



The Impact of Capital on Bank Profitability: Case of Tunisia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The capital adequacy ratio measures the ability of a financial institutions to meet its liabilities by comparing its capital with assets.

This article studied the relationship between bank capital and bank profitability measured by (Return on assets; return on equity; net interest margin). We used a method of static panel for a sample of 11 banks in Tunisia between (2000...2018). We found that bank capital has a significant impact on ROA. But capital has a non significant effect on bank return on equity and not significant impact on bank net interest margin.

Keywords: Capital; bank; profitability; panel static.

1. INTRODUCTION

Capital and bank profitability are important variables in banking industry. Higher capital is often supposed to be costly for banks; implying

that higher capital reduces profitability; but according to the trade -off theory it may also reduce a bank's risk and hence the premium demanded to compensate investors for the cost of bankruptcy (Osborne; al (2009)).

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The bank's capital play an important role in maintaining the safety and durability for the banks and the integrity of banking system in general; capital represents the wall or barrier that prevents any unexpected loss can be exposed to the bank that affect depositor's money; as well known; the bank's generally operate in an environment with high degree of uncertainty which result in exposure to many risks (Aref and al. (2017)).

In other hand; profitability is a key target of all financial institutions as bank must keep adequate liquid amounts so as to maintain the continuity. They are one of the most important sources key to generate capital. Without profit banks will ne be able to attract external capital to strengthen its investment and existence with the competition.

Besides; the financial crisis has highlighted the need to tighten the regulation and supervision of the banking sector in order to strengthen its ability to absorb negative shocks.

The Basel III reform; whose outline was announced in 2010 has brought particular attention to the role of bank capital; since numerous highly leveraged financial institutions have failed or have had to be bailed out by public authorities.

The social cost of bank failure justifies the capital requirement for financial institutions [1]; Admati and al (2011); Clomiris (2013).

According to the Govern of Bank England Mark Garney "Only well capitalized banks can serve the needs of the real economy and promote strong ; sustainable growth " where capital (has been rebuilt and balance sheet have been required ; building systems and economies have prospered) (Garney (2013).

2. LITERATURE REVIEW

There are several articles that studying the relationship between capital and bank profitability. Osborne et al (2019) have examined the effect of capital on bank profitability over economic cycles using data from the US banking sector spanning several economic cycles from the late 1970 s to the recent financial crisis (2008..2010) .

This relationship is likely to be time –varying and heterogeneous across banks; depending on bank's actual capital ratios and how these relate

to their optimal capital ratios. Banks with a surplus of capital relative to target exhibit a strongly negative relationship between capital and profitability; both in stressed and non stressed conditions; implying that reducing capital may be the optimal strategy of these banks .

Ali (2016) investigated the determinants of bank profitability in Jordan over the period (2005...2011). He found a positive association between capital adequacy and bank profitability. Lin; Trang (2019) studied a sample of 30 banks in Vietnam. They found positive relationship between bank capital and bank profitability during the period (2012...2018).

Datta; Mahmud [2] studied 29 listed banks in Bangladesh. They found positive relationship between bank profitability and bank capital. Gedegloi (2017) studied 28 universal banks in Ghana over the period (2005...2015). The random effect Generalised least squares (GLS) regression was adopted as an estimation technique for the research.

The study revealed that equity capital is significant and positive relation to net interest margin (NIM) and return on equity (ROE). Udom; Ongekachi [3] studied the effect of capital on bank performance.

They found that capital has a positive effect on ROA (retun on assets)

Berger [1] finds that bank capital ratio is positively related to bank profitability measured is ROE for US commercial banks in the 1980s. Ben Naceur; Goaid [4] found that Tunisian banks which hold an relatively high amount of capital tend to exhibit higher level of net interest margin and profitability .

Ben Naceur; Goaid [4] find that Tunisian banks which hold a relatively high amount of capital tend to exhibit higher level of net interest margin and profitability .

Also; Sufian and habibullah [5] find that capitalization has a positive impact on the bank profitability. Susan, Nasieku (2015) studied listed banks in kenya over the period (2010...2014). They found a positive relationship between capital and bank profitability.

Onaolapo and Olufemi [6] examined the effects of capital adequacy conditionality on the performance of selected banks within the

Nigerian banking sector. The study employed mainly secondary data obtained from the publications of regulatory agencies like the Central Bank of Nigeria in a ten year period 1999-2008. Ordinary Least Square (OLS) estimation obtained from an SPSS 17.0 package was adapted to analyze relationship between the variables while the Augmented Dickey Fuller (ADF) was used to test the stationary of the time series data employed. The findings indicated that all the performance indicators tested such as Returns on Assets, Returns on Capital Employed and Efficiency Ratios among others did not reflect much on Capital Adequacy Ratio (CAR) of the Nigerian banking sector.

