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What Determines the Profitability of Banks During and before the International Financial Crisis? Evidence from Tunisia

Houssem Rachdi
Faculty of Law, Economic and Management of Jendouba, University of Jendouba, Tunisia
French Corporate Governance Association, France
rachdih@uvic.ca

ABSTRACT

The current international financial crisis has highlighted that a well-functioning financial system is significantly important for economic growth. The aim of this study is to specify an empirical framework to investigate the impact of bank-specific, industry-specific and macroeconomic determinants on the profitability, before (2000-2006) and during (2007-2010) the international financial crisis, in the large Tunisian commercial banks. The measures of profitability that have been used in the study are the return on equity (ROE), return on assets (ROA) and net interest margin (NIM). We adopt the dynamic panel approach to correct for these potential problems by using the generalized method of moments in system (GMM in system). Our empirical study allowed us to conclude that the Tunisian banking sector was slightly exposed to the effects of the international financial crisis because of its low integration in international financial markets.

Keywords: *Financial crisis, bank profitability, Tunisia, GMM in system.*

1. INTRODUCTION

Banks are the brain in each economy in financing economic activity and different segments of the market. Profitable and sound banks contribute to the stability of the financial sector. Last decencies, especially in crisis periods, determinants of bank profitability have attracted the interest of managers of banks, public authorities and academic researchers and continue to be a fundamental issue in the literature. Findings of recent literature are often inconclusive (e.g., Athanasoglou et al. 2008; Brissimis et al. 2008; García-Herrero et al. 2009; Dietrich and Wanzenried 2011; Lee and Hsieh 2013).

The main contribution of this study is an analysis of how bank-specific (i.e. capital adequacy, liquidity, operational efficiency, growth of deposits, bank size, interest income share, off-balance sheet activities), industry-specific (i.e. ownership, concentration) and macroeconomic (i.e. inflation rate, GDP growth, effective tax rate, term structure of interest rates) determinants affect performance in Tunisian banking industry measured by return on assets (ROA), return on equity (ROE) and net interest margin (NIM).

Few scientific papers treat the impact of financial and banking crisis on bank profitability. The majority of studies have investigated only determinants of banking performance in Tunisia (e.g., Ben Naceur 2003; Ben Naceur and Goaied 2001-2008; Ayadi and Boujelbene 2012). Likewise, no econometric study has yet considered the determinants of profitability for Tunisian banks during periods of dramatically levels of economic growth in the period of US subprime crisis. During the last two decades the banking sector in Tunisia has experienced major transformations in its operating environment. Using the GMM in system method of Blundell and Bond (1998), the present study aims to contribute to the literature in examining the determinants of banking performance in 10 large commercial banks in Tunisia before the (2000-2006) and during the crisis (2007-2010).

The paper is structured as follows. Section 2 surveys the relevant literature on determinants of banking profitability. Section 3 outlines our model, describes the data sample and methodology used and presents the major findings of our empirical study. Section 4 concludes.

1.1 Related Literature in Determinants of Bank Profitability

In general, bank profitability is usually measured by ROA, ROE, NIM and Tobin's Q and expressed as a function of internal (bank-specific) and external (macroeconomic, industry-specific and bank governance) factors. Since seminal works of Short (1979) and Bourke (1989), many studies has focused to attempted in different countries and in banking sector of individual countries to identify the most important determinants of bank profitability (e.g., Demirguc-Kunt and Huizinga 1999; Mamatzakis and Remoundos 2003; Micco et al. 2007; Pasiouras and Kosmidou 2007; Athanasoglou et al. 2008; Ben Naceur and Goaied 2001, 2008; Athanasoglou et al. 2008; Garcia-Herrero et al. 2009; Fadzlan 2010; Alper and Anbar 2011; Suminto and Yasushi 2011; Dietrich and Wanzenried 2011; Kanas et al. 2012; Bolt et al. 2012; Lee and Hsieh 2013). Variables such as capital adequacy, liquidity, operational efficiency, growth of deposits, bank size, interest income share, credit risk, off-balance sheet activities, ownership, concentration, central bank intervention, inflation rate, GDP growth, effective tax rate and term structure of interest rates have a large or less impact on bank profitability.

