



ANALYSIS OF INTERNAL AND EXTERNAL FACTORS INFLUENCING COMMERCIAL BANKS PERFORMANCE: EMPIRICAL EVIDENCE FROM TUNISIA BANKING SECTOR

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Abstract

The aim of this study is to examine the effect of bank-specific and macroeconomic factors of Tunisian bank profitability. We apply a dynamic panel model, using Generalized Methods of Moments (GMM) system for 10 Tunisian commercial banks, during the period 1998-2017. The empirical results reveal a high degree of persistence in bank performance. The estimation of a dynamic panel model by the GMM method allowed us to observe that the internal variables; capital, cost/income ratio and ownership play a significant determinant role in bank performance, measured by ROA ROE, NIM ratio. Private banks seem more profitable than public banks. Also, industry-specific factors, such as concentration and the size of the banking system, have a negative and significant effect on performance. However, inflation seems to negatively affect the net interest margin of the bank and the corruption coefficient (CI) is positive and statistically significant only when the performance of banks is measured by the ROA.

Keywords: Performance, internal factors, external factors, ROA, ROE, NIM, GMM, Tunisia



INTRODUCTION

The soundness and stability of the banking system is a global concern that increasingly attracts the attention of national regulators, financial as well as international institutions. The major element of the economic development strategy is mainly the banking system. It operates with the help of regulatory and supervisory bodies and intervenes in the process of currency circulation. Banking performance is mainly represented by quantitative or quantifiable indicators. Also, it uses internal and external variables of a tangible nature to explain performance. To address the issue of banking performance, it is necessary to refer to determinants that integrate both the financial, organizational and the environmental aspects.

Given the importance of performance for the proper functioning of the banking system, the literature has devoted a great deal of energy to understanding the main determinants which can be classified into two groups: specific banking and macroeconomic.

In this line up, the research question arises: what are the main determinants of banking performance in Tunisia from 1998 to 2017?

This paper is organized as follows: The First part is devoted to the literature review concerning the determinants of banking performance and then we will empirically analyze the determinants of banking performance in Tunisia, based on our selected sample, while investigating the descriptive statistics related to the explanatory variables and interpreting the results of the chosen model estimation .

LITERATURE REVIEW

The economic and financial literature on this subject is very rich. Several studies have focused on the determinants of bank performance. Some researchers have focused on internal factors; others have interpreted in addition to macroeconomic the internal factors as well as market factors. Most of these studies have been linked to the cases of industrialized countries. However, few studies have concentrated on the banks performance in emerging countries, and particularly in Arab countries.

Numerous studies have carried out on the determinants of bank performance. Nevertheless, views on the determinants diverge. This could be explained according to Athansoglou et al (2008) by the fact that the studies are realized in different countries, environments and time periods.

In what follows, we present the results of some studies performed in recent years in Western and Arab countries:

Lanotta et al. (2007) studied a sample of 181 banks belonging to 15 European Union countries for the period from 1999 to 2004. In fact, the objective of this research is to assess the

effect of the ownership structure of banks on profitability and risk. The authors ended with the following conclusions: State-owned banks are less profitable than private banks due to the quality of assets (credit risk, etc.) and liquidity risk. In other words, the banks belonging to pension funds face less asset risk than private and state-owned banks and there is no relationship between profitability and concentration of ownership.

With regard to European banks, specifically the domestic banks, the analyzes of Kosmidou & Pasiouras (2007) showed the existence of a positive relationship between the profitability of the bank measured by the ROA (net income reported in total assets) and the following internal and external factors: capitalization, liquidity, GDP growth, inflation, market capitalization to total bank assets and the ratio of market capitalization to GDP. This study shows a negative relationship between profitability and the following variables: bank size, operating expenses compared to the profit, concentration sector banking and total assets of the banks compared to the GDP.

Through a study on the internal and external determinants of profitability focusing on 3 banks in Greece observed over the period of 1985 to 2001, Athanasoglou et al. (2006) produced the following results: The capitalization and productivity ratio has a positive effect on profitability. Credit risk and the ratio of general operating expenses to total assets have a negative effect on bank profitability along with certain determinants concerning the size of the bank, the structure of the ownership and the concentration of the banking sector have no impact on profitability. The authors also concluded that the internal determinants that act positively on the profitability measured by ROE can be summed up in three variables: capitalization, bank size and liquidity by inventing that operational efficiency measured by the general expense ratio and administrative ratio to total assets has a negative impact on profitability.

