta + \varepsilon_{it} \quad i = 1 \dots n, \quad t = 1, \dots T$$

Y_{it} indicates the dependent variable while X_{it} represents the vector of k explanatory variables. ε_{it} is the disturbance term. ($\varepsilon_{it} \rightarrow N(0, \sigma_\varepsilon^2)$).

The bank specific effect is α_i , which is taken to be constant over time. The fixed effects approach takes α_i to be a bank specific constant

term in the regression model. 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:

$$H_0 : \alpha_1 = \dots = \alpha_N = \alpha$$

It is rather the acceptance of the alternative hypothesis which is interesting if we want to confirm the existence of significant heterogeneity across banks.⁷

The random effects model specifies that α_i is a bank specific disturbance:

$$(3) \quad Y_{it} = \alpha_i + X'_{it}\beta + \varepsilon_{it} \quad i = 1 \dots n, \quad t = 1, \dots, T$$

where :

$$\alpha_i = \alpha + \mu_i \quad \text{with} \quad \mu_i \rightarrow IIN(0, \sigma_\mu^2)$$

FEM model is estimated using the Least Square Dummy Variable procedure (LSDV) where as REM is estimated using the Generalized Least Squares (GLS) procedure discussed in Greene (2000. chap 14).

Finally, a Hausman specification test⁸ is conducted in order to find which of these models is the most appropriate. Under the null hypothesis, the Hausman statistic is asymptotically distributed as chi-square with k degrees of freedom and is written down as follows:

⁷ 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:

$$F = \frac{SSR_0 - SSR_1}{SSR_1} \frac{\sum_{i=1}^N T_i - N - k}{N - 1} \quad \text{where } SSR_0 \text{ and } SSR_1 \text{ are, respectively, the sum of squared}$$

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.

⁸ For most of our estimation, we undertake standard GLS panel estimation with random effects. The choice of random over fixed effects is supported by the Hausman test. Moreover, from a purely partial standpoint, the fixed is costly in terms of degree of freedom and time fixed variables lost.

$$(4) \quad H = (\hat{\beta}_{GLS} - \hat{\beta}_F)' (\hat{V}(\hat{\beta}_F) - \hat{V}(\hat{\beta}_{GLS}))^{-1} (\hat{\beta}_{GLS} - \hat{\beta}_F)$$

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.

6 - 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 3, 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 table 4 includes 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. Although all specifications were estimated for completeness, the discussion focuses on the most robust empirical findings. Since the Hausman test always indicates a preference for random over fixed effects (insignificant value of the Hausman test), we have displayed random effects results in the NIM regressions. The estimates of the random effect model are also reported in the ROA equations as the Breusch-Pagan test confirms that the randomness of the specific effects since the model fitted on data fails to meet the asymptotic assumptions of the Hausman test.

Table 3 Descriptive statistics of variables

Variable name	Mean	Minimum	Maximum	Standard deviation
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
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

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 Huizinga (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. This may indicate that well-capitalized banks have higher margins and profitability, which is consistent with theories stressing that highly capitalized banks can charge more for loans and/or pay less on deposits because they face lower bankruptcy risks.

Next, there is a positive and significant coefficient on the overhead to assets ratio variable (OVERHEAD) in the net interest

margin and ROA equations. The overhead variable has an estimated coefficient of 0.78 in the net interest equation, which suggest that 78% of a bank's overhead costs are passed on its depositors and lenders (in terms of lower deposit rates and/or higher lending rates). Therefore banks that support high operating expenses operate with wider margins to compensate their high intermediation costs.

In all net interest margin equation specifications, we see that the coefficient on bank loans (BLOAN) is significant. This notably reflects that bank loans are interest-paying contrary to the cash, thereby increasing net interest margin.

The coefficient on economic growth variable (GROWTH) is not significant in all regressions. Economic growth does not reflect any aspects of banking regulations and technology advance in the banking sector omitted from the regressions. These results confirm those of Ben-Khediri et al. (2005) that inflation and real output growth influence neither bank interest margins nor bank profitability in Tunisia.

In table 4, we have included two sets of financial market or structure variables. The first set includes the market concentration ratio (CONC) 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 complementarity or substitutability between bank and stock markets.

