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Explanatory Factors of Bank Performance in Tunisia: A Panel Model Approach

Ines Ghazouani Ben Ameur [α] & Sonia Moussa Mhiri [σ]

Abstract - Using the GMM estimator technique described by Blundell and Bond (1998), this paper tend to identify factors explaining Tunisian bank performance. Retaining the main 10 commercial Tunisian banks during the 1998 to 2011 period, we look at whether, for banks operating in similar macro-economic and financial structure environments, one can make judgments concerning the success of their competitive strategies and other managerial procedure by using different profitability measures. Our investigation includes bank-specific as well as industry-specific and macroeconomic factors affecting bank performance.

The empirical results reveal a high degree of persistence of bank performance. By the other hand, our findings suggest that the bank capitalization, as well as the best managerial efficiency, have a positive and significant effect on the bank performance. Private owned banks seem to be more profitable than state owned ones. That's why, privatizing state-owned Tunisian banks is recommended in order to improve their performance. Industry-specific factors, as the concentration and that of the system bank size have a negative and a significant effect on performance. As for the impact of the macroeconomic indicators, we conclude overall that the variables do not have a significant effect on bank performance. However Inflation seems to affect negatively bank's net interest margin.

Keywords : performance, banking industry, macro-economic, gmm system, tunisia.

I. Introduction

During the last two decades the worldwide financial sector has experienced most important changes. These changes have affected its structure and performance. In front of these international transformations and under the auspice of the International Monetary Fund (IMF), the Tunisian financial sector has undergone major financial reforms since 1980. However, despite the increased trend toward bank disintermediation undertaken in Tunisia, the role of banks remains fundamental in financing economic activity in general and different sectors of the market in particular. Restructuring of the Tunisian banking system was intended to enhance competition in the banking sector and lead to a more efficient allocation of resources.

The determinants of bank performance have attracted the interest of academic research as well as of bank management, financial markets and bank supervisors. While several studies on bank performance have been conducted widely for US and European markets and, to lesser extent, for large emerging markets us Brazil, China, and others, relatively little is known about bank performance among other developing countries as Tunisia. The first group of studies were carried out by Short (1979), Bourque (1989), Molyneux and Thorton (1992) and Demirguc-Kunt and Huizinga, (1999, 2001), who focused mainly on bank performance of US and European banks. More recently, the same purposes were undertaken for some emerging countries, such as Colombia (Barajas et al., 1999), Brasil (Afanasieff et al., 2002), Malaysia (Guru et al., 2002).

Added to that, the majority of investigations on bank profitability, such as Short (1979), Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (2000) and Goddard et al. (2004), use linear models to estimate the impact of various factors that may explain profits. However, some issues are not dealt with sufficiently. First, the literature principally considers determinants with the selection of variables sometimes lacking internal consistency (e.g. credit risk). Second, the econometric methodology held by major previous research, does not account for some features of bank profits (e.g. persistence), which implies that the findings may be biased and inconsistent.

The purpose of this paper is to empirically assess the main explanatory factors that might affect the banks performance in Tunisia. In this way we examine whether, for banks operating in similar macroeconomic and financial development environments, one can make judgments concerning the success of their competitive strategies and other managerial procedure by using different profitability measures. This paper investigates, in a single regression, the effect of bank-specific, industry specific and macroeconomic factors on Tunisian's bank performance. Added to that it consider several regressions with different measures of the bank performance; Return on Assets, Return on Equity, and Net Interest Margin. In view of the findings, we should be able to draw some policy implications that may be useful for bank management, shareholders, and policymakers in Tunisia.

To that end, we use data from the 10 conventional commercial banks on the longest relevant period (from 1998 to 2011). To account for performance

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persistence and potential endogeneity problems, we apply a dynamic panel data estimation approach, and address these problems by employing the generalized method of moments (GMM), following Blundell and Bond (1998), also known as GMM system estimator.

The remainder of the paper is organised as follows. Section 2 presents a review of the relevant literature regarding the explanatory factors of bank performance. Section 3 describes data, defines variables, and exposes model specification and estimation methodology. Section 4 provides the findings and major results. We conclude in Section 5.

