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Testing the concentration-performance relationship in the Tunisian banking sector

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ABSTRACT

The aim of this paper is to investigate whether concentration affects profitability of the Tunisian banking sector for the period 1980-2009. Our sample is made up of 9 banks and our empirical analysis is based on panel data analysis. In this paper, profitability is measured by the conventional return on equities (ROE) and return on assets (ROA). In the robustness checks we add net interest margin (NIM) as a third indicator of profitability. The main results of the paper reveal that concentration has positive impacts on Tunisian banking profitability. More, the adoption of the various industrial strategies by Tunisian banks was advantageous for the banking sector and for the economy as a whole.

Keywords: Concentration, Performance, Liberalization, Tunisians banks, Panel data.

JEL Classification: G21, G34, L10, L11, C51

Introduction

During the past three decades, the Tunisian banking sector has experienced several structural reforms to modernize the financial sector and to give banks more power in the Tunisian economy. Hence, policy makers have adopted the Structural Adjustment Programs (SAPs henceforth) in 1987 which were suggested by the international monetary fund and the World Bank. The aim of the SAPs is to progressively liberalize the monetary policy of the central bank of Tunisia (i.e. freeing of the interest rates) and to promote the role of financial sector in economic development and growth. During the nineties, Tunisia starts to gain from financial liberalization. In fact, banks start proposing attractive deposit interest rates which in turn has had a positive impact on financial savings. Liquidity of banks increased considerably and was followed by a dynamic of investment activities.

It is worth mentioning that in the beginning, the program of financial liberalization was in somewhat harmful for banks. In fact, the removal of some restrictions on banking activities led to the born of new financial institutions which has increased competitions between banks. Moreover, the Tunisian banking market has opened its borders which in turn accelerate pressure and competition. Therefore, the profits of the banks have diminished slightly and the spread between deposit and lending rates have decreased (Gibson and Tsakalotos, 1994). As a response, banks have gone to look for new strategies to survive the pressure and competition. Some banks have successfully realized great gain from liberalization and superior allocation of savings, while others have failed to adapt to the new environment. Concentration was one of the industrial strategies adopted by several banks to surpass the bankruptcy. Thus, banks have moved toward an industrial era to survive the liberalization process. Are banking concentration advantageous or harmful for banks?

The answer to this question has been widely analyzed in recent literature. While some schools of thought in the industrial organization models believe that concentration raise profitability, others schools of thought opine that any evident relationship between concentration and profitability is spurious and that both concentration and profitability are likely to be the outcomes of other causal factors (Tregenna, 2006). The study of Allen and Gale (2004) explains that less concentration in the banking system should erode bank market power, therefore affecting the profits of a bank. This would encourage banks to take high risky activities to maintain their profits at their previous level (Marcus, 1984; Keeley, 1990; Demsetz et al, 1996; Carletti and Hartmann, 2003). Petersen and Rajan (1995), demonstrate that banks in highly concentrated markets are more likely to extend credit to lower-quality firms at discounted rates.

The aim of this paper is to enrich the available literature, initially developed by Bourke (1989), by investigating whether or not concentration affects profitability of the Tunisian banks over the period 1980-2009. During this period, the banking sector has witnessed the implementation of several structural reforms. Some banks have experienced a large success while some other have faced several problems and the concentration throughout consolidation and merger and acquisition was the only strategy for their survival. Our sample is made up of 9 banks and we use an econometric model based on panel data analysis. The main results of the paper reveal that concentration has positive impact on banking profitability in Tunisia. Moreover, the paper demonstrates that the adoption of structural reforms was advantageous for the banking sector.

The reminder of the paper is as follows: after introducing our paper, section one provides an overview on the evolution of the Tunisian banking sector following the adoption of the adjustment structural programs in 1987. Section two presents the literature review on the concentration-performance relationship. Section three studies the empirical results while section four concludes.

The Tunisian banking system in light of the financial liberalization

The Tunisian banking sector has witnessed significant organizational reforms over the past three decades. These reforms were implemented under the structural adjustment programs which were suggested by the International Monetary Fund and the World Bank to improve the role of banks in the Tunisian economy. In the first step, the central bank of Tunisia (CBT, henceforth) had modified its monetary policy by removing some restrictions on granting, monitoring and refinancing loans. The progressive liberalization of interest rates has given banks the freedom of settling their own strategies and their own credit policy without getting the agreement of the Central Bank of Tunisia.