Lee and Hsieh (2013) conclude that the extant literature presents an ambiguous impact of bank capital on profitability. Using data that cover 2276 banks for 42 Asian countries over the period 1994 to 2008, authors find that investment banks have the lowest and positive capital

effect on profitability and banks in low-income countries have a higher capital effect on bank profitability. Dietrich and Wanzenried (2011) find no correlation between the equity over total assets, as a proxy of capital adequacy, and bank profitability, i.e. the coefficient is always negative but never statistically significant when using return on average equity (ROAE) and i.e. the coefficient is always positive but never statistically significant when using Net Interest Margin (NIM). Other studies, like Demirguc-Kunt and Huizinga (1999), Garcia-Herrero et al. (2009), Fadzlan (2010), Liu et al. (2010) and Suminto and Yasushi (2011), concluded that the best performing banks are those who maintain a high level of equity relative to their assets because they can face lower costs of funding due to lower prospective bankruptcy costs.

Furthermore, there is also empirical evidence that liquidity, measured by total loans to total assets, positively affects bank profitability (Abreu and Mendes 2002) and negatively affects bank profitability measured by ROA, ROE and NIM (Liu et al. 2010). Another determinant of profitability is the level of operational efficiency. Athanasoglou et al. (2008) and Goddard et al. (2009) point out a positive correlation between the cost income ratio and bank profitability. In contrast, Dietrich and Wanzenried (2011) find a negative and highly significant relationship between operational efficiency and profitability, measured by ROAE and NIM, in the Swiss banks over the period 1999-2006.

A further bank-specific variable is the size of the bank. Dietrich and Wanzenried (2011), Pasiouras and Kosmidou (2007) and Alper and Anbar (2011) find a positive and statistically significant relationship between bank size and bank profitability because large banks have higher degree of loans and product diversification than small and medium banks. Trujillo-Ponce (2013) point out that large bank can imply economies of scope for the bank resulting from the joint provision of related services. Micco et al. (2007) find, also, positive and but no significant correlation. In contrast, Kasman (2010) find a significant negative coefficient between bank size and Net Interest Margin in a panel of 431 banks from 39 countries. It is generally assumed that the old banks are more profitable than banks recently created due to their experience and stability (Beck et al. (2005)). Old banks have better relationships with lenders that lower the cost of debt (Dewaelheyns and Van Hulle (2007)). In addition, newly established banks are focusing on increasing their market share rather than on improving profitability (Athanasoglou et al. 2006). Stanger (2000) found that there is a positive relationship between age and the bank's profitability. However, a negative relationship between age and the growth rate was reported by Almus and Nerlinger (1999). Zeitun (2012) noted that age has no significant impact on ROA, while there is a significant negative effect of age on ROE. Furthermore, Dietrich and Wanzenried (2009) found that the age of the bank does not have a significant impact on bank profitability.

As to ownership, empirical results are ambiguous. Some studies found strong empirical evidence that ownership has an impact on bank performance (e.g., Short 1979; Molyneux and Thornton 1992; Loukil and Chaabane 2009; Mamoghli and Dhouib 2009) found no significant relationship between ownership status and the bank profitability. Dietrich and Wanzenried (2011) find mixed results across different measures of bank profitability. They find that, in Swiss, public-owned banks are more profitable than privately owned banks during the financial crisis. In this time of turmoil, public-owned banks were considered as safer and better banks in comparison to privately owned institutions. For Micco et al. (2007), there is no evidence to support the idea that privately banks are more profitable than public banks. Lannotta et al. (2007) conclude that public owned banks exhibit a lower profitability than privately owned banks because they finance projects with higher level of risk.

More to the bank-specific and to the industry-specific variables described above, determinants of bank profitability includes some macroeconomic characteristics that we except to have an impact on bank performance. The most macroeconomic determinants used on empirical literature are GDP growth and inflation. Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (1999), Kosmidou et al. (2005), Athanasoglou et al. (2006), Pasiouras and Kosmidou (2007), Athanasoglu et al. (2008), Davydenko (2010), Dietrich and Wanzenried (2011) and Zeitun (2012) find a positive correlation between GDP growth and bank profitability. However, Ben Naceur (2003) found no impact on economic growth on profitability. Kosmidou (2008) found a negative relationship. Al-Khouri (2011) found that the rate of inflation is irrelevant and is not significantly related to profitability.