In addition, bank profitability is still a function of multitude factors, both quantitative and qualitative. Many factors simultaneously participate in the explanation of bank profitability. Other elements linked to the governance of banks and the ways they are managed are also likely to have an impact on banking performance.

Estimating the effect of macroeconomic variables, including economic growth (GDP) and inflation, has often led to conflicting conclusions. Several authors unanimously certify the existence of a positive relationship between economic growth and bank profitability (Bashir, 2000 and Rouabah, 2006). Their opinion was that the national wealth promoting all the economic activities in the country, positively affects the development of the banking sector and encourages banks to innovate and renovate their management techniques and also technologies. Concerning the impact of the prices variation in the general level, the work of Molyneux & Thornton in 1992, Abreu & Mendes in 2002 shed light on the links that may exist

between overactive yield and inflation. Their empirical conclusions show a positive relationship suggesting that the increase in inflation will be favorable to the growth of bank profitability.

Some previous studies have tested various factors that affect performance. Internal and external factors are put forward to test their influence on banks. However, some studies only test the influence of internal factors.

Fungacova and Poghosyan (2011) examine the determinants of the interest margin of banks in Russian, focusing on the ownership structure of the bank over the period 1999-2007. They observed that the effect of the number of determinants used such as market structure, credit risk, and risk liquidity differed depending on the owner of real estate control, government, public banks, private sector or foreign companies.

The results convey that the overall shape of the bank's assets should be taken into account when analyzing the determinants of the interest margin.

Almumani (2013) studied the factors that determine the profitability of Jordanian commercial banks listed on the Amman Stock of Exchange (ASE). Thirteen Jordanian commercial banks listed on ASE since 2000 were selected (91 observations) between 2005 and 2011. Factors taken into account are ROA, total cost to total income, liquid assets to customers and short term borrowed funds, net credit to total Asset ratio, allowance for credit facilities and outstanding interest on credit facilities, total equity to total assets and journal of total assets. The total cost in relation to the total income is the main endogenous factor under management control, is the result of this study which determines the banking performance in Jordan. Other variables, like liquid deposits on customers and short-term borrowed funds, net credit to total assets ratio, provisions for credit facilities and outstanding interest on credit facilities, total equity relative to total assets and the log of total assets show no statistical effect on ROA.

Saeed (2014) studied the effect of internal and external variables of 73 UK banks for the period 2006 to 2012 on their performance. Two ratios represent the measure of performance: return on assets (ROA) and return on equity (ROE). Based on regression analysis, it turns out that internal factors such as capital, loan, bank size, deposits and liquidity are positively correlated with profitability indicators ROA and ROE. On the other hand, the interest rate has a positive impact on bank profitability while GDP and inflation have a negative impact. This study shows that large banks with assets, capital, deposits, loans, equity and macroeconomic factors such as interest rates, economic growth and low inflation can thus achieve higher profitability. Based on slightly negative correlations of the banks size and deposits with bank profitability, the UK banking sector experienced a considerable drop in deposits and therefore reduced banking operations during the financial crises of 2008. Therefore, deposits and bank size have a

negative effect on bank profitability. Other variables such as Total Deposits on Total Assets and Total Assets Journal did not affect ROA.

Samad (2015) examined the impact of specific bank characteristics and macroeconomic variables on determining the profitability of Bangladesh's 42 commercial banks for the years 2009 and 2010. Factors internal to banks, such as loan-to-deposit ratio, allowance for loan losses, total assets, equity to total assets, and operating expenses to total assets are factors that have an impact on economic profitability, While, bank size, GDP, inflation have no impact on ROA.

Linh and Toan (2015) examined the factors that affect the profitability of commercial banks in Vietnam. The data is based on the financial reports of 22 commercial banks in Vietnam covering the period 2007-2013. They deduce that the bank's profitability is measured by indicators such as: return on assets (ROA), return on equity (ROE) and net interest margin (NIM). The research results show that the ratio of equity to total assets (CAP), the ratio of loans to total assets (LOAN), liquid assets to total assets (LA) and the rate of economic growth (GDP) affect the profitability of banks' business activities in Vietnam.