II. Explanatory Factors of Bank Performance: Literature Review

An extensive body of literature have examined the explanatory factors of banks' performance in many countries around the world. While some studies focus on the understanding of bank performance in a particular and single country (Berger et al. (1987), Berger (1995), Neely and Wheelock (1997), Mamatzakis and Remoundos (2003), Ben Naceur and Goaied (2008), Athanasoglou et al. (2008) and García-Herrero et al. (2009)), others concentrate their studies on a panel of countries; Short (1979), Bourke (1989), Molyneux and Thornton (1992), Demirguc-Kunt and Huizinga (1999), Abreu and Mendes (2002), Staikouras and Wood (2004), Goddard et al. (2004), Athanasoglou et al. (2006), Micco et al. (2007) and Pasiouras and Kosmidou (2007).

All of the above studies examine combinations of three categories of factors effecting on bank performance, namely bank-specific, industry-specific, and macroeconomic factors. The empirical results vary significantly, since both data sets and environments differ. There exist, however, some common elements that allow a further categorization of the explanatory factors. Molyneux and Thornton (1992) is one of the first works who nicely illustrated this approach by investigating bank profitability of 18 European countries over the period 1986–1989. Demirgüç-Kunt and Huizinga (1999) underlined the internal and external determinants of profitability for banks of 80 countries over the period 1988–1995. Most researchers have measured performance using either Return on Equity (ROE) or Return on Assets (ROA).The major studies dealing with micro-specific factors employ variables such as size, risk, capital adequacy and operational efficiency.

The bank size is generally introduced to account for existing economies of scale in the market banking. The relationship between size and profitability is an important part of the firm's theory. Since larger banks are more capable to realize economies of scale and reduce the cost of gathering and processing information (Demerguç-Kunt and Huizingha (1999), Toni Uhomoibhi, (2008), Dietrich and Wanzenried (2011), the bank size should be positively associated with its performance. However, extremely large banks might illustrate a negative relationship between size and profitability. This is due to agency costs, the overhead of bureaucratic processes, and other costs related to managing large firms (e.g. Stiroh and Rumble, 2006; Pasiouras and Kosmidou, 2007).

Smirlock (1985) find a positive and significant relationship between size and bank profitability. More recently, Pasiouras and Kosmidou (2007) report the same result and argue that larger banks might have a higher degree of production and loans diversification than smaller ones. Other studies suggest that small cost saving can be achieved by increasing the size of a banking firm (Berger et al., 1987). Ayadi and Boujelbene (2012) in their banking performance study of twelve Tunisian deposit banks over the period of 1995-2005, notice a significant positive relation between size and Return on Average Assets proving the existence of economies of scale in the Tunisian banking sector. On the contrary, Ben Naceur, and Goaied (2010), show that size impact negatively on profitability which involves that Tunisian banks operating above their optimum level. Similarly, Sinkey (1991) concludes that larger banks are more profitable than smaller ones. So, the impact of bank size on its profitability cannot be theoretically anticipated.

Given by the international prudential regulation, capital ratio was considered as an important tool for assessing capital adequacy and should capture the general safety and soundness of banks. Consequently, highly capitalized banks might reduce their funding costs, which affect positively their profitability. By the other hand, highly capitalized banks usually have a reduced need to external funds, which has again a positive effect on their profitability. However, if we consider the conventional risk-return hypothesis, we have to expect banks with lower capital ratios to have higher returns in comparison to better-capitalized financial institutions. Bourke (1989) report a positive and significant relationship between capital adequacy and profitability. He concluded that the higher the capital ratio is, the more the bank's profitability is. Kosmidou et al., (2005) confirm a positive and highly significant relationship between the equity ratio to total assets and profitability, measured by Net Interest Margin (NIM). Thus, banks are seeking to slight the cost of their relatively high capital ratios by requiring higher NIM. In this vein, Molyneux and Thornton (1992) confirm the positive relationship but in only state-owned banks. Recently, Chien-Chiang Lee and Meng-Fen Hsieh (2013) examine the impacts of bank capital on profitability and risk for 42 Asian countries over the period 1994 to 2008. Their results point out a positive and significant relationship between capital adequacy and performance (proxied by ROA, NIM, and Net Result) for overall Asian banking system. However, Dietrich and

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Wanzenried (2011), find no significant effect of capital ratio on bank profitability before the crisis in Switzerland. Nevertheless, it has a negative and significant impact on bank's profitability as measured by Return on Average Assets during the financial crisis 2007–2009. Again, anticipating the net impact of changes in this ratio is complex.