2. EMPIRICAL STUDY

2.1 Data, Models and Measures of Variables

To study the empirical determinants of bank profitability in Tunisia over the period 2000-2010, data is sourced from Tunis Stock Exchange, annual reports of the selected banks, Fitch-IBCA Bankscope database and International Financial Statistics (IFS) Database. The general models to be estimated are of the following the linear forms specified as a dynamic model that include one lag of performance as an explanatory variable.

Model 1: bank-specific and industry-specific determinants of bank profitability

$$PERF_{it} = \alpha + \eta PERF_{i,t-1} + \beta_1 CAP_{i,t\ \ 1} + \beta_2 LIQ_{it} + \beta_3 CIR_{it} + \beta_4 DEP_{it} + \beta_5 SIZE_{it} + \beta_6 OBS_{it} + \beta_7 HH_{it} + \varepsilon_{it}$$

Model 2: bank specific, industry-specific and macroeconomic determinants of bank profitability

$$PERF_{it} = \alpha + \eta PERF_{i,t-1} + \beta_1 CAP_{i,t\ \ 1} + \beta_2 LIQ_{it} + \beta_3 CIR_{it} + \beta_4 DEP_{it} + \beta_5 SIZE_{it} + \beta_6 OBS_{it} + \beta_7 HH_{it} + \beta_8 INF_{it} + \beta_9 GDP_{it} + \varepsilon_{it}$$

Where subscripts i denotes individual banks (i = 1,2, . . . ,10: Amen Bank, Arab Tunisian Bank, Attijari Bank, Banque de l'Habitat, Banque Internationale Arabe de Tunisie, Banque Nationale Agricole, Banque de Tunisie, Société Tunisienne de Banque, Union Bancaire pour le Commerce et l'Industrie and Union Internationale de Banques), t time period (t = 2000,…,2010). η, β are the parameters to be estimated. ε is the remaining disturbance term.

Performance (PERF): we employ three measures. These include ROA (Return on Assets: Net Profit before tax to Total Assets), ROE (Return on Equity: Net Profit before tax to Total Shareholders' Equity) and NIM (Net Interest Margin: The net interest income as a percentage of average earnings assets). Our profitability determinants include bank-specific, industry-specific and macroeconomic factors:

Bank-specific and Industry-specific factors

- Capital adequacy: Equity over total assets (CAP). All the 10 banks in our sample are subject to the Basel II capital adequacy regulations (Tunisian Banks are required to hold at least 8% of capital against their risk weighted assets).
- Liquidity : Total loans to customers to total assets (LIQ)
- Cost-income ratio: Total expenses over total generated revenues as a measure of operational efficiency (CIR)
- Yearly growth of deposits: We measure a bank's growth by the annual growth of its deposits (DEP)
- Bank size: We measure bank size by the accounting value of the bank's total assets (SIZE)
- Off-balance sheet activities **:** Noninterest income over total assets (OBS)
- Concentration **:** Herfindahl-Hirschman index (HH)

Macroeconomic factors

- Current period inflation rate (INF)
- The yearly real GDP growth (GDP)

3. SUMMARY STATISTICS

Table 1 contains the descriptive statistics for the variables that investigate the effect of specific, industry and macroeconomic factors on bank performance. It presents means, frequencies, maximums, minimums and standard deviation of all the variables. Table 2 presents the correlation coefficients of the variables used in our models.