At the beginning of the 90s, the Tunisian banking sector has witnessed the birth of some investment companies which aimed at promoting the large investment projects in the country in order to improve the Tunisian infrastructure. In 1992, the CBT launched several reforms to improve the supervision of the banking sector and to remove a variety of restrictions on participation in the sector and the nature of products and services that could be provided (Hamdi et al, 2013).

Following all these reforms, the banking sector in Tunisia has become dynamic and well diversified. In 2008, it is made up of 29 banks: 18 universal bank, 8 offshore banks; 2 investment banks and 1 Islamic bank. Among the 29 banks, 11 of them are listed in Tunis Stock Exchange (Hakimi *et al* 2011). Nowadays, the Tunisian banking sector is performing effectively. Table 1 gives an overview on the evolution of some financial indicators of the banking system during 2006-2011.

These indicators show the evolution of the level of profitability (ROA, ROE) and risk management (capital adequacy ratio and the liquidity ratio) during the pre and post period of the global financial crisis.

As we can see, the total assets moved from MDT 36470 in 2006 to MDT 63431 in 2011. The total deposits are MDT 38427 in 2011 against MDT 19138 in 2006 with a growth rate of 100.789%. Loans to customer constitute the main part of the bank activity. The total credits of the Tunisian banking sector knew a 124,457 % increase in 2011 compared with 2006, reaching an amount of MDT 43996 at the end of 2011. The capital adequacy ratio appears to be constant during the period 2006-2011: 11,6% in 2006 and 11,5% in 2011. The CBT required to increase the minimum capital adequacy ratio (CAR) from 8 percent to 10 percent by 2014, and suggested to impose higher solvency requirements on banks with a higher risk profile.

Regarding the liquidity ratio, measured by the total loans to total deposits, it was 89,4% in 2011 while it was over 120% in 2006. The fall in the liquidity ratio reveals the problem of liquidity from which the Tunisian banking sector suffers following the global financial crisis. .

Turning now to the common measures of bank profitability which are the return on assets (ROA) and the return on equity (ROE), Table 1 shows that the return on assets in the Tunisian banking sector stands at 0,9% on average during the period 2006-2011. Regarding the ROE, it moved from 7% in 2006 to 7.9% in 2011 but it falls from its post 2006' level.

Table 1: Evolution of some indicators of the Tunisian banking sector during 2006-2011

Indicators	2006	2007	2008	2009	2010	2011
Total Assets	36470	41377	46830	52145	58467	63431
Total deposit	19138	21195	29200	32559	36562	38427
Total loans	19601	20958	27915	32264	38664	43996
Capital Adequacy ratio	11,6	11,6	11,7	12,2	11,6	11,5
Liquidity ratio	120,8	121,9	124	119,1	104,1	89,4
ROA	0,7	0,9	1	1	0,9	0,7
ROE	7	10,1	11,2	11,7	10,2	7,9

*Total assets, deposit and total loans are in MDT, however all the ratios are in %.

Source: Tunisian professional association of banks

Nowadays, Tunisia's banking is one of the largest sectors in the finance and insurance industry. In 2009, it accounts for almost 9% of the country's GDP. In addition, the banking sector carries out a number of functions that strengthen economic activity in the country, such as financing business and facilitating payment process. It also provides consumption and investment related services to virtually all households in Tunisia.

Concentration and performance: literature review and hypothesis

In the industrial organization context, literature based on the concentration-performance relationship is abundant and empirical evidence provides a series of contrasting results. Bain (1951) was the first author investigating the concentration-performance relationship. The Structure/Conduct/Performance paradigm postulates that the degree of market concentration is inversely related to the degree of competition. This is because market concentration favors collusive behavior. Following Bain's paper, several articles stress on the idea that the main factors of industry profitability are related to the degree of concentration and competition in the industry, specifically among established firms. The higher the degree of concentration, the greater is the ease of collusion, and hence the higher would be industry profits (Tregenna, 2006). Additional barriers to entry would also increase profits in the industry.

Another hypothesis close to SCP paradigm is the "Efficient Structure Hypothesis" (ESH) developed by Demsetz, (1968 and 1973) and Peltzman (1977). The ESH suggests that the relationship between market structure and firm's performance is defined by efficiency due to better management or production technologies generating lower costs and therefore higher profits.