Goddard et al. [7] investigated profitability of European banks using cross sectional data during 1990s. The results showed that the relationship between the capital to asset ratio and profitability was positive.

Athanasoglou et al. (2013) examined the effect of bank specific, industry specific and macroeconomic determinants of bank profitability in Greece. The coefficient of capital variable was positive and highly significant reflecting the sound financial condition of Greek banks.

Kosmidou et al. [8] investigated the impact of banks' characteristics, macroeconomic conditions and financial market structure on banks' net interest margin and return on average assets (ROAA) in the UK commercial banking industry over the period 1995-2002. The results showed that capital strength is one of the main determinants of UK banks performance providing support to the argument that well capitalized banks face lower cost of going bankrupt, which reduces their cost of funding or that they have lower needs for external funding which results in higher profitability. However, Ngo (2006) investigated the relationship between bank capital adequacy and profitability and the results showed no significant relationship between capital and profitability.

Saunders; Cornett (2012) define bank capital as an item in the balance sheet; containing preferred and common stock; surplus or additional paid in capital; and retained earnings. This item is supposed to be a cushion to compensate losses. Admati; Hellwing (2014) claims that capital item not only decreases the profitability of bank failure; but generally helps the economy to perform better. Olalekan (2013) in this direction argues that capital plays an important role to promote both bank and

customers when it comes to an negative circumstances.

Admati; Hellwing (2014) suggest that bank can generate benefit by holding more capital. Banks not only could decrease the profitability of distress and default; but efficiently change the allocation of downside risk between tax payer and stockholders.

Besides; Lee [9] employed a panel regression analysis for Korean banks during (2000...2008). This study finds that higher capital ratios banks tend to manage the better factors of determining bank profitability.

Maraudu; Sibindi (2016) investigate the relationship between capital structure and profitability within the context of an emerging market of South Africa. They conduct multiple linear regression on times series data of big South African banks for the period (2000...2013). They establish a strong relationship between ROA and bank capital.

Also; Sahbani; Morina and Misiri (2018) studied the relationship between capital adequacy and return on commercial bank assets in Kosovo during (2008..2017). Based on the results we can conclude that capital adequacy has a positive impact on assets returns and has a significant relationship.

Suppia; Arshad [10] found a positive relationship between capital and bank profitability in Malaysia. Capital refers to the ratio of total equity to total assets which help to determine the number of assets that shareholders have a residual claim (Abduh; Alias (2014)). This is the most standard ratio used to determine the overall financial stability of the bank.

2.1 Pecking Order Theory

This theory structure states that firm have a preferred hierarchy for financing decisions. Firms will borrow instead of issuing equity when internal cash-flow is not sufficient to fund capital expenditure. The highest preference is to use internal financing theory before resorting to any form of external funds

If a firm use external funds; the preference will be to follow a certain order of financing sources: debt; convertible securities; preferred stock and common stock [11].

This order reflects the motivations of the financial manager to retain control of the firm ; reduce the agency costs of equity and avoid negative market reaction to an announcement of new equity issue.

2.2 Efficiency Hypothesis

Demestez [12] posited the efficiency hypothesis which was his attempt to offer alternative explanation to the traditional structure collision model.

He argued that the high profits of some banks relative to others is not out of collusive behavior but rather from efficiency in operations that lead to higher market share and hence profitability .

Gygorenko (2009) concluded that high profitability achieved by banks do not come as a result of market concentration but by operational efficiency that results in low operational costs .

2.3 Capital Buffer

In capital buffer theory; banks aim at holding more capital than recommended regulations targeting the creation of adequate capital buffers are designed to reduce the procyclical nature of leading by promoting the creation of countercyclical buffers [13]

The capital buffer is the excess capital a banks holds above the minimum capital required [14]; the capital buffer theory holds that bans with lower capital buffers attempts to build an appropriate capital buffer by raising capital and banks with capital buffers attempts to maintain their capital buffers .

More capital tends to absorb adverse shocks and thus reduces the likelihood of failure (Rime (2011)).

Banks raise capital when the portfolio risk goes up in order to keep up their capital buffer as righted by Leaven and Levine [15] which appears to relate to capital adequacy and performance of the bank.