Menicucci and Paolucci (2016) have verified the relationship between the specific characteristics of banks and the profitability of the European banking sector. Data are collected from thirty-five European banks during the period 2009-2013 and the results were obtained using regression analysis. The study found that both asset size and capital ratio had a significant impact on banking performance, while increasing loan losses reduced performance. The results also suggest that larger deposits and loans tend to be more profitable, but their effect on profitability is statistically negative.

RESEARCH METHOD

The sample

In order to examine the factors explaining the performance of banks in Tunisia, we collected data on the main deposit banks in Tunisia (10 banks) during the period 1998-2017. Hsiao (1986) and Baltagi (2001) indicate that Panel's data methodology controls individual heterogeneity, reduces problems associated with multi-collinearity and bias in estimates, as it specifies a variable relationship over time and space between independent and dependent variables. The ten main banks listed on the Tunisian stock exchange are:

❖ Tunisian public banks:

- Housing Bank (BH)
- National Agricultural Bank (BNA)
- The Tunisian Bank Company (STB)

❖ **Tunisian private banks:**

- Amen Bank (AB)
- Bank of Tunisia (BT)
- International Arab Bank of Tunisia (BIAT)

❖ **Banks controlled by foreign institutions:**

- Attijari Bank (Attijari Bank)
- Arab Tunisian Bank (ATB)
- The International Bank Union (UIB)
- Banking Union for Trade and Industry (UBCI)

Definition of research variables***Dependent variables*****Return on assets ROA:**

$$ROA = \frac{Net\ income}{Total\ assets}$$

The ROA is a complete financial ratio allowing measuring the performance of banks. According to Rose (2002), ROA is defined as net income divided by total assets. Many authors (Rivard and Thomas (1997), Golin (2001)) have indicated that the ROA is the best measure of bank profitability.

Return on equity ROE:

$$ROE = \frac{Net\ income}{Equity}$$

ROE is defined as net income over total equity. It measures the accounting profits of banks per dollar of accounting equity (Rose, 2002). In addition, the ROE can be broken down into a leverage factor (stock multiplier) and an ROA. The equity multiplier is the assets divided by equity, which is the inverse of the capital-to-asset ratio. It measures the leverage aspect of the bank.

Net Interest Margin (NIM):

$$NIM = \frac{Net\ Interest - Interest\ Expenses}{Total\ Assets}$$

The Net Interest Margin (NIM) is defined as net interest income minus costs of net interest on total assets. NIM has been used as a performance measure in studies by Goldberg and Rai (1996), Hassan and Bashir (2003), Ben Naceur and Goaid (2003), Kosmidou et al.

(2006) and Heffernan and Fu (2008). The high NIM indicates that the profitability of the bank is higher if the assets quality is kept healthy.

Explanatory variables

Internal factors

- Size: is measured by the natural logarithm of the book value of the total assets in percentage (\log_Total_actif).

The impact of the size of the bank on its profitability cannot be theoretically anticipated. The size of banks is one of the important factors influencing their performance. Also, Spathis et al. (2002) studied the performance of large and small Greek banks during the period 1990-1999 and found that large banks were more efficient. Short (1979), Smirlock (1985), Bikker and Hu (2002), Pasiouras et al. (2007) find that the size of the bank has a positive impact on performance. Indeed, the large size of the bank reduces costs because of the economies of scale it implies and they can also raise capital cheaply.

- Capital adequacy CAPAD:

$$CAPAD = \frac{Equity}{Total\ assets}$$

Capital adequacy refers to the sufficient amount of the bank's capital to absorb any shocks. CAPAD reflects the bank's ability to bear financial losses or risks. Bourke (1989), Berger (1995), Demirgüç-Kunt and Huizin (1999), Goddard et al. (2004), Naceur and Goaid (2001), Pasiouras and Kosmidou (2007), García-Herrero et al. (2009), Liu et al. (2010), Naceur et al. (2010) and De Jonghe (2010) found a positive impact of capitalization on the performance of banks.