Table 1: Summary statistic of dependent and explanatory variables: 2000-2010

Variable	Mean	St. Deviation	Minimum	Maximum
ROA	0.73	1.51	-10.65	2.91
ROE	1.07	94.98	-9.69	29.77
NIM	2.58	0.79	0.77	4.63
CAP	9.38	3.11	-1.1	17.48
LIQ	72.24	8.54	43.49	83.57
CIR	2.37	0.67	1.19	4.06
DEP	11.12	7.58	-6.68	31.17
SIZE	21.646	53.17	20.037	22.633
OBS	1.78	0.44	0.87	3.05
HH	11.70	0.27	11.12	12.04
GDP	4.56	1.29	1.7	6.3
INF	3.32	0.97	1.9	4.9

Table 2: Correlation Matrix for the explanatory variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CAP (1)	1.0000								
LIQ (2)	0.1856	1.0000							
CIR (3)	-0.0842	-0.1007	1.0000						
DEP (4)	-0.1229	-0.2373	-0.1442	1.0000					

SIZE (5)	-0.2923	-0.0436	-0.4008	0.1135	1.0000				
OBS (6)	0.0224	-0.6645	0.3515	0.1438	-0.2656	1.0000			
HH (7)	0.1666	0.0704	0.2011	-0.2004	-0.5081	-0.0470	1.0000		
GDP (8)	-0.0352	-0.0366	0.0697	0.1698	-0.1020	0.0594	0.1496	1.0000	
INF (9)	-0.1309	-0.0530	-0.1104	0.2111	0.2997	0.1044	-0.5134	0.0713	1.0000

For brevity for the full period 2000-2010, the descriptive statistics, in table 1, of Capital adequacy, Liquidity, Cost-income ratio, Yearly growth of deposits, Bank size, Off-balance sheet activities, Concentration, Yearly real GDP growth and Current period inflation rate are omitted. On average, the 10 banks in our sample have a ROA of 0.73% over the entire period. This implies that the Net Profit before tax represents 0.73% of total Assets. The mean of ROE for the sample is 1.07%. The Net Profit before tax represents 1.07% of total Shareholders' Equity. The 10 commercial banks in our sample exhibit an average net interest margin of 2.58%.

Results in Table 2 indicate that all correlation coefficients are lower than 0.8. We conclude the absence of bi-variable multi-colinearity.

3.1 Econometric Methodology and Major Findings

The empirical study on determinants of bank's profitability can potentially suffer from three sources of inconsistency: highly persistent profit, omitted variables, and endogeneity bias. We adopt the dynamic panel approach to correct for these potential problems by using the generalized method of moments in system (GMM in system) of Blundell and Bond (1998). This estimator gives consistent estimates of parameters.

The test for AR (2) in first differences is more important, because it will 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. We will estimate models over 2 sub-periods: pre (2000-2006) and during the international financial crisis (2007-2010). Tables 3 and 4 present empirical results.

Table 3: Regression results for the period 2000-2006: Before the international financial crisis

Dep.variable	**ROA (1)**	**ROA (2)**	**ROE (1)**	**ROE (2)**	**NIM (1)**	**NIM (2)**
Lag Dep.V	0.180	0.568	0.406	0.784	0.599	0.999
	(1.67) *	(1.85) *	(2.19) **	(2.41) **	(2.46)**	(1.69) *
CAP	0.249	0.121	-1.253	-3.129	0.093	0.125
	(2.10)**	(2.98) ***	(0.93)	(0.91)	(1.87)*	(2.40) **
LIQ	0.078	0.057	0.979	1.329	0.044	0.050
	(2.23)**	(1.33)	(2.44)**	(2.77)***	(2.48)**	(0.79)
CIR	-2.767	-1.534	-3.188	-5.612	-1.106	-1.722
	(2.28)**	(2.90)***	(2.36)**	(2.88)***	(2.48)**	(2.91)***
DEP	-0.005	-0.017	-0.180	-0.331	-0.018	-0.030
	(0.74)	(2.21)**	(1.79)*	(2.44)**	(3.60)***	(3.61) ***
SIZE	-0.003	-0.006	-0.012	-0.004	-0.001	-0.001
	(3.58)***	(2.34)**	(1.33)	(0.09)	(1.05)	(0.37)
OBS	0.297	0.559	-3.051	-5.173	0.484	1.013
	(1.67)*	(2.73)***	(0.72)	(0.28)	(0.82)	(0.24)
HH	0.431	0.488	5.139	9.366	0.100	-0.699
	(3.75)***	(2.56)**	(4.26)***	(1.82)*	(0.38)	(0.73)
INF		-0.063		-0.254		-0.052
		(2.36)**		(2.19) **		(2.24) **
GDP		0.071		0.181		0.006
		(2.85)***		(2.21) **		(2.07) **
Nb. obs.	54	54	54	54	60	60
Wald Chi^2	1297.59***	219.95***	165.46***	234.06***	111.30***	862.52***