Turning to market concentration, we see that the concentration ratio (CONC) has a negative but insignificant impact on net interest margins and return on assets. Besides, the positive and statistically significant relationship between RSIZE and performance indicates that a larger stock market relative to the banking sector increases bank profits and margins. This may be due to the complementarity's effect between equity and debt funding. As stock markets enlarge (MCAP), improved information availability increases the potential number of customers to banks by easing the identification and monitoring of borrowers. However, the increase of bank activity (SBS) did not contribute to enhance profitability in the Tunisian banking industry. 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.

As far as the interest rate liberalization is concerned, the results show that partial liberalization impact negatively on the Tunisian bank's interest margins but positively on the return on assets. This means that the partial interest liberalization has decreased the margin profit but pushed banks to look for compensating activities linked directly to financial markets. Besides, we find that complete interest liberalization enters positively and significantly in the net interest margin regressions, consistent with the view that banks that are free to fix their margin tend to profit from the situation.

Finally, the relationship between NIM and state ownership variable (OWN) is negative and significant meaning that private owned banks generate better margin than their state counterparts. This result confirms the supremacy of private banks in a matter of performance which is a clear signal to spur the privatization of state owned banks.

Table 4 Determinants of Tunisian deposit banks' NIM and ROA

Regressions	NIM 1a	NIM 1b	ROA 1a	ROA 1b
CAP	0.0373* (0.0205)	0.0358* (0.0204)	0.0245* (0.0138)	0.0236* (0.0137)
BLOAN	0.01224* (0.0681)	0.01215* (0.006)	0.0051 (0.0046)	0.0038 (0.0043)
NIBA	0.0024 (0.0083)	0.0028 (0.0075)	-0.0053 (0.0055)	-0.0019 (0.0051)
OVERHEAD	0.7809*** (0.1071)	0.7682*** (0.1048)	0.1683** (0.0722)	0.1747** (0.0711)
GROWTH	0.0073 (0.0132)	0.0081 (0.0129)	0.0116 (0.0088)	0.0111 (0.0087)
SBS	0.0028 (0.0091)	/	-0.0039 (0.0061)	/
MCAP	0.0111 (0.0094)	/	0.0106* (0.0063)	/
RSIZE	/	0.011* (0.0079)	/	0.0085* (0.0048)
CONC	-0.0231 (0.0365)	-0.0067 (0.3137)	0.0049 (0.024)	-0.0007 (0.021)
OWN	-0.5813* (0.3447)	0.5818* (0.3443)	/	/
DUMILP	-0.4911*** (0.1162)	-0.4985*** (0.103)	0.1445* (0.07)	0.1305* (0.0751)
DUMILT	0.4822** (0.2233)	0.5524 (0.2137)	0.1315 (0.1575)	0.1125 (0.1431)
Constant	0.0113 (0.0185)	0.0045 (0.0180)	0.0028 (0.0123)	-0.0017 (0.0118)
Nb. Obs.	210	210	210	210
R² overall	0.5211	0.5230	0.3567	0.3610
Hausman test	0.48	0.47	370.3***	279.47***

The NIM and ROA present two specifications to avoid multicollinearity between the measures of bank and stock markets development (model 1a) and the relative development of stock markets (models 1b). The models in the NIM and ROA regressions are drawn from a REM specification. Standard errors are in brackets. * shows significance of the test statistic at 90%, ** and *** at 95% and 99% respectively.

7 - Conclusion

This paper investigates the impact of banks' characteristics, financial structure and macroeconomic indicators on banks' 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. Bank loans have a positive and significant impact on the capacity of Tunisian banks to generate interest margins. The size has mostly negative and significant coefficients on the bank profitability. This latter result may simply reflect scale inefficiencies.

Second, the paper finds that the real growth output growth influence neither bank interest margins nor bank profitability in Tunisia.

Third, turning to financial structure and its impact on banks' interest margin and profitability, we find 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. This could be explained by the fact that banks in Tunisia have more than compensated their reduced margin by extending their activities towards financial markets through fees and revenues earned from stock market intermediation and portfolio management.

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 needs to be conducted by a reinforcement of the capitalization of banks through national regulation programs, by implementing incentive measures to reduce the volume of non-interest bearing assets in favour of bank loans and by reducing the size of large banks to optimal levels

At the nation level, we need to boost the development of the equity market in order to improve banks' profitability as banks and the stock market were found to be complementary. Further, privatising state owned banks is recommended in order to improve their performance.

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