- The ratio of non-performing loans to total loans (NPL) is an indicator of loan quality and a measure of credit risk.

$$NPL = \frac{Non-performing\ loans}{Total\ loans}$$

This ratio is a good indicator of future performance problems. A high NPL ratio means that a bank faces higher credit risk, which affects its performance.

- Cost-Income Ratio (CIR): Efficiency in expense management is measured by the cost / income ratio (CIR).

$$CIR = \frac{Operating\ cost}{Net\ income}$$

The CIR measures the operating costs of banks. In general, profits and expenses are negatively correlated, because higher expenses imply lower profits, and vice versa.

Kosmidou et al. (2006) and Pasiouras and Kosmidou (2007) found that the CIR had a significant negative relationship with bank profitability. This is due to the fact that the expenses incurred will reduce the bank's profits. We prefer a lower CIR, as this improves the profitability of the bank.

- Growth Deposit (GDEP): reflects the growth of the bank and is measured by the annual growth of its institutional deposits and its clientele sum. A high level of deposit amount can increase performance because they are more stable funds and at lower costs compared to borrowed funds.
- Ownership of the bank (OWN): The ownership structure is always measured in the empirical literature by a dummy variable which takes the value of 1 if the bank is public and of 0 if the bank is private.

External factors

- Concentration (CONC): It reflects that the competitiveness entering the banking sector is measured by the bank assets held by the three largest banks in relation to total bank assets. It is the percentage of assets held by the k largest banking institutions, measured by the total assets (k = 3 or 5) compared to the total assets of banks .
- The size of the Banking System (SBS): reflects the importance of bank financing in the economy. It is measured by the ratio of total bank assets to GDP. This variable is widely used in the literature (Lee et al. (2015); Tan (2016)).
- Gross domestic product (GDP): this is the growth rate of the gross domestic product. The study of the impact of macroeconomic variables on the performance of the bank is generally highlighted in the literature.
- Inflation (INF) is also controlled to take into account macroeconomic risk. The extent to which inflation influences the bank's profitability depends on its future development which is precisely anticipated, and in turn, this depends on the ability of banks to accurately forecast their future movements.
- Corruption (CI): The use of the Corruption perception Index =corruption (CPI) of the International Transparency to measure the level of corruption in the country. It ranks countries according to how their populations perceive corruption in the public sectors. Next, Park (2012) defined the corruption index as presented in the table 1.

$$CI = 10 - CPI$$

Table 1. Summary table of dependent and independent variables

Variables	Abreviation	Formula	Expected signs
Performance variables (dependent variables)			
Return on assets	ROA	Net income/Total assets	
Return on equity	ROE	Net income/total equity	
The net interest margin	NIM	(net interest income-net interest charges) /Total assets	
The explanatory factors variables (independent variables)			
Internal factors			
Size	Size	Log total assets	+/-
Capital adequacy	CAPAD	Equity / Total assets	+
Non-performing loans ratio (Credit risk)	NPL	Non-performing loans / Total loans	-
Ratio cost/ income	CIR	Operating cost / net income	+/-
Deposit growth	GDEP	Amount of deposits	+
The property of the bank	OWN	Equals 1 if a bank is state-owned and 0 if a bank is private.	+/-
External factors			
Concentration	CONC	Total assets of the 3 largest banks in relation to total assets	-
The size of the banking system	SBS	Total bank assets to GDP	+/-
Gross domestic product	GDP	Growth rate of gross domestic product	+
L'inflation	INF	Inflation rate	+/-
Corruption	CI	CI= 10-CPI	-

Hypotheses

From the review of the literature and after presenting in a synthetic way the variables of our study, we could draw the following 2 hypotheses:

- ❖ *Internal factors explain the performance of Tunisian banks.*
- ❖ *External factors explain the performance of Tunisian banks.*

Presentation of the model retained for the measurement of banking performance

In order to verify the specific factors to the bank and the sector as well as the macroeconomic factors that affect the performance of Tunisian banks, we develop the following regression:

$$\text{Per}_{it} = \alpha_0 + \beta_{it}X_{it} + \sigma_{it}Y_{it} + \delta_{it}Z_{it} + \varepsilon_{it} \quad (1)$$

With:

- i is the individual bank
- t presents the year,
- Per is the dependent variable relating to the performance measured by ROA, ROE and NIM
- X is the vector of the individual factors of a bank,
- Y is the vector factors specific to the sector,
- Z is the vector of macroeconomic factors.