The relationship between market concentration and bank performance has received significant attention, especially following the eighties deregulation policies. Meanwhile, existing lliterature shows contradictory results. According to Berger and Humphrey (1997), mergers and acquisitions in the U.S. have positive effects on profitability and efficiency of banks. These authors argue that banks' profits are lower in a competitive banking system, while the probability of adopting a risk-taking behavior decreases when profitability improves (Allen et al, 2000). In the same line, Rhoades (2000), analyzes the effects of U.S. commercial bank mergers on banking structure between the 80s and the 90s, and confirms the results of Berger and Humphrey. Also, Allen and Gale (2004) demonstrate that a less concentrated banking system erode market power, hence affecting the net present value of profits (franchise value). This would motivate banks to follow risky policies in an attempt to preserve the former level of profits. The study of Bordo et al. (1996) compares the performance of the U.S. and Canadian banking system between 1920 and 1980. The authors find a higher degree of systemic stability in

Canada compared to the U.S. and they conclude that it could be ascribed to the higher degree of concentration in the Canadian banking sector. Such a proposition converges with the findings of Cipollini and Fiordelisi (2012). Another advantage of a concentrated banking system is pointed out by Beck et al. (2006) arguing that banks' control in a competitive environment is a complicated task, while a concentrated banking system enables a more effective supervision, the risk of contagion and systemic crises being reduced.

Conversely to these views, the study of Caminal and Matutes (2002) shows that strong competition reduces credit rationing and improves access to credit. Another argument advanced by Mishkin (1999) is that a more concentrated banking structure is rewarded by government grants. This can favor moral hazard and encourage banks to take more risks. Hence the banking fragility increases. The study of Besanko and Thakor (1992) underlines that when the number of players in the banking system increases the deposit rates increase too and the lending rates decrease. With low interest rates, the cost of credits decreases and the access to finance is affordable implying a positive impact on investment and economic development. From their part, Koskela and Stenbecka (2000) show that bank competition lowers interest rates and stimulate investment without increasing the risk of bankruptcy of the borrowers. Martinez-Miera and Repullo (2007) also stipulate that the probability of bankruptcy is reduced when the number of banks increases. At last, De Nicolo and Loukoianova (2007) - using data of 10,000 banks from 133 countries during the period 1993 to 2004 - find a significant positive relationship between bank concentration and the risk of bankruptcy, especially in the case of big state banks.

As mentioned above, the banking sector in Tunisia has experienced significant consolidation and restructuring during the mid-nineties, following the liberalization process and the implementation of banking reforms. These movements aimed to improve the performance of banks and to reinforce their position by increasing their size. Concentration was supposed to improve performance. However, if profitability is affected, one can consider that the consequences of concentration are not positive. In order to test the consequences of concentration on the banks' performance, and according to the literature review and the overview of the Tunisian banking sector, one could draw the following hypothesis:

H1: There is a positive relationship between the level of concentration and performance of banks.

Microeconomic and macroeconomic factors influence the banks' performance. For example, the size of a bank could be an important variable which affect its profit. The studies of Boyd and Runkle (1993) or Miller and Noulas (1997) for the USA reveal the existence of an inverse relation between size and profitability which is

explained by the absence of scale economies. Similar results are also found by Jiang et al. (2003) concerning Hong Kong. Conversely, Goddard et al. (2004), and also Garcia-Herrero and Vazquez (2007), show that very big banks in the industrial countries tend to be more profitable. Sinkey (1992) finds that size negatively affect banking profitability for large banks but positively for small ones. Hence we can test the following hypothesis for the Tunisian context:

H2: The size of the bank can affect its performance

According to Abreu and Mendes (2002), loans are a crucial variable that shape bank profits. Loans are the largest segment of interest bearing assets and are expected to have a positive relationship with bank performance. The findings of Wood et al. (2003) do not confirm this idea and show that a higher loan ratio impacts profits negatively. In any way, loans could affect performance either positively, or negatively:

H3: Loans affect the profitability of banks

Literature also shows the significant weight of macroeconomic variables on the performance of banks. The most studied variables are the inflation rate and the gross domestic product (Apergis, 2009). The study of Afanasieff et al. (2002) concludes that the macro-economic variables have the most significant effect on banking profitability in Brazil. They state that a high aggregate growth rate may strengthen position of banks and that an improvement in economic growth helps bank performance. Conversely, Tan and Floros (2012) reveal a negative relationship between GDP growth and bank profitability in China over the period 2003–2009.

Regarding inflation, several studies report a correlation with bank profitability. Revell (1979) noted that variations in bank profitability can be strongly explained by the level of inflation and similar results are found by Hoggarth et.al. (2002). In fact, high inflation rates are generally associated with high loan interest rates, and therefore, high incomes. However, if inflation is not anticipated and banks are sluggish in adjusting their interest rates then there is a possibility that bank costs may increase faster than bank revenues and hence adversely affect bank profitability (Ben Naceur and Goaied, 2003). An anticipated inflation causes cash flow difficulties for borrowers which can lead to premature termination of loan arrangements and precipitate loan losses.