While some studies considered the overall bank risk as a determinant of their performance, other studies focus on one particular and major risk affecting bank profit, such as the credit risk. In the literature on bank profitability, the bank loans over total assets ratio is mainly used as a proxy for credit risk when data do not permit the calculation of the non performing loans (Maudos and De Guevara, 2004). Delis Dietrich, and Wanzenried (2011) was the first study approximating credit risk or credit quality by the Loan loss provisions over total loans ratio. Bourke (1989) and Molyneux and Thornton (1992), among others show that the level of credit risk tend to be negatively associated with bank's profitability. Miller and Noulas (1997) suggest a negative relationship between credit risk and profitability because a higher loan to asset ratio increases the exposure of banks to bad loans and hence lowers profit margins. This result might reflect the fact that the higher the loans-to-assets ratio (as a proxy for credit risk) is, the more financial institutions are exposed to high-risk loans and by far the greater accumulation of nonperforming loans will be. However, Kosmidou at al. (2005) and Fernandez (2007) provide the evidence that credit risk affect positively the bank profitability.

In addition, many researchers include operational efficiency as a specific-bank factor affecting their profitability. Theoretically more operational efficient bank is expected to be more profitable. However, measured by the cost-income ratio or by overhead costs to total assets ratio, some empirical literature found a negative relationship between operational efficiency and bank's profitability (Athanasoglou et al., 2008; Goddard et al., 2009). Others authors, show a positive relationship between profitability and expenses. Molyneux and Thornton (1992) provide the evidence that bank's expenses affect positively the European banking profitability. Their results defend the efficiency wage theory, which states that employee's productivity increases with the wage's rate. Similarly, Guru et al.(2002) and Ben Naceur (2003), suggest that banks are able to pass their overheads to depositors and borrowers in terms of lower deposit rates and/or larger lending assets. Nevertheless, Ben Naceur and Omra (2011) on MENA countries, find the opposite results when they consider the total operating costs divided by the sum of total earning assets and total deposits as a proxy of operational efficiency.

A further bank-specific variable is the ownership of a bank. According to Micco et al. (2007), in developing countries, state-owned banks tend to have a less profitability, less important margins, and higher overhead costs than privately owned banks. Barth et al. (2004) and Iannotta et al. (2007) report a similar result; government ownership of banks is negatively related to bank efficiency. On the contrary, the results of Bourke (1989), Molyneux and Thornton (1992) suggest that ownership type is irrelevant for explaining profitability. Authors find a little evidence to support the theory that state-owned banks are less profitable than privately owned ones. However, we can notice that ownership structure is always measured in empirical literature by a dummy variable that take a value of one if bank is publicly owned and Zero otherwise.

Concerning the industry specific variables, empirical literature underline the market concentration, the ownership statue, the financial market development and the size of bank system among others as variables affecting bank profitability. Smirlock (1985), Bourke (1989) and Staikouras and Wood (2003) provide evidence that industry concentration has a positive impact on banking performance. They show that high concentrated bank system allows to a large monopolistic power of firms, and then improve profit margins of banks. Similarly, Bourke (1989) and Molyneux and Thornton (1992), find a positive and significant relationship between bank concentration ratio and bank's profitability. Thus, they confirm the structure–conduct–performance hypothesis which stipulates that higher market power submit monopoly profits. However, BenNaceur (2003) and Staikouras and Wood (2004), among others, conclude that an inverse relation exists between concentration and bank profitability.

Regarding to the bank size system, Demerguç-Kunt and Huizingha (1999) provide the evidence that small size bank system allow to high margins and profits, when they explore the bank profitability of 80 countries over the 1988-1995 period. In further study, using a larger sample of developed and developing countries over the period 1990-1997, Demerguç-Kunt and Huizingha (2001), investigate whether financial structure plays a key role in determining banking performance. They conclude that the less profitable banks are those operating in high developed bank system. This means that more competitiveness bank sectors, where bank asset-to-GDP ratio is high, allow for lower margins and less profitability. As well, BenNaceur (2003), reports that the growth of bank system does not necessary contribute to improve profitability of the banking sector in Tunisia. From their part, Eichengreen and Gibson (2001) investigate market-specific profitability determinants in Greek over the 1993–1998 period. They find, that concentration ratios and market shares, as market-specific variables, reveal positive but not significant effect on profitability proxies.

The last category of bank's factors affecting bank performance deals with macroeconomic environment. Those external factors cannot be controlled by

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bank's managerial power. They just reveal the economic and legal environments within banks operate and that might affect their procedure and then their performance. Among a number of macroeconomic variables, the growth of the gross domestic product, the long-term interest rate, and inflation are often held in previous literature.