The complete model is then as follows:

$$\text{Per}_{i,t} = \alpha_0 + \alpha_1 \text{Per}_{i,t-1} + \alpha_2 \text{SIZE}_{i,t} + \alpha_3 \text{CAPAD}_{i,t-1} + \alpha_4 \text{NPL}_{i,t} + \alpha_5 \text{CIR}_{i,t} + \alpha_6 \text{GDEP}_{i,t} + \alpha_7 \text{OWN}_{i,t} + \alpha_8 \text{CONC}_{i,t} + \alpha_9 \text{SBS}_{i,t} + \alpha_{10} \text{GDP}_{i,t} + \alpha_{11} \text{INF}_{i,t} + \alpha_5 \text{CI}_{i,t} + \varepsilon_{i,t} \quad (2)$$

Due to the dynamic nature of our model, the least squares estimation methods are biased and inconsistent (Baltagi, 2001). Therefore, we need to use dynamic panel estimation techniques to deal with biases and inconsistencies in our estimates. In addition, estimating the profitability of banks refers to the problem of endogeneity.

The best performing banking institutions could easily increase their equity while maintaining their profits (García-Herrero et al. 2009). They could pay more for advertising campaigns and increase their size, which could affect their performance. On the other hand, the causal link could go in the opposite direction, since the most profitable banking establishments can recruit more staff and decrease their operational efficiency. Heterogeneity is a significant obstacle, unobservable between the banking establishments, which could exist in Tunisian banks.

To study the empirical determinants of the performance of Tunisian banks, we will follow the study by García Herrero et al. (2009) and we deal with these problems using the generalized method of moments (GMM), following Blundell and Bond (1998), known as the GMM estimator system. The latter methodology refers to a system of two equations: the original equation as well as the transformed one.

ANALYSIS AND FINDINGS

Descriptive analysis

First, data was subjected to descriptive analysis. In Table 2, we present a descriptive analysis of the different variables associated with Tunisian banks obtained using the STATA software. In fact, in this study we considered performance to be a dependent variable (ROA, ROE and NIM) expressed as a function of characteristics specific to Tunisian banks such as: Size, Capital adequacy (CAPAD), Nonperforming Loans (NPL), Cost-Income Ratio (CIR), Deposit Growth (GDEP), Ownership (OWN), Sector Concentration (CONC), Banking System Size (SBS), GDP Growth (GDP), Inflation (INF) and The Corruption Index (IC).

Table 2. Descriptive Statistics for variables

Variables	N	Mean	Min	Max	Standard
ROA	200	0.8060852	-10.32150	2.912639	1.342196
ROE	200	314.1231	-177.000	17000	2058.555
NIM	200	2.867413	0.7681571	7.319218	1.163921
Size	200	21.59731	20.45424	22.69988	0.5610169
CAPAD	200	9.329399	-1.094332	17.48179	3.048374
NPL	200	21.99030	5.3	97	18.07802
CIR	200	49.69864	24.60	85.1	11.86809
GDEP	200	816.0332	-11.63083	104845.1	9194.508
OWN	200	80.9521	31.65	100	23.08661
CONC	200	45.80007	42.74229	47.4283	1.521739
SBS	200	64.94694	55.99841	76.53999	5.157415
GDP	200	3.066032	-2.947252	5.250388	2.113941
INF	200	3.301600	1.983333	4.920696	0.8538632
CI	200	5,350	4.600	5,800	0,376

According to the descriptive statistics presented in Table 2, the Tunisian banks have a ROA greater than 0.80% throughout the period from 1998 to 2017. The difference between Min and Max clearly shows that there are large differences in profitability between Tunisian banks justified by the existence of large banks such as BIAT or ATTIJARI and small banks such as UBCI. The same goes for our third main performance metric, NIM, which averages 2.86%.