H4. Macroeconomic factors may have an impact on the performance of banks

Finally, given the considerable reforms undertaken by Tunisian government to liberalize the financial and banking sector, one could expect a negative relationship between liberalization and banking performance. This is mainly because of the

increase in competition and the freeing of interest rates which in turn decreases the lending interest rates and increases the deposit interest rates. In the Columbian context, Barajas et al. (1999) found that financial liberalization affects the net interest margin. It results an increase in the banking profitability which is the result of the lending rate liberalization. Demirguc-Kunt and Huizingha (2001) studied the impact of the financial development on the banking profitability for a panel of developed and developing countries over the period 1990-1997. They show that the financial development exerts a significant and negative effect on the banking performance. Similar results are recently found by Hamdi *et al* (2012) for the Tunisian context.

H6: Liberalization has a negative impact on the performance of Tunisian banks.

The literature review reveals important differences according to the characteristics of the banking system and the countries' macroeconomic structure. In the following section, we test empirically the validity of these hypotheses, in order to appreciate the overall effects of concentration on banks performance and determine which micro and macroeconomic factors influence the profitability of Tunisian banks.

The concentration-performance relationship: an empirical study

The aim of this section is to model the relationship between banking concentration and performance of the Tunisian banking system. Two of the most important bank profit ratios[22] are ROE and ROA. ROA is mainly an indicator of managerial efficiency in converting bank assets into net earnings, while ROE is a measure of the rate of return to shareholders.

First we use a Pooled Ordinary Least Squares (PLS) model for each variable assuming no weights for banks panel estimator. Second, we estimate each of the dependant variables using fixed effect and GLS random effect estimations. Hausman specification test is conducted to find which of these models is the most appropriate. Under the null hypothesis, the Hausman statistic is asymptotically distributed as chi-square with k degrees of freedom.

Data and Methodology

Our study is based on a sample of nine Tunisian banks observed during the period 1980-2009. We use annual bank-level balance sheet and income statement data

[22] According to Rajan (1994), Molyneux, and Forbes, (1995) and Apergis (2009), among others**,** the performance reflects the profitability of banks which is basically measured by the return on assets (ROA) and/or the return on equities (ROE).

retrieved from the Tunisian professional association of banks. The macro variables are collected from the national institute of statistics (NIS). Performance is the indicator of banking profitability and it is a function of several variables related to the banking sector, macroeconomic indicators and financial liberalization. The model is based on earlier works of Molyneux and Forbes (1995), Maudos (1998), and Yongil and Stephen (2002), adding new variables such as intermediation (ITR), financial liberalization (Dummy variable), inflation and GDP growth. The model is written as follows:

$$\begin{aligned} &\mathrm{PERF}_{i,t} = \beta_0 + \beta_1 \mathrm{CTR}_{i,t} + \beta_2 \mathrm{MS}_{i,t} + \beta_3 \mathrm{CTR.MS}_{i,t} + \beta_4 \mathrm{MKTDP}_{i,t} + \\ &\beta_5 \mathrm{ASTGROW}_{i,t} + \beta_6 \mathrm{ITR}_{i,t} + \beta_7 \mathrm{SIZE}_{i,t} + \beta_8 \mathrm{LOAN}_{i,t} + \beta_9 \mathrm{FINLIB}_{i,t}, \\ &+ \beta_{10} \mathrm{GDP}_{i,t} + \beta_{11} \mathrm{Inf}_{i,t} + \varepsilon_i \qquad (1) \end{aligned}$$

Where,

PERF is the dependent variable which reflects the bank performance. The performance of a bank is measured by its return on assets (ROA) and return on equities (ROE). The ROA is defined as the ratio Net Income/Total Assets, while the ROE is defined as the ratio Net Income/Shareholders Equity. CTR indicates banking concentration and is measured by the Herfindahl-Hirschman concentration index. The variable (MS) reflects the market share of each bank (ratio total assets of the bank/total bank assets of the sample) and it is introduced to measure the effect of market share on performance. Empirical evidence shows that this variable has a combined effect on profitability. A positive relationship indicates that the bank enjoys economies of scale, while a negative relationship implies that the bank suffers from diseconomies of scale.

The variable (CTR.MS) results from the multiplication of two variables, concentration index and market share, in order to assess their dynamic interaction.