According to the literature on the association between economic growth and financial sector profitability (e.g. Demirguc-Kunt and Huizinga, (1999); Bikker and Hu, (2002); Kosmidou and al., (2005), Pasiouras and Kosmidou, (2007) and Athanasoglou et al., (2008), GDP growth affect positively bank's profitability. However, Ben Naceur and Goaid, (2005) suggest that GDP growth does not tell any characteristic of the banking regulation and the advanced technology in the banking sector. By the other side, Staikouras and Wood (2003) find two of their three macroeconomic indicators, the variability of interest rate and the growth of GDP, have a negative impact, while the level of interest rate have a positive effect on bank performance.

Association between inflation and bank's profitability is ambiguous. Revell (1979) initiates the question of the relationship between bank performance and inflation. He highlights the fact that inflation's effect on bank profitability depends on whether banks' wages and other operating expenses increase at a similar rate than inflation. In this vein, Perry (1992) suggests that the extent to which inflation affects bank profitability depends on whether inflation expectations are fully anticipated. So, if inflation rate is appropriately anticipated by the bank's management, banks may be able to appropriately adjust interest rates, and thus increase their revenues faster than their costs, acquiring higher profits.

A large number of studies (e.g. Bourke, 1989; Molyneux and Thornton, 1992; Guru et al. (2002) and Jiang et al. (2003), although different, have revealed a positive relationship between inflation and profitability. However, Abreu and Mendes (2000), point out a negative relationship between the inflation rate and bank's profitability in European countries. Likewise Ayadi and Boujelbene (2012), report a negative effect of inflation on Tunisian bank profitability over the 1995-2005 period. In the same way, Demirguc-Kunt and Huizinga (1999) suggest that banks with high capital ratio in developing countries tend to be less profitable in inflationary environments.

III. Data, Variables and Model Specification

This section identifies the sources of our data, presents the data itself, describes the regression model we use to investigate the effects of bank specific, industry-specific and macroeconomic factors on bank profitability and summarizes the empirical results for our profitability measures. The empirical study on determinants of bank's performance can suffer from two sources of inconsistency: highly persistent profit and endogeneity bias (Poghosyan and Hesse, 2009). To correct for these potential problems, we adopt the dynamic panel model in our empirical analysis.

a) Data

To examine factors explaining bank profitability in Tunisia, we collected data related to the main deposit banks in Tunisia (10 banks) over the period 1998-2011. Micro data used in the empirical work is collected from annual reports of each selected banks. Only for non performing loans variable who's sourced from the Central Bank of Tunisia. The financial structure and macroeconomic indicators were extracted World Bank Development Indicators database. It consists of 14 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.

b) Variables Definition

We proxy the bank performance (BPer) by different measures commonly used in literature. We compute three standard measures of profitability for each bank throughout the period under study on the basis of annual accounting data; Both the Return on Assets (ROA), the Return on Equity (ROE), and Net Interest Margin (NIM) are considered in alternative specifications.

The first measure (ROA) reflects the ability of a bank's management to generate profits from the bank assets. As Golin (2001) points out, the ROA has emerged as the key ratio for the evaluation of bank profitability and has become the most common measure of bank profitability in the empirical literature. The ROA is defined as the ratio of net profits to total assets.

The second (ROE) reflects the return earned on the funds invested in the bank by its stockholders. ROE, on the other hand, reflects how effectively a bank management is using shareholders' funds. The ROE is defined as the ratio of net profits to total equity. Although many authors use the ROE to evaluate bank's performance, one may think that it is not the best indicator of profitability. Dietrich and Wanzenried (2011) suggest that banks with a lower leverage ratio (higher equity) usually report a higher ROA but a lower ROE. However, the ROE disregards the higher risk that is associated with a high leverage and the effect of regulation on leverage.

Finally, the NIM variable focuses on the profit earned on interest activities. It is defined as the net interest income divided by total assets. As a measure of the return on assets, the net interest margin has been used in many studies of bank performance. While the

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ROA measures the profit earned on assets and reflects how well bank management uses the bank's real investment resources, the NIM focuses on the profit earned on lending, investing and funding activities.

Thus, in our analyses, we consider the ROA and NIM as the better-quality measures of bank's profitability and use them as the main dependent variables, although we also report the results for the ROE.