2.4 Capital Requirements

2.4.1 Core capital and bank profitability

Tier 1 (core) capital in Basel 1 consists of the most liquid and reliable capital on a bank's

balance sheet; namely equity capital and disclosed reserves (BCBS (1988)). Tier 1 Capital includes:

- Permanent shareholder's equity in the form of common stock; perpetual non cumulative preferred stock and minority interest in equity accounts of consolidated subsidiaries.
- Disclosed reserves such as retained earnings; share premium or other surplus.
- Qualifying innovative capital instruments up to a maximum of 15% of Tier 1 capital.

According to Gropp and Heider [16] there is a straight connection between the core capital held and the earnings of local banks.

They asserted that more capitalized banks are more profitable because they have sufficient financial resources in invest in higher return investments which generate higher returns for the banks.

Capital plays a vital role in the performance of a bank; as the banks that have higher capital perform well as compared to undercapitalized ones. A direct association between capital level and the bank profit was concluded in a study by European commercial banks [7].

A significant link between the core capital and profit of bank was also found by Lee, Hsieh [17]; Lipunga (2014) .

2.4.2 Basel accord and bank capital

The regulation requires banks to have a side enough capital to cover unexpected losses and keep themselves solvent in a crisis.

As a main principle; the amount of capital required depends in the risk attached to the assets of a particular bank.

In the capital requirements regulation; this is referred to us the owner funds requirement and is expressed as a percentage of risk weighted assets.

The risk weighted assets concept in essence means that safer assets are attributed a lower allocation of capital while riskier assets are given in a higher risk weighted.

Tier1 capital is considered to be the going concern capital.

2.5 Subordinate Capital and Bank Performance

Subordinate (Tier 2) capital in Basel I consist of less reliable capital then that of Tier 1. Tier 2 capital includes (a) undisclosed reserves that have been accepted by the bank's supervisory authority; (b) general loan-loss reserves limited to 1.25 percent of risk weighted assets; (c) hybrid (debt, equity) capital instruments; (d) subordinated debt limited to 50 percent of Tier 1 capital and (e) asset revaluation reserves (BCBS, 2010).

Generally, banks are expected to absorb losses from their normal earnings. But there may be some unanticipated losses which cannot be absorbed by normal earnings. Capital comes in handy on such abnormal loss situations to cushion off the losses. In this way, capital plays an insurance function [18].

Adequate capital in banking is a confidence booster. It provides the customer, the public and the regulatory authority with confidence in the continued financial viability of the bank. Confidence to the depositor that his money is safe; to the public that the bank will be, or is, in a position to give genuine consideration to their credit and other banking needs in good as in bad times and to the regulatory authority that the bank is, or will remain, in continuous existence [19].

3. EMPIRICAL STUDY

The relationship between bank capital and bank profitability has been the object of several to.

Under this section; we will identify the sample at the beginning and then we specify the variables and the models.

After we carry out the necessary econometric tests:

Finally we show the estimation results of the model and their interpretations.

3.1 Sample

We will use 11 banks (BIAT ; STB ; BNA ; BH ; ATB ; AMEN Bank ; BH ; BTEI ; BT ; Attijari bank; UBCI) that belong to professional association of banks in Tunisia and quoted in Tunisian sotck exchange over the period (2000...2018).

Financial data are collected through the annual report of banks existed in the website of the professional association of banks in Tunisia over the period (2000...2018).

3.2 Estimation Method

We will utilize panel static because it controls:

- The time and individual variation in the observable behavior across sectional times series aggregated.
- The observed or unobserved individual heterogeneity

3.3 Specification of Variables

We will estimate the following models :