The variable (MKTDP), called also the deposit specialization ratio, measures the weight of deposits of each bank in the total liabilities. The rate of asset growth is measured by the variable (ASTGROW). We can expect a negative relationship between ASTGROW and performance (especially ROA). Bank intermediation is measured by (ITR) which is the ratio of interest expense to interest income. This ratio reflects the weight of the traditional activities in the total profit of banks. The higher this ratio, the lower the profit is. (SIZE) is the size of a bank measured by natural logarithm of total assets of each bank.It is probably the most frequently used accounting variable in banking studies and the literature suggests a positive relationship between profitability and SIZE. (LOAN) is proxied by total loans divided by total assets and reflects the asset composition.

GDP per capita (GDP) and inflation (INF) reflect the macroeconomic variables. Finally (FINLIB) is a binary variable equal to 1 for t=1988 to 2009 representing the post-liberalization period and zero otherwise.

$$\text{FINLIB} = \begin{cases} 0 \text{ for } 1980\text{-}1987 \\ \text{and} \\ 1 \text{ for } 1988\text{-}2009 \end{cases}$$

In the cases where liberalization facilitates entry, we expect lower performance as a result of current and potential competition; otherwise liberalization can strengthen the monopoly power of existing banks. Since the number of years is identical for all banks, our sample is a balanced panel.

The models are written as follows:

$$\text{ROA}_{i,t} = \beta_0 + \beta_1 \text{CTR}_{i,t} + \beta_2 \text{MS}_{i,t} + \beta_3 \text{CTR.MS}_{i,t} + \beta_4 \text{MKTDP}_{i,t} + \beta_5 \text{ASTGROW}_{i,t} + \beta_6 \text{ITR}_{i,t} + \beta_7 \text{SIZE}_{i,t} + \beta_8 \text{LOAN}_{i,t} + \beta_9 \text{FNILIB}_{i,t}, + \beta_{10} \text{GDP}_{i,t} + \beta_{11} \text{Inf}_{i,t} + \varepsilon_i \quad (2)$$

$$\text{ROE}_{i,t} = \beta_0 + \beta_1 \text{CTR}_{i,t} + \beta_2 \text{MS}_{i,t} + \beta_3 \text{CTR.MS}_{i,t} + \beta_4 \text{MKTDP}_{i,t} + \beta_5 \text{ASTGROW}_{i,t} + \beta_6 \text{ITR}_{i,t} + \beta_7 \text{SIZE}_{i,t} + \beta_8 \text{LOAN}_{i,t} + \beta_9 \text{FINLIB}_{i,t}, + \beta_{10} \text{GDP}_{i,t} + \beta_{11} \text{Inf}_{i,t} + \varepsilon_i \quad (3)$$

The fixed effects are contained in the error term of the equation (1-2), which consists of the unobserved bank-specific effects, v_i, and the observation-specific errors, $\varepsilon_{i:}$ $u_{it} = v_i + \varepsilon_{i:}$ Equation (2) and (3) is estimated by POLS, Fixed effect and Random effect as well.

Results and interpretations

The average level of ROA and ROE are 0.6% and 11.16% respectively, while the average level of net interest margin (NIM) is 2.95% with a maximum of 11.25% and a minimum of 0.37% (Table 1). Banking concentration (CTR) achieved an average of 12.80% with a minimum of 10.95% and a maximum of 29.18%. Despite the small number of institutions in the banking system, concentration level is low. The average market share (MS) is 10.51% (the maximum value is 29.18%,

and the minimum value is 0.59%). The average value of bank intermediation (ITR) is 53.26%; its maximum value is 97.75% while its minimum value is 27.77%. Cocerning macroeconomic variables, the average growth rate of real GDP per capita (LGDPpc) is 7.58%; its minimum value is 7.30% and its maximum value is 8.03%. The average inflation is 5.37%.

Table 2: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	270	.0069485	.0111214	-.1030483	.0418974
ROE	270	.1116546	.1217926	-1.239656	.4094973
NIM	270	.029518	.0130831	.0037807	.1125161
MS	270	.1051889	.0531173	.0059237	.2918081
MSCTR	270	.0133686	.0076121	.0009567	.0482938
MKTDEP	270	.1269364	.1118243	-.1540438	.6371017
ASTGROW	270	.0949466	.1544331	-.255338	1.007933
ITR	270	.5326685	.1495157	0.21486	.9775637
SIZE	270	14.63432	.5282412	13.62969	15.74801
LOANS	270	.6051609	.1553896	0.26229	.9036872
FINLIB	270	.7666667	.4237381	0	1
LGDPPC	270	7.584596	.2324363	7.306033	8.033978
INF	270	5.373667	2.243858	2.7	9.16