We attempt to examine the bank's profitability impact of an extended number of factors with distinguishes internal determinants of bank's profitability to external ones. The internal factors include bank-specific factors (size, capital ratio, credit quality, operational efficiency, bank deposit growth ans ownership). The external ones reflect environmental variables that are expected to affect the profitability of financial institutions. External factors include both industry-specific variables (Concentration and size bank system) and macroeconomic (GDP Growth and inflation).

i. *Bank's Specific Factors*

Size (Size): is measured by the natural log of the book value of total assets as a percentage. The impact of bank size on its profitability cannot be theoretically anticipated.

Capital Adequacy (CAPAD): reflect the bank risk taking along with international prudential regulation. Capital adequacy is defined as the ratio of book value of equity to total assets. Large size of equity is expected to reduce the bank risk.

Nonperforming Loans (NPL): reflect bank's credit quality and it is measured by the proportion of nonperforming loans in total bank loans.

Cost-Income Ratio (CIR): reflect bank's operational efficiency and it is computed by total operating expenses (the sum of salaries and other operating expenses) over total generated revenues. More operational efficient bank is expected to be more profitable.

Growth Deposit (GDEP): reflect bank's growth and it is measured by the annual growth of the sum of its institutional and clientele deposits. Dietrich and Wanzenried (2011) suggest that the effect of this variable on profitability cannot be theoretically anticipated: One might anticipate that a faster growing bank would be able to increase its business and thus generate greater profits. But, the contribution of increasing deposits to profits depends upon a number of factors. The bad credit quality of those assets and bank's operating inefficiency might inverse the positive effect of deposit growth. Therefore, anticipating the sign of this variable is complex.

Ownership (OWN): measured by the percentage of bank equity hold by private sector, we use this variable to test whether privatization of banks promote their profitability.

ii. *Industry-Specific Factors*

Concentration (CONC): reflect the competitiveness among bank sector is measured by bank assets held by the three largest banks to total assets banks.

Size Bank System (SBS): reflect the importance of bank financing in the economy and it is measured by the ratio of total assets of banks to GDP.

iii. *Macroeconomic Factors*

GDP growth (GDP): this variable is used to account for economic environment and it is measured by reel GDP per capita growth. GDP growth varies over time but not among the banks.

Inflation (INF): This variable is used to represent the changes in the general price level or inflationary conditions in the economy and it is measured by annual country inflation rate.

c) Model Specification and Estimation Methodology

In order to check the bank-specific, industry-specific and macroeconomic factors affecting the Tunisian bank's profitability, we develop the following regression:

$$\boldsymbol{BPer}_{it} = \alpha_0 + \beta_{it}X_{it} + \sigma_{it}Y_{it} + \delta_{it}Z_{it} + \varepsilon_{it}$$

Where:

- i refers to an individual bank,
- t refers to the year,
- B Per is the dependent variable referring to the profitability measured by ROA, ROE and NIM,
- X is a vector of the individual-specific factors of a bank,
- Y is a vector of the industrial-specific factors,
- Z is a vector of the macroeconomic factors.

The complete model is then:

$$\boldsymbol{BPer}_{i,t} = \alpha 0 + \alpha 1\ \boldsymbol{BPer}_{i,t-1} + \alpha 2SIZEi,t + \alpha 3CAPADi,t\text{-}1 + \alpha 4NPLi,t + \alpha 5CIRi,t + \alpha 6GDEPi,t + \alpha 7OWNi,t + \alpha 8CONCi,t + \alpha 9SBSi,t + \alpha 10GDPi,t + \alpha 11INFi,t + \varepsilon i,t \quad (1)$$

Given the dynamic nature of our model, least squares estimation methods are biased and inconsistent (Baltagi, 2001). Then, we have to use techniques for dynamic panel estimation that are able to deal with the biases and inconsistencies of our estimates. Further, estimation of bank profitability refers to the endogeneity problem. According to García-Herrero et al. (2009), more profitable banks, may be able to increase their equity more easily by retaining profits. Similarly, they could also pay more for advertising campaigns and

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increase their size, which in turn might affect profitability. However, the causality could also go in the opposite direction, because more profitable banks can hire more personnel, and thus reduce their operational efficiency. Another important problem is unobservable heterogeneity across banks, which might exists in the Tunisian banking industry.

To study the empirical determinants of Tunisian banks performance, we will follow the study of García-Herrero et al. (2009), and address these problems by employing the generalized method of moments (GMM), following Blundell and Bond (1998), also known as GMM system estimator.