This brings us to briefly highlight some interesting facts. With regard to bank-specific indicators, the capitalization of Tunisian banks is 9.32% on average, which largely respects the key international prudential regulations of Basel II.

Like the other variables, this ratio differs from bank to bank. The most capitalized bank in our study has a capital ratio of 17.48%, while the capital ratio is negative for some banks in some years. Non-performing loans relative to total NPL loans, which is an indicator of credit risk, averaged 21.98% during the period 1998-2017. According to the IMF (International Monetary

Fund), the rate of non-performing loans in the banking sector rose to around 19.5% in 1998. While according to reports from the central bank of Tunisia, this rate reached 24% in 2003. This rate also reached 13.2% in 2009. Despite this downward trend, the banking sector is still characterized by a significant credit risk around after the revolution of January 2011. Non-performing loans continue to plague the banking sector with a turning point of 16% in 2014, being the highest rate in the countries of the south and east of the Mediterranean. In fact, the three public banks hold around 38% of bank assets and represent a significant share of non-performing loans.

Examination of the correlations

Table 3. Correlation matrix

	Size	CAPAD	NPL	CIR	GDEP	OWN	CONC	SBS	GDP	INF	CI
Size	1										
CAPAD	-0,2792	1									
NPL	0,0269	-0,2039	1								
CIR	0,0315	-0,04789	0,2587	1							
GDEP	0,1179	-0,0371	-0,0511	-0,0515	1						
OWN	-0,4222	0,1989	-0,1084	-0,3130	-0,1201	1					
CONC	-0,4547	0,0112	0,0285	0,1509	-0,1671	-0,0583	1				
SBS	0,5283	-0,1310	-0,0548	-0,1144	0,1181	0,0666	-0,6127	1			
GDP	-0,3389	0,0508	0,0405	0,0897	-0,0435	-0,0374	0,5374	-0,8082	1		
INF	0,4103	-0,1503	-0,0931	-0,0899	0,1102	0,0712	-0,3576	0,3092	-0,0495	1	
CI	0,5900	-0,0208	-0,5010	-0,1850	-0,0178	-0,0486	0,0190	-0,0356	-0,0123	-0,0121	1

The study of the correlation coefficients makes us to examine the null hypothesis of the absence of correlation between the explanatory variables. According to Kennedy (1985), we consider 0.8 the cutoff value of the correlation coefficient to confirm the null hypothesis. So, if the correlation between two variables exceeds 0.8, we must reject the null hypothesis since it is not possible to keep the two variables in the same model. As shown in Table 3, all the correlation coefficients are less than 0.8 for which the phenomenon of colinearity is pronounced. So, there is no problem of multi-colinearity.

This matrix takes into account the estimated relationship between the different variables. Therefore, the correlation coefficient is an indicator that gives us an idea about the linear relationship strength between two variables. Furthermore, we find a weak correlation between SIZE, NPL and CIR. At the same time, there is a strong negative correlation between the variable SIZE and GDP. Additionally, there is a strong positive correlation between SIZE and CI, indicating that larger banks are perceived to be more corrupt.

Analysis of the estimation results

After giving a vision of our variables and the correlation matrix evolution, we present the estimation results of our model measuring the performance of Tunisian banks.

Table 4. Estimation result: Explanatory factors for Tunisian banks

	ROA	ROE	NIM
Per t-1	0.1470479** (0.016)	0.5587879*** (0.000)	0.346472*** (0.000)
Constant	5.971267 (0.531)	2385.743 (0.834)	42.19367*** (0.000)
Size	-0.0165845** (0.029)	172.3487 (0.724)	-1.4877*** (0.000)
CAPAD	0.2883731*** (0.000)	-77.99859 (0.197)	0.0208183*** (0.005)
NPL	0.0022453** (0.011)	7.0678 (0.315)	0.00257 (0.291)
CIR	-0.0683821*** (0.000)	-29.23925** (0.041)	-0.0394482*** (0.000)
GDEP	-0.0000126 (0.227)	0.0029983 (0.785)	-3.68e-06 (0.396)
OWN	0.0081684* (0.082)	-2.227428 (0.861)	0.0093829** (0.027)
CONS	-0.1034974** (0.013)	67.48617 (0.431)	-0.1213643*** (0.001)
SBS	-0.0134697** (0.039)	-109.3862** (0.020)	-0.0253363 (0.217)
GDP	0.0139735 (0.844)	-171.476** (0.027)	-0.0651451** (0.036)
INF	-0.1225765 (0.309)	183.0942 (0.159)	-0.2104976*** (0.000)
CI	0.653*** (0.004)	-11.993 (0.313)	0.243 (0.287)
N	190	190	190
AR (1)			
P-value AR (1)	-21.65	-6.86	-7.28
AR (2)	0.000	0.000	0.000
P-value AR (2)	0,44	-0.01	-0.29
Sargan test	0.807	0.79	0.772
P-value Sargan test	267.00	16.91	86.95
	0.120	0.30	0.302