- (1) $ROA_{i,t} = b_0 + b_1 Size_{i,t} + b_2 CAPI_{i,t} + b_3 TLAI_{i,t} + b_4 CEAI_{i,t} + b_5 CFCi_{i,t} + b_6 Tdeposit_{i,t} + b_7 CEAI_{i,t} + b_8 CFCi_{i,t} + b_9 ALA_{i,t} + b_{10} CD_{i,t} + b_{11} TPIBi_{i,t} + b_{12} TINFi_{i,t} + E_{i,t}$
- (2) $ROE_{i,t} = b_0 + b_1 Size_{i,t} + b_2 CAPI_{i,t} + b_3 TLAI_{i,t} + b_4 CEAI_{i,t} + b_5 CFCi_{i,t} + b_6 Tdeposi_{i,t} + b_7 CEAI_{i,t} + b_8 CFCi_{i,t} + b_9 ALAI_{i,t} + b_{10} CD_{i,t} + b_{11} TPIBi_{i,t} + b_{12} TINFi_{i,t} + E_{i,t}$
- (3) $NIM_{i,t} = b_0 + b_1 Size_{i,t} + b_2 CAPI_{i,t} + b_3 TLAI_{i,t} + b_4 CEAI_{i,t} + b_5 CFCi_{i,t} + b_6 Tdeposi_{i,t} + b_7 CEAI_{i,t} + b_8 CFCi_{i,t} + b_9 ALAI_{i,t} + b_{10} CD_{i,t} + b_{11} TPIBi_{i,t} + b_{12} TINFi_{i,t} + E_{i,t}$

Where: i = Bank

T= Time

b0= constant

b 1; b2; b3;.....b12= parameters to be estimated

ROA = return on assets = net income/ total assets

ROA shows how to generate income from the assets of the bank (Chin (2011))

It measures the profit earned per dollar of assets and reflects how well management uses the bank's investment resources has generate profit (Naceur (2003))

ROA is considered as the best proxy of profit (Famini; al [20]; Samad [21])

ROE = return on equity = Net income /total equity

ROE reflects the ability of bank to use its own funds to generate profits (Yilmaz (2013))

This ratio shows the profit earned per 1 dinar of investment. This is an indicator of how well banks uses investor’s money or generate profit [22].

Size = size of the bank = Natural logarithm of total assets

Size can show the economies of scale. The large banks benefits from economies of scale which reduces the cost of production and information gathering [23]

ALA= liquid assets / total assets

ALA depicts the bank’s ability to absorb the liquidity shocks. In theory the higher liquidity ratio indicates that the bank is better position to meet its stochastic with drawals [24]

CEA= operating expenses / total assets

Operating expenses including personal expenses and other expenses. CEA shows the weight of operating expenses compared to total assets

CFC = Financial expenses / total credits

Financial expenses include interest expenses due to loan made in the money market and the capital market by banks.

CFC shows the financial expenses in relation to total credits

Tdeposits = Total deposits / total assets

Deposits include demand deposit and term deposits. T deposits shows the share of deposits compared to total assets. The more the deposit a bank collect; the more the loan opportunities; it will be able to generate further profits [25].

CD= total credits / total deposits

It is the ratio that describes how allocation of funds in term of deposits; comparing to a number of funds which is obtained from savings (Widyastuti; al (2017))

When the ratio is higher; it show more risky conditions because the funds from deposits have been collected in more of credits. Conversely the lower ratio indicate effective banks in lending decision.

TPIB = Growth rate of gross domestic product

It shows the growth in the economic activity in the country.

TINF = rate of inflation.

We will estimate a following hypothesis:

H1: Bank Capital has a significant effect on ROA (retun on assets)

H2: Bank Capital has a significant effect on ROE (return on equity)

H3: Bank Capital has a significant effect on NIM (net interest margin)

Graph 1. 3-4 Descriptive statistics

	Observations	Mean	Standard deviation	Minimum	Maximum
ROA	209	0.0117	0.0100	0	0.975
ROE	209	0.1047	0.06077	0	0.2976
NIM	209	0.02746	0.024	0.0083	0.35324
Size	209	15.013	1.017	11.93	18.29
CAP	209	0.1162	0.096	0	0.6739
TLA	209	0.7569	0.131	0.107	0.9817
CEA	209	0.02841	0.0063	0.000237	0.056
CFC	209	0.03677	0.0207	0.0184	0.3051
T deposit	209	0.7421	0.1599	0.0205	0.956
ALA	209	0.03494	0.037	0.0033	0.44
CD	209	1.5292	2.83	0.1852	35.76
TPIB	209	0.03310	0.0147	0.0012	0.0811
TINF	209	0.05529	0.05356	0.03	0.781

209= 11*19; 11= Number of banks; 19= Number of years (2000....2018)

ROA (mean = 0.0117). In the average; net return represent 1.17% of total assets. Standard deviation is low (1%). There is no great difference between banks in ROA. Also ROE (Mean = 0.1047). In the average; net profit represent 10.47% of total assets. Standard deviation is high (6%). There is no great difference between banks in ROE. Besides; NIM (mean = 0.027). In the average net interest represent 2.7% of total assets. Standard deviation is low (2.4%). The banks not very differently in NIM.

On the