This last methodology retains a system of two equations-the original equation as well as the transformed one-. The Arellano and Bond test for autocorrelation has a null hypothesis of no autocorrelation and is applied to the differenced residuals. The test for AR (2) in first differences is more important, because it detect autocorrelation in terms of levels. The validity of the instrumental variables is tested using Sargan test of over-identifying restrictions and over a test of the absence of serial correlation of the residuals. As our data contain a small number of banks, we use the method one-step GMM-in-System estimator. All in all, this estimator yields consistent estimations of the parameters.

IV. Findings and Major Results

This section provides empirical evidence on the determinants of bank profitability in the Tunisian Banking industry. We introduce summary statistics for all variables in Table 1. A broad description of the characteristics of the variables used in the study is given in Table 1, which reports their statistical means, standard deviation, minimal and maximal level. The correlation matrix for the independent variables can be found in Table 2. Next, we report the results of all the return on asset, return on equity and net interest margin regressions, respectively in column 2, 3 and 4.

Table 1 : Descriptive statistics for variables

Variables	Obs	Mean	Std. Dev.	Min	Max
ROA	140	0.8070952	1.342196	-10.31148	2.912641
ROE	140	315.1361	2058.555	-176.478	17000
NIM	140	2.897413	1.163921	0.7681571	7.319218
Size	140	21.61731	.5610169	20.45424	22.69988
CAPAD	140	9.349399	3.048374	-1.094332	17.48179
NPL	140	21.98929	18.07802	5.2	98
CIR	140	49.71864	11.86809	24.57	84.8
GDEP	140	818.0655	9194.508	-11.63083	104845.1
OWN	140	81.0521	23.08661	31.65	100
CONC	140	45.74847	1.521739	42.74229	47.4283
SBS	140	65.24694	5.157415	55.99841	76.53999
GDP	140	3.056032	2.113941	-2.947252	5.249388
INF	140	3.301598	.8538632	1.983333	4.920696

According to the descriptive statistics reported in Table 1, Tunisian banks have a ROA of 0.80% over the entire period from 1998 to 2011. The difference between Min and Max clearly shows that there are large differences in profitability among the Tunisian banks. The same holds true for our second main profitability measure, the NIM, which amounts to 2.89% on average. This significant amount of variation can be explained by the factors included in our analyses.

Now, let us briefly highlight a few interesting facts. Concerning bank-specific indicators, the capitalization of Tunisian banks is 9.34% on average, which largely respect the key international prudential regulation of Basel II. However, this ratio differs among banks, like the other variables as well. The best-capitalized bank in our sample, for instance, has a capital ratio of 17.48%, whereas, capital ratio is negative for some banks at some years. The non performing loans relative to total loans, which is an indicator of the credit risk, amounts to 21.98% on average, which seems very high comparing to the limit fixed by national prudential regulation (Tunisian Central Bank). But there exist again large differences among the banks in our sample.

In addition, private sector holds 80% of Tunisian banks equity with a minimum of 30% in public statue banks. The concentration, as a bank assets held by the three largest banks over total bank system assets, amounts to 45.74% on average.

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Table 2 : Correlation Matrix

	Size	CAPAD	NPL	CIR	GDEP	OWN	CONC	SBS	GDP	INF
Size	1.0000									
CAPAD	-0.2811	1.0000								
NPL	0.0270	-0.2042	1.0000							
CIR	0.0325	-0.4800	0.2642	1.0000						
GDEP	0.1180	-0.0349	-0.0507	-0.0505	1.0000					
OWN	-0.4244	0.2009	-0.1085	-0.3129	-0.1170	1.0000				
CONC	-0.4557	0.1119	0.0284	0.1508	-0.1670	-0.0582	1.0000			
SBS	0.5273	-0.1309	-0.0547	-0.1143	0.1179	0.0665	-0.6126	1.0000		
GDP	-0.3400	0.0507	0.0404	0.0896	-0.0434	-0.0373	0.5373	-0.8081	1.0000	
INF	0.4064	-0.1502	-0.0930	-0.0898	0.1101	0.0711	-0.3575	0.3091	-0.0494	1.0000

Examination of the correlation coefficients, allows us to study the null hypothesis of no correlation between explanatory variables. Following Kennedy (1985), we consider 0.8 as the limit value of the correlation coefficient to confirm the null hypothesis. So, if correlation between two variables exceeds 0.8, we have to reject the null hypothesis; it's not possible to hold the two variables in the same model.

As shown in the table 2, all correlation coefficients are smaller than 0.8 at which the pheno-menon of colinearity is pronounced. Then, there is no problem of multicollinearity.

The lagged dependent variable, which measures the degree of persistence of profitability, measured by ROA, ROE or NIM, is statistically significant across all models, indicating a high degree of persistence of bank performance and justifying the use of a dynamic model. However, we observe some significant differences between the estimation results of the different regressions.

Considering the internal factors related to the bank-specific characteristics, as to bank size, which we track by the logarithm of bank total assets, we find some empirical evidence that smaller commercial banks were more profitable than larger ones. This finding corroborate those of Smirlock (1985) and Bikker and Hu (2002) who suggest that larger banks were able to benefit from higher product and loan diversification possibilities, and economies of scales. The main reason for this negative relationship between size and profitability is that larger banks in Tunisia had relatively higher loan loss provisions during the retained period. Added to that, this negative impact implies that Tunisian banks are operation above their optimum level as reported by Bennaceur and Goaied (2010).

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Table 3 : Explanatory factors of Tunisian banks' profits

	ROA	ROE	NIM
Π_{t-1}	-0.1470469** (0.015)	.5587899*** (0.000)	0.346462*** (0.000)
Constant	5.971277 (0.530)	2385.733 (0.824)	42.19357*** (0.000)
Bank Specific Variables			
Size	-0.0165835** (0.028)	172.3497 (0.714)	-1.48617*** (0.000)
CAPAD	0.2883721*** (0.000)	-77.99849 (0.197)	0.0208083*** (0.005)
NPL	0.0022443** (0.011)	7.0688 (0.315)	0.00267 (0.291)
CIR	-0.0683811*** (0.000)	-29.23915** (0.041)	-0.0394382*** (0.000)
GDEP	-0.0000116 (0.227)	.0029982 (0.785)	-3.68e-06 (0.396)
OWN	0.0081584* (0.082)	-2.227418 (0.861)	0.0093819** (0.027)
Bank Industry Variables			
CONC	-0.1034975** (0.013)	67.48607 (0.431)	-0.1213633*** (0.001)
SBS	-0.0134696** (0.039)	-109.3861** (0.020)	-0.0253263 (0.217)
Macroeconomic Variables			
GDP	0.0139725 (0.844)	-171.466** (0.027)	-0.0651441** (0.036)
INF	-0.1224765 (0.309)	183.0932 (0.159)	-0.2104966*** (0.000)
N	130	130	130
Wald test	1.56e+08	501.79	495.54
P-value Wald test	0.000	0.000	0.000
AR (2)	61.1769	0.5432	1.2457
P-value AR (2)	0.2392	0.5870	0.2129
Sargan test	0.7014	2.83e-22	1.24e-23
P-value Sargan test	1.000	1.000	1.000

This table presents the results from regressions conducted to determine explanatory variables of Tunisian bank profitability. Estimations were performed using GMM dynamic model estimation in system. p-values in brackets; * Significance at the 10%.; ** Significance at 5%; *** Significance at 1% AR (2): test of null of zero second-order serial correlation, distributed N (0, 1) under null.; Sargan-statistics is the test of over-identifying restrictions.

Next, Consistent with the results of Buser, Chen and Kane (1981) and Bennaceur and Goïd (2008), we confirm the positive relationship between capital ratio and bank profitability, whether we use interest margin or return on assets as a proxy of bank performance. 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 pay less on deposits because they face lower bankruptcy risks. Although, using return on equity as a proxy of bank performance we found a negative and no significant correlation. This is can be explained by the fact that some listed banks may have effectively lower their equity capital to increase the ROA.

Consider non performing loans to total loans ratio, bank risk enters positively in all the ROA, ROE and NIM regressions but only significant in ROA regression. The positive impact of credit risk on bank profitability could be explained by the fact that higher credit risk should improve bank incomes since loans are the most risky and, hence, the highest-yielding type of assets. Thus, our result confirms those found by Kosmidou et al. (2005) and Fernandez (2007).

Our operational efficiency indicator is negatively related to profitability for all regressions. It is particularly

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high significant when we profitability is measured by return on assets and net interest margin. This mean that the more efficient a bank is the higher is its profitability. This result confirms our expectation and stands in line with the results of Athanasoglou et al. (2008). However, our finding corroborates those of Bennaceur and Omra (2011) on MENA countries, when they consider the total operating costs divided by the sum of total earning assets and total deposits as a proxy of operational efficiency.

The yearly growth of deposits has no significant impact on Tunisian bank profitability and this effect is mainly driven by the crisis years. It seems that banks in Tunisia were not able to convert the increasing amount of deposit liabilities into significantly higher income earnings above all in recent time.

Added to that, table 3 shows that privatization of Tunisian banks positively and significantly affects profitability. According to the findings of Micco et al. (2007) and Iannotta et al. (2007), who's point out that government-owned banks reveal a lower profitability than privately owned ones, our results confirm the advantage of private banks in a matter of performance. The relationship between either NIM and ROA and private ownership variable (OWN) is positive and significant meaning that private owned banks generate better profit than their state counterparts. This is a clear signal to encourage the privatization policy taken by Tunisian authorities.

Turning to the external factors related to the financial structure in Tunisia, our study finds that the more the market is concentrated, the lower the banks profit is. Bank concentration is negative and significant in all the return on assets and net interest margin regressions. This fining is consistent with Berger (1995), who supports the argument that concentration is usually negatively associated with profitability once the institutional and regulation variables are controlled for. However, bank concentration enters positively and not significantly in the return on equity regression.

Turning to bank activity (SBS) and its impact on bank performance, our results show that the increase of size bank system do not contribute to enhance profitability in the Tunisian banking industry. Therefore the bank assets to GDP ratio enters negatively and significantly related in all return on assets and return on equity regressions. According to Demirguc-Kunt and Huizinga (1999), our results suggest that in countries where the banking assets largely contribute to GDP, banks are less profitable.

Regarding the external factors related to the macroeconomic environment in Tunisia, the coefficient on economic growth variable (GDP) is negative and significant in all return on equity and net interest margin regressions. Those results are contrary to our expectations and corroborate the major study relating real output to performance. Nevertheless, Staikouras and Wood (2003) found two of the three macro-economic indicators, the variability of interest rate and the growth of GDP had a negative impact, while the level of interest rate had a positive effect on bank performance.

By the other hand, our results show week significance about the impact of inflationary conditions in the economy on bank performance. It seems that only net interest margin is negatively and significantly affected by inflation. This means that Tunisian banks do not adjust their lending rates accordingly to inflation and consequently they allow the entire negative cost of inflation.

V. Conclusion

This paper has examined how bank-specific characteristics, industry-specific and macroeconomic factors affect the profitability of 10 listed commercial banks in Tunisia over the period from 1998 to 2011.

For this purpose, we used a dynamic model specification that allows for profit persistence. Our results clearly showed that differences in profitability among the Tunisian banks can be explained by the factors included in our analyses. Furthermore, our results illustrated that bank-specific and industry-specific characteristics explain a substantial part of the within-country variation in performance.

First, we found that bank profitability is mainly explained by adequate capital and operational efficiency. So, Banks that hold a relatively high amount of capital is more profitable than less capitalized ones. And efficient banks are more profitable than banks with high cost income ratio. We also found some evidence that ownership is an important determinant of profitability. Larger is the percentage of foreign-owned banks more profitable is the bank. So, at the nation level, privatizing state owned banks is recommended in order to improve bank performance.

The bank size generally had negative and significant coefficients on the bank profitability. This negative impact may simply implies that Tunisian banks are operation above their optimum level.

Concerning industry-specific characteristics and its impact on Tunisian bank performance, we found concentration and size bank system has a negative impact on bank profitability, essentially measured by return on assets and net interest margin.

Second, as for the impact of macroeconomic indicators on bank performance, we concluded that these variables have no significant impact on the return on assets. However, GDP growth and inflation are significantly related to the net interest margin. Inflation shocks seem to be passed mainly through the deposit rates, and this means that banks bear the entire negative cost of inflation.

On the whole, our findings provided some remarkable new insights into the mechanisms that determine the Tunisian commercial banks performance.

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These results are relevant for a number of reasons. First, because we considered a larger set of bank-specific, industry-specific and macroeconomic determinants of bank profitability, which extends our comprehension of bank profitability. Second, we used the GMM system estimator developed by Blundell and Bond (1998). So, we applied an advanced econometric procedure that addresses the issue of endogeneity of independent variables, which, in this type of study, can lead to inconsistent estimates. Finally, our dynamic model specification allowed for the fact that bank profits show a tendency to persist over time, reflecting impediments to market competition, informational opacity, and sensitivity to macroeconomic shocks. Further, our approach seems to be incomplete in that way that do not consider other managerial aspects that may influence Tunisian bank performance. Internal mechanism governance can be one of those managerial aspects which may be important in understanding bank profitability.

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