Significant value at a threshold of: (*) 10%; (**) 5% and (***) 1%

The lagged dependent variable, which assesses the degree of persistence of performance, measured by ROA, ROE or NIM, is statistically significant for all models, indicating a high degree of persistence in banking performance and justifying the use of a dynamic model.

On the contrary, we notice significant differences between the estimation results of the different regressions. Considering internal factors related to bank-specific characteristics, such as bank size (SIZE), which we track by log of total bank assets, we found empirical evidence that small commercial banks were more profitable than the big ones. This finding corroborates those of Smirlock (1985) and Bikker and Hu (2002) who suggested that larger banks could benefit from opportunities for greater product and lending diversification and economies of scale. The main reason for this negative size relationship (SIZE) is that the large Tunisian banks had relatively higher loan loss provisions during the period selected. In addition and as indicated by Ben Naceur and Goaid (2008), this negative impact implies that Tunisian banks are operating above their optimal level.

Then, in accordance with the results of Buser, Chen and Kane (1981) and Ben Naceur and Goaid (2008), we confirm the positive relationship between the capital ratio (CAPAD), ROA and NIM. This may indicate that the well-capitalized banks have higher interest margins and return on assets, which supports the theories that banking institutions with strong capitalization may charge more for loans and pay less for deposits because they are less prone to bankruptcy.

Although, using return on equity (ROE) as an indicator of bank performance, we found a negative correlation. This can be explained by the fact that some publicly traded banks may actually reduce their equity to increase ROA.

Then, taking into account the ratio of non-performing loans to total loans (NPL), the bank risk enters positively in all the ROA, ROE and NIM regressions, but is only significant in the ROA regression. The positive impact of credit risk on the performance of banks could be explained by the fact that a higher credit risk should improve the income of banks since the riskiest loans are the best performing. Thus, our results confirm those found by Kosmidou et al. (2005) and Fernandez (2007).

As expected, the coefficient of the cost / income ratio (CIR) is negative and significant in all cases, which suggests that the efficiency of expenditure management is a determining factor in the performance of Tunisian banks. Kosmidou (2006) and Pasiouras et al. (2006) also confirm this inverse relationship for Malaysia, Greece and Australia respectively.

The annual growth in deposits (GDEP) has no significant impact for all the regressions (ROA), (ROE) and (NIM). Indeed, Tunisian banks have not been able to convert the growing amount of deposit commitments into income especially in recent times.

In addition, Table 4 shows that the privatization of Tunisian banks has a positive and significant impact on banking performance. According to the results of Micco et al. (2007) and Iannotta et al. (2007), where public banking institutions have a lower performance than private

institutions, our results confirm the performance advantage of private banks. The relationship between the NIM or ROA variable and the private ownership variable (OWN) is positive and significant, which means that privately owned banks generate better profits than their state counterparts. This is a clear signal to encourage the privatization strategy led by the Tunisian authorities.

Regarding the external factors linked to the financial structure in Tunisia, our study reveals that the more concentrated the market (CONS), the lower the profits of banks. The concentration of banks is negative and significant in the return on assets (ROA) and net interest margin (NIM) regressions. This conclusion is consistent with that of Berger (1995), who argued that concentration is generally negatively associated with banking performance once institutional and regulatory variables have been controlled. However, the concentration of banks is positive and not significant in the regression of return on equity (ROE).