Sargan test	4.023	4.82e-26	2.488	4.58e-22	1.488	3.72e-22
Pv Sargan	0.999	1.000	1.000	1.000	1.000	1.000
AR (2) test	0.741	-0.501	0.835	0.487	1.119	0.375
Pv AR (2)	0.458	0.616	0.403	0.625	0.262	0.707

Table 4: Regression results for the period 2007-2010: During the international financial crisis

Dep.variable	**ROA (1)**	**ROA (2)**	**ROE (1)**	**ROE (2)**	**NIM (1)**	**NIM (2)**
Lag dep.V	0.008	0.059	0.243	0.061	0.362	0.151
	(2.34) **	(2.59) **	(1.66)*	(2.16) **	(2.42) **	(2.39) **
CAP	-0.139	-0.072	-0.433	-3.031	-0.053	-0.255
	(3.65)***	(3.67)***	(0.56)	(1.50)	(1.40)	(2.74)***
LIQ	0.006	-0.013	-0.114	2.731	0.025	0.044
	(0.54)	(0.40)	(0.62)	(1.24)	(2.03)**	(2.14)**
CIR	-1.405	-1.604	-2.382	-1.781	-0.660	-1.021
	(2.00)**	(2.42)**	(1.61)*	(2.61) ***	(3.56)***	(3.28)***
DEP	-0.013	-0.015	-0.090	-0.778	-0.001	-0.005
	(2.10) **	(2.73) ***	(2.53) ***	(1.93)*	(3.14) ***	(2.61)***
SIZE	-0.003	-0.002	-0.001	-4.590	-0.002	-0.036
	(2.23)**	(2.02)**	(0.04)	(1.17)	(2.34)**	(2.53)**
OBS	-0.429	3.628	0.403	-3.457	-0.441	-4.978
	(0.56)	(0.98)	(0.02)	(1.31)	(0.56)	(2.31)**
HH	0.918	0.012	5.238	9.773	0.260	7.641
	(2.62)***	(2.01)**	(0.74)	(1.18)	(1.13)	(1.56)
INF		-0.05		1.089		8.156
		(2.02) **		(2.15)**		(2.44)**
GDP		-0.082		-1.284		-9.491
		(2.02)**		(2.15)**		(2.42) **
Nb. obs.	30	30	29	29	30	30
Wald Chi^2	1749.50***	28752.05***	1619.18***	1418.74***	360.86***	155.69***
Sargan test	0.986	8.13e-14	5.595	2.47e-11	1.910	1.94e-16
Pv Sargan	0.911	1.000	0.231	1.000	0.752	1.000

Note:

(1) Bank specific and industry-specific determinants of bank profitability.

(2) Bank specific, industry-specific and macroeconomic determinants of bank profitability.

ROA (Return on Assets), ROE (Return on Equity), NIM (Net Interest Margin), CAP (Capital adequacy), LIQ (Liquidity), CIR (Cost-income ratio), DEP (Yearly growth of deposits), SIZE (Bank size), OBS (Off-balance sheet), HH (Herfindahl-Hirschman index), INF (inflation rate) and GDP (real GDP growth).

T-student are in brackets. Coefficients that are significantly different from zero at the 1%. 5% and 10% level are marked with ***, ** and * respectively.

The Wald test is the test of the joint significance asymptotically distributed as chi^2 under the null of no significance. The Sargan test is the test for over-identifying restrictions in GMM dynamic model estimation. AB test AR(2) refer to the Arellano–Bond test that average autocovariance in residuals of order 2 is 0 (H0: no autocorrelation). Pv: P-value.

Our estimation results point out to stable coefficients. Also, for all models, the Wald-test indicates fine goodness of fit and the Sargan test shows no evidence of over-identifying restrictions. The serial-correlation of Arellano and Bond test do not reject the null hypothesis (H0: no autocorrelation) because P-value of AR (2) test are larger than 5%, lending support to our estimation findings. The statistically significant of lagged depend variables (RAO, ROE and NIM) across all the two models indicate the high degree of persistence of profitability and justify the use of a dynamic model.