Table 3. Results of the Random effect Model

Variables	POLS				GLS RANDOM EFFECT			
	Model 1		Model 2		Model 3		Model 4	
	Coef.	P>z	Coef.	P>z	Coef.	P>z	Coef.	P>z
CTR	.05347	0.016**	.79773	0.001***	.0473	0.023**	.7387	0.001***
MS	.07409	0.007***	1.1581	0.000***	.0701	0.006***	1.089	0.000***
MSCTR	-.0744	0.007***	-1.148	0.000***	-.0675	0.009***	-1.048	0.000***
MKTDEP	-.0013	0.078*	-.0061	0.470	-.00097	0.204	-.0026	0.756
ASTGROWTH	.0020	0.048**	.01289	0.250	.0015	0.100*	.0085	0.428
ITR	-.0011	0.479	-.0179	0.293	-.0017	0.314	-.0208	0.252
LSIZE	-.0126	0.510	-.1071	0.610	-.0042	0.855	.2493	0.314
LOANS	.0000	0.983	-.0059	0.731	.0010	0.522	.0035	0.838
FINLIB	.0039	0.242	.03021	0.417	.0031	0.332	.0256	0.472
INF	-.0060	0.146	-.0215	0.633	-.0050	0.198	-.0177	0.679

LGDPPC	-.0247	0.006***	-.3735	0.000***	-.0218	0.010*	-.3409	0.000***
CONS	.19177	0.019**	2.5350	0.005***	.1547	0.068	1.4886	0.10*
Wald test					21.53**		26.67***	
F –Stat	2.23*		2.20*					
Haussman test					0.9996		0.5838	
L M B. and P. test					33.55***		19.79***	
R-Squared	0.561		0.579		0.7238		0.7255	
N of Obs.	270		270		270		270	

Model 1 and 2 are estimated with POLS and the dependent variables are is ROA and ROE. Model 3 and 4 are estimated with GLS-Random effect and the dependent variables are ROA and ROE respectively.

****, **, * Denote the rejection of the null hypothesis at 1%, 5 % and 10% level of significance respectively*.

There is a weak correlation[23] between the different variables, which means no multicolinearity. The ROA is negatively linked to most of the variables except the concentration (CTR), the Net Interest Margin (NIM) Loans to assets ratio (Loans), LGDPPC and financial liberalization (Finlib). For ROE, it is also positively linked to concentration (CTR) as well as the most of the variables of the model except Loans, LGDPPC, LSize and ITR.

The empirical results are displayed in Table 2. According to Hausman test, we perform the random effect estimation. The Wald test is significant and the overall goodness of fit is 78.15 which indicate the robustness of the model. The Breusch and Pagan Lagrangian multiplier test for random effects confirms the randomness of the specific effects.

There are four regressions and all of them are regressed against all bank specific variables, macroeconomic variables as well as a financial liberalization dummy variable. The first two regressions (1 and 2) are performed using Pooled Ordinary Least Square regression while the regression 3 and 4 are performed with Random effect estimations with reference to Hausman specification and LM tests. Again, ROA and ROE are the dependant variables.

First of all, one can observe that the concentration ratio is positively correlated with the dependant variable in all equations. The concentration is defined by reference to the number of players in the market. Broadly, the concentration level increases when the number of institutions operating in the market decreases. Table 2 reveals that concentration (CTR) affects positively and significantly ROA at the level of 5% of signification in regressions (1) and (2) while it affects ROE at the 1% level of significance in regressions (3) and (4). In both models we can conclude that concentration has brought-up an added value to Tunisian banks. This could be considered as a remarkable success because from 1987 to 2001 the Tunisian banking sector has faced a period of boom and bust and the stock market has experienced a severe volatility (Hakimi et al, 2011). As we mentioned above, the banking and financial sectors have experienced massive structural reforms during that period. Our results reinforce research stipulating à positive relation concentration and performance (Berger and Hymphrey, 1997; Rhoades, 2000; Allen and Gale, 2004).

All regressions give similar results despite the fact that GLS random effect estimations are preferred than the POLS according to the squared goodness of fit. In regression (1), we can see that MS and ASTGROW affect positively and significantly the ROA while MSCTR, MKTDEP and LGDPPC affect it negatively and significantly. In regression (2), similar results were found except for Loans

[23] Except for the relation MS and MSCTR , INF and CTR

affecting negatively ROE. In regressions (3) and (4) results are similar to those of regressions (1) and (2).