Regarding the size of the banking system (SBS), its objective is to assess the importance of bank financing in the economy and its impact on the performance of banks, our results show that the increase in the size of the banking system will not contribute to improving the performance of the Tunisian banking sector. Accordingly, the bank assets to GDP ratio is negatively and significantly in the return on assets (ROA) and return on equity (ROE) regressions. However, the increase in this variable (SBS) did not help improve the profitability of the Tunisian banking sector.

Regarding the external factors linked to the macroeconomic environment in Tunisia, the coefficient of the economic growth variable (GDP) is negative and significant in the regressions of return on equity (ROE) and net interest margin (NIM). These results are contrary to our expectations and corroborate the majority of research linking actual production to performance. Nevertheless, Staikouras and Wood (2003) found that two of the three macroeconomic indicators, interest rate variability and GDP growth had a negative impact, while the level of interest rates had a positive effect on banks performance. In addition, our results show the importance of the impact of inflationary conditions in the economy on the performance of banks. Inflation appears to have a negative impact on the net interest margin (NIM). This means that Tunisian banks do not adjust their lending rates according to inflation and for that allow the entire negative cost of inflation. Inflation affects the banking sector through its influence on the bank credit market. Indeed, an increase in the inflation rate generates a decrease in the real rate of return, which will, consequently, affect the credit market and therefore the banking performance, because with high inflation, the banks will grant less credit.

The corruption coefficient (CI) is positive and statistically significant only when the performance of banks is measured by the ROA. In the meantime, this indicates that there is a

link between corruption and net income or total assets. However, the unimportant impact of corruption on ROE, measured as net income, is a total value, a focus on the corruption ratio, as well as the evolution of corruption. This outcome is predicted because the absence of fierce competition among Tunisian banks could lead to loan corruption. Overall, our results show that the commercial banks in Tunisia take advantage of the high level of corruption to increase return on their assets (ROA).

CONCLUSION

This article analyzes the effect of internal factors, sectoral factors and macroeconomic factors on the performance of 10 listed banks in Tunisia over the period 1998-2017. To do this, we used a dynamic model specification that allows earnings persistence. Our results showed that the differences in profitability between Tunisian banks can be explained by the factors included in our analyzes. In addition, our results showed that bank and industry specific characteristics explain a large part of the variation in performance.

First, banks with relatively high capital are more profitable than less capitalized ones. And efficient banks are more profitable than banks with a high income ratio. We have also found that ownership is a determining factor in profitability. Thus, it is recommended to privatize state owned banks in order to improve their performance. Bank size generally had negative and significant coefficients on its (ROA) and (NIM). This negative impact may simply imply that Tunisian banks are operating above their optimal level. Regarding sectoral characteristics and their impact on the performance of Tunisian banks, we found that the concentration and size of the banking system had a negative impact on bank performance, measured by return on assets and net interest margin.

Second, regarding the impact of macroeconomic indicators on the performance of banks, we concluded that these variables do not have a significant impact on the return on assets. However, GDP growth and inflation are closely related to the net interest margin. The impact of inflation seems to be mainly transmitted by deposit rates, in fact banks bear the entire negative cost of inflation. Commercial banks in Tunisia take advantage of the high level of corruption to increase return on their assets (ROA).

In summary, our results provided new insight into the operations that determine the performance of Tunisian commercial banks. These results are robust for several reasons: First, because we have looked at a broader set of macroeconomic determinants of bank performance specific to their industry and macroeconomics, which broadens our understanding of bank profitability. Second, we used the GMM system estimator developed by Blundell and Bond (1998), so we applied an advanced econometric procedure addressing the problem of

endogeneity of independent variables. Finally, our specification of the dynamic model took into account the fact that banking institutions' profits tend to persist reflecting barriers to market competition, informational opacity and sensitivity to macroeconomic shocks, not to mention effect of inflation nor that of corruption which rose after 2011.

This study could be extended in several ways. Other macroeconomic variables could be used to control the external determinants of bank profitability (unemployment, Institutional constraints to competition, Regulatory policies). Moreover, it would be conceivable to study the efficiency levels (cost and profitability) of banks in Tunisia using stochastic frontier analysis. This research could also be extended by a study of the role of the banking sector in economic growth.

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