Before the international financial crisis, we find that the coefficient of capital adequacy is positive and highly significant with ROA and NIM. More capital reduces the costs of external debt, compensating for the higher costs of own funds. Athanasoglou et al. (2008) confirm this finding in Greek banks. In contrast, the coefficient is negative and not statistically with ROE. This result is in concordance with results of Dietrich and Wanzenried (2011). During the crisis, the coefficient is negative. The positive coefficient reflects the sound financial condition in Tunisian banks. Referring to Demirguc-Kunt and Huizinga (1999), Garcia-Herrero et al. (2009), Fadzlan (2010), Liu et al. (2010) and Suminto

and Yasushi (2011) we can conclude that, before the US sub-prime crisis, Tunisian banks can deal problems of unexpected losses. Liquidity, affect positively the performance of the Tunisian banking sector before and during the crisis. This result is in concordance with Abreu and Mendes (2002). In contrast, Liu et al. (2010) find a negative correlation between liquidity and ROA, ROE, NIM.

As expected, before and during periods of crisis, cost income ratio, our measure of operational efficiency is negatively and significantly related to bank profitability. This result stands on line with the empirical results of Dietrich and Wanzenried (2011) when ROAE and NIM are considered as dependent variables in Switzerland banks and with Trujillo-Ponce (2013) when ROA and ROE are used like measures profitability in Spanish banks. This outcome is not consistent with previous studies (e.g., Athanasoglou et al. 2008; Goddard et al. 2009).

Yearly growth of deposits appears to be crucial determinant of bank profitability in all the period. We find a negative and highly significant coefficient for all measures of profitability. We conclude, for the correlation between growth of deposits and profitability, that Banks in Tunisia were able to convert the increasing amount of deposit liabilities into significantly higher income earnings. Not consistent with empirical outcomes of Pasiouras and Kosmidou (2007), Micco et al. (2007), Dietrich and Wanzenried (2011), Alper and Anbar (2011) and Trujillo-Ponce (2013), we find a negative coefficient between size and profitability. This coefficient is statistically significant before and during the crisis when ROA is used as the profitability measure and like Kasman (2010) when NIM is used in crisis period.

Furthermore, the impact of the market structure, approximated measured by the Herfindahl-Hirschman index have a significant and positive impact on bank profitability (ROA and ROE), possibly due to the high quality of management of Tunisian banks, and an insignificant and negative effect on NIM before the crisis. During crisis, coefficients are still positive and only significant with ROA. This result stands on line with the results of Claeys and Vander Vennet (2008). Trujillo-Ponce (2013) argues this positive relationship by the efficient-structure theory. This theory explains the positive relationship between concentration and profitability as an indirect consequence of efficiency.

Turning to the macroeconomic variables of bank profitability, the coefficient of GDP growth is positive and highly significant with ROA, ROE and NIM before the crisis. This finding corroborate results of Molyneux and Thornton (1992), Demirgüç-Kunt and Huizinga (1999), Pasiouras and Kosmidou (2007), Athanasoglou et al.(2008), Davydenko (2010) and Zeitun (2012) possibly due to an increase in lending rates with less probability of a default rate. In period of crisis, the coefficient becomes negative. Our results confirm the findings of Kosmidou (2008).This counterintuitive result could be explained by Trujillo-Ponce (2013) that poor economic conditions can worsen the quality of the loan portfolio, generating credit losses and increasing the provisions that banks need to hold, thereby reducing bank profitability. Also, Mirzaei et al. (2013) argument this result that the level of economic activity also affects the supply of funds, i.e. deposits, and if deposit supply declines due to a rise in consumption in line with GDP growth. Before the international crisis, coefficients associated to in inflation are negative and significant at the level of 5% across all measures of bank profitability but not thereafter except for ROA. Alexiou and Sofoklis (2009) find a positive relationship between inflation and bank profitability. Ben Naceur and Kandil (2009) explained this result by the fact that higher inflation rate increases uncertainty and reduces demand for credit. Banks attempt to counter this environment by reducing the cost of intermediation. In Tunisia, the high rate of inflation (approximately 6.5%) affects both salaries and the other operating costs of the bank.

4. CONCLUSION

In this study, using dynamic panel model, we specified an empirical framework to investigate the impact of bank-specific, industry-specific and macroeconomic determinants on the profitability of 10 commercial Tunisian banks over the period 2000-2010. To account for the impacts of the recent financial crisis, we proceeded to subdivide the period into two sub-periods: before the crisis (2000-2006) and during the crisis (2007-2010). Mainly, we find that, before the US subprime crisis, capital adequacy, liquidity, bank size and yearly real GDP growth affect positively the performance of the banking sector. However, we find that cost-income ratio, yearly growth of deposits and inflation rate are negatively correlated across all measures of bank profitability. In crisis period, bank profitability is mainly explained by operational efficiency, yearly growth of deposits, GDP growth and inflation.

Overall, our findings provide some interesting new insights into the determinants of the profitability of commercial banks in Tunisia. We conclude that the Tunisian banking sector was slightly exposed to the effects of the international financial crisis because of its low integration in international financial markets and the strict control by specific and rigorous rules of banks by the Central Bank. Our findings support the argument for continuing the banking sector reform programme in Tunisia.

To enhance academic understanding of this subject, this research can be extended by introducing other determinants of bank performance (e.g., board of directors, Basel accord, age of the bank, taxation, term structure of interest rates, level of corruption, deposit insurance, law and order, stock market turnover ratio) because a sound

well-functioning banking sector can positively contribute to promote performance and leads to provide sustained economic growth.

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REFERENCES

[1] Abreu. M. and Mendes. V. 2002. Commercial Bank Interest Margins and Profitability: Evidence from E.U. Countries. University of Porto Working Paper n°245.

[2] Alexiou, C. and Sofoklis, V. 2009. Determinants of bank profitability: evidence from the Greek banking sector, Economic Annals 182. 93-118.

[3] Al-Khouri, R. 2011. Assessing the Risk and Performance of the GCC Banking Sector, International Research Journal of Finance and Economics 65. 72-81

[4] Almus, M, and Nerlinger, E.1999. Growth of technology based firms: Which factors matter? Small Business Economics 13, 141-154.

[5] Alper, A. and Anbar, A. 2011. Bank specific and macroeconomic determinants of commercial bank profitability: Empirical evidence from Turkey. Business and Economics Research Journal 2 (2). 139-152.

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

[7] Athanasoglou, P. Delis. M. and Staikouras, C. 2006. Determinants of Bank Profitability in the Southern Eastern European Region. Bank of Greece Working Paper n° 47.

[8] Ayadi, N. and Boujelbene, Y. 2012. The Determinants of the Profitability of the Tunisian Deposit Banks. IBIMA Business Review. 1-21.

[9] Beck, T. Cull, R. and Afeikhena, J. 2005. Bank privatization and performance: empirical evidence from Nigeria. Journal of Banking and Finance 29 (8-9). 2355–2379.

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

[11] Ben Naceur, S. and Goaied, M. 2001. The Determinants of the Tunisian Deposit Banks' Performance. Applied Financial Economics 11 (3). 317–319.

[12] Ben Naceur, S. and Goaied, M. 2008. The Determinants of Commercial Bank Interest Margin and Profitability: Evidence from Tunisia. Frontiers in Finance and Economics 5 (1) 106-130.

[13] Ben Naceur, S. 2003. The determinants of the Tunisian banking industry profitability: panel evidence. Working paper. 1-17.

[14] Bolt, W. De Haan, L. Hoeberichts, M. Van Oordt, M. and Swank, J. 2012. Bank profitability during recessions. Journal of Banking and Finance 36 (9). 2552-2564.

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

[16] Brissimis, S.N. Delis, M.D. Papanikolaou, N.I. 2008. Exploring the nexus between banking sector reform and performance: evidence from newly acceded EU countries. Journal of Banking and Finance 32 (12), 2674-2683

[17] Claeys, S. and Vander Vennet, R. 2008. Determinants of bank interest margins in Central and Eastern Europe: a comparison with the West. Economic Systems 32, 197-216.

[18] Davydenko, A. 2010. Determinants of Bank Profitability in Ukraine. Undergraduate Economic Review 7 (1). 1-31.

[19] Demirguc-Kunt, A. and Huizinga, H. 1999. Determinants of commercial bank Interest margins and profitability: some international evidence. World Bank Economic Review13 (2). 379-408.

[20] Dewaelheyns N. and Van Hulle, C. 2007. Internal capital markets and capital structure: Bank versus internal debt. SSRN Working paper. 1-37.

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

[22] Fadzlan, S. 2010. Financial depression and the profitability of the banking sector of the republic of

Korea: Panel evidence on bank-specific and macroeconomic determinants. Asia-Pacific Development Journal 17 (2). 65-92.

[23] García-Herrero, A. Gavilá, S. and Santabárbara, D. 2009. What explains the low profitability of Chinese banks? Journal of Banking and Finance 33 (11). 2080-2092.

[24] Goddard, J. Liu, H. Molyneux, P. and Wilson, J. 2009. Do bank profits converge? Working Paper.

[25] Kanas, A., Vasiliou, D. and Eriotis, N. 2012. Revisiting bank profitability: A semi-parametric approach. Journal of International Financial Markets, Institutions and Money 22 (4). 990-1005.

[26] Kasman, A. 2010. Consolidation and Commercial bank net interest margins: evidence from the old and new European union members and candidate countries. Economic Modeling 27. 648-655.

[27] Kosmidou, K., Tanna, S. and Pasiouras, F. 2005. Determinants of Profitability of Domestic UK Commercial Banks: Panel Evidence from the Period 1995-2002. Money Macro and Finance Research Group Conference.

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

[29] Lannotta, G. Nocera, G. and Sironi, A. 2007. Ownership structure. risk and performance in the European banking industry. Journal of Banking and Finance 31 (7). 2127-2149.

[30] Lee, C. and Hsieh, M. 2013. The impact of bank capital on profitability and risk in Asian Banking. Journal of International Money and Finance 32. 251-281.

[31] Liu, H. and Wilson, J.O. 2010. The profitability of banks in Japan. Applied Financial Economics 20(24). 1851–1866.

[32] Loukil, k. and Chaabane, A. 2009. Structure de propriété et performance financière : cas des banques de dépôts en Tunisie. 30ème congrès de l'association Francophone de Comptabilité, Strasbourg France.

[33] Mamatzakis, E. and Remoundos. P. 2003. Determinants of Greek Commercial Banks Profitability. 1989–2000. University of Piraeus Working paper 53 (1). 84–94.

[34] Mamoghli, M. and Dhouibi, R. 2009. Quel est l'impact de la propriété publique sur la rentabilité des banques ? Cas des banques tunisiennes, 8éme colloque ATSG Tunisie.

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

[36] Mirzaei, A., Moore, T. and Liu, G. 2013. Does Market Structure Matter on Banks' Profitability and Stability? Emerging versus Advanced Economies. Journal of Banking and Finance, pp 1-55.

[37] Molyneux, P. and Thornton, J. 1992. Determinants of European Bank Profitability: A Note. Journal of Banking and Finance 16 (6). 1173-1178.

[38] Pasiouras, F. and Kosmidou, K. 2007. Factors influencing the profitability of domestic and foreign commercial banks in the European Union. Research in International Business and Finance 21 (2). 222-237.

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

[40] Stanger, A.M. 2000. Determinants of Home-based Business Sales Performance, School of Commerce Research Paper Series N°18, Australia.

[41] Suminto, S. and Yasushi, S. 2011. Post crisis Indonesian banking system profitability: bank-specific. industry-specific. and macroeconomic determinants. The 2nd International Research Symposium in Service Management Yogyakarta. Indonesia. pp 451-454.

[42] Trujillo-Ponce, A. 2013. What determines the profitability of banks? Evidence from Spain. Accounting and Finance 53. 561-586.

[43] Zeitun, R. 2012. Determinants of Islamic and Conventional Banks Performance in GCC Countries Using Panel Data Analysis, Global Economy and Finance Journal 5 (1). 53-72.