In addition to the above characteristics, the negative sign of bank size (LSIZE) (all regressions) shows that larger banks attain a lower profitability than smaller ones. Generally, large banks are supposed to record higher performance than small banks. In Tunisia, this is not always true given that the second largest bank in terms of turnover and total assets (BNA) recorded the lowest average performance during the period 1980-2009. This shows that the interbank market is competitive and efficient since banks with a large retail deposit-taking network do not necessarily enjoy a cost advantage compared to other banks. As for the loan-to-total assets ratio (LOAN), it actually increases the return on assets rather than affecting profitability positively. This reflects to some extent that the Tunisian banking activity is mainly based on traditional activities and loans remain the principal source of banking income. Similar results were found in the study of Ben Naceur and Goaied (2003) for the Tunisian context.

The inverse relationship between ITR and ROA, and ROE in all the regressions supports the earlier finding of Vong (2005) which argues that severe competitions in the credit market and interbank placement of idle funds abroad have jointly reduced the profitability of banks. This is especially true in Tunisia where banks rely on traditional lending activities.

Among the others factors, GDP affect negatively banking profitability. Similar results are found for the inflation rate (INF). This may imply that bank management may not anticipate and react in function of the inflation rate. Consequently, banks in Tunisia tend to be more profitable in non-inflationary environments. As for the other variables, namely, financial liberalization (FINLIB) and assets growth (ASTGROW), they do not show a great impact on profitability.

Robustness checks

To gain further insight into the effects of concentration on profitability of Tunisian banks, equation 2 and 3 are also estimated with net interest margin (NIM) as dependant variable. These specifications serve as a robustness check to the traditional ROA and ROE. As the first two measures reflect bank profitability, NIM reflects gross profitability as well as pricing efficiency of bank services. The NIM variable is defined as the net interest income divided by total assets. NIM is focused on the profit earned on interest activities. Therefore, in this section we aim analyzing the consequences of banking concentration on traditional banking activities.

According to Allen and Gale (2004) and Dietsch and Lozano-Vivas (2000), the net interest margin (NIM) is another indicator of profitability which reflects the

dynamism of lending and deposit activities. Broadly, if the bank is capable to increase funds with liabilities that have low interest costs and is able to get assets with high interest earnings, the net interest margin and the profit of the bank will be high.

In the other side if the interest cost of liabilities increases comparing to the interest earned on assets, the net interest margin will drop, and bank profitability will shrink. To confirm this point as well as our previous results we estimate equation 2 and 3 with NIM as dependent variable the other explanatory variables remaining the same. We estimate the model using POLS and GLS random effects and empirical results are displayed in Table 4 below.

$$\mathrm{NIM}_{i,t} = \beta_0 + \beta_1 \mathrm{CTR}_{i,t} + \beta_2 \mathrm{MS}_{i,t} + \beta_3 \mathrm{CTR.MS}_{i,t} + \beta_4 \mathrm{MKTDP}_{i,t} + \beta_5 \mathrm{ASTGROW}_{i,t} + \beta_6 \mathrm{ITR}_{i,t} + \beta_7 \mathrm{SIZE}_{i,t} + \beta_8 \mathrm{LOAN}_{i,t} + \beta_9 \mathrm{FINLIB}_{i,t}, + \beta_{10} \mathrm{GDP}_{i,t} + \beta_{11} \mathrm{Inf}_{i,t} + \varepsilon_i \quad (4)$$

Here again the variable bank concentration (CTR) is positively and significantly correlated with the NIM at the level of 10%. This result supports the findings of equations 2 and 3. In Tunisia, the level of concentration varies between 12.02% and 12.97%. This low level is due to the low number of banks operating in the market and may reveal an intense banking competition.

While the variable market share (MS) is negatively and significantly correlated at the level of 5% with performance of banks (NIM), the combined effect of the increasing level of concentration and market share (MSCTR) exerts a negative and significant effect on the performance of Tunisian banks. Moreover, results reveal a negative and significant correlation between the variable (MKTDEP) and the performance of banks. This variable reflects the weight of customer deposits in total bank liabilities. When this ratio increases, the liquidity of banks remains uncertain given that relies on depositors' decisions. A massive and unexpected withdrawal may cause liquidity problems and consequently reduce performance. In this respect, it is suitable for Tunisian banks to reinforce their own capital or to encourage the long-term deposits.

The variable (ASTGROW) is introduced into our model to capture the weight of total assets in the performance of banks. This variable has a negative and significant correlation at the level of 5% with the dependent variable. An increase in the level of total assets decreases the performance given that the profitability indicator is an inverse function of total assets. This means that when assets increase, the net interest margin decreases.

Table 4. Robustness check with Net Interest Margin

Variables	Model 5		Model 6	
	Coef.	**P>z**	**Coef.**	**P>z**
CTR	.1305194	0.033**	.1101092	0.056*
MS	.1243831	0.010***	-.1152733	0.012**
MSCTR	-1.29496	0.000***	-.0163369	0.000***
MKTDEP	-.017411	0.000***	-1.202918	0.000***
ASTGROWTH	-.006429	0.074*	-.0061212	0.049**
ITR	-.073114	0.000***	-.0740932	0.000***
LSIZE	-.001300	0.094*	-.0013355	0.069*
LOANS	.015015	0.001***	.0143934	0.001***
FINLIB	.004587	0.016**	.0052324	0.003***
INF	-.012800	0.001***	.0113241	0.002***
LGDPPC	.000037	0.934	-.0002206	0.614
CONS	.162344	0.000***	.1530222	0.000***
Wald chi2			923.96	
F-Test	62.00***			
Hausman Test			0.8040	
LM Breusch and Pagan test			28.914*	
R-Squared	0.7618		0.7817	
N of Obs.	270		270	

Model 5 and 6 are estimated with POLS and GLS-Random effect and the dependent variables are is NIM.

****, **, * Denote the rejection of the null hypothesis at 1%, 5 % and 10% level of significance respectively.*

Regarding loan to assets ratio, the variable is positively and significantly linked to the performance of Tunisian banks.This ratio measures the total loans outstanding as a percentage of total assets and indicates if a bank is loaned up and its liquidity is low. A high ratio means a significant risk of default. In our example, this ratio affects significantly the performance and, logically, policy makers have to control it in order to avoid any credit problem. As for the size of the bank, it affects the

performance of banks negatively and significantly at the level of 10%. Concerning banking intermediation (ITR), this variable is negatively and significantly correlated with the dependent variable of the model. Indeed, a decrease in lending interest rates or an increase in deposit interest rates, is likely to deteriorate performance. It should be noted that an increase in deposit rates should be roughly proportional to the decrease in lending rates. To be profitable, funds distributed should exceed the deposits collected.

Regarding macroeconomic variables, the growth rate of GDP per capita (GDPpc) influences negatively profitability. At the same time, inflation affects positively and non-significantly the Net interest margin. Previous studies have demonstrated a positive relationship between inflation and profitability. A high rate of inflation is generally associated with a high interest rate and therefore an important income for banks. In the Tunisian context, inflation seems to do not have a potential impact on performance as its weight is low in all regressions and it does not affect significantly any of the dependant variables.

Finally, financial liberalization has positive and significant effects on performance of Tunisian banks. Despite the openness and increasing competition on the banking market, financial reforms undertaken by Tunisian governments seems to have positive impact on performance. This is due to the diversification of activities and the innovation which have led to high return. Moreover, it is worth to recall that since the past twenty years, Tunisia is becoming an attractive destination for international investors and the infrastructure of the country has been improved drastically. In this context, and following the Arab spring revolution, Tunisian banks may play a major role in the national economic process.[24]

[24] According to the Change Readiness Index 2012, Tunisia is placed in the 2nd rank after Chili in terms of effectiveness of managing change.

Conclusions

Following the adoption of structural reforms in late 1980s and early 1990s, the Tunisian banking sector has been experiencing a movement of concentration and privatization. Banks were obliged to change their strategies and activities to follow the new business model imposed by the financial globalization. They were obliged to improve their competitiveness and to realize economies of scale. Therefore majors Tunisian banks have adjusted their activities pursuing diversification policies and, restructured their organization mainly through merger and acquisitions. Therefore, assessing the implications of concentration on overall banking profitability is an important task for banks as well as for policymakers. This question was the broad aim of this paper. The empirical evidence of the paper validates the assumption according to which concentration led to performance (hypothesis H1), even if the initial outcome of the Tunisian banking sector liberalization was a dramatic decrease of profits because of the movement from a monopoly to a competitive-type market. Indeed, the drop of lending interest rates has encouraged foreign investments, as the recent acquisition of a 13.1% stake held by the Tunisian government in the capital of the Bank of Tunisia by CM CIC (France), for an amount of 217 million dinars (MTD).

We can conclude that the industrial strategies adopted by Tunisian banks helped them to improve their output and to ameliorate their profitability. Apparently, their interest is to continue the diversification pace of their activities and the search for economies of scale through mergers and acquisitions with international and other national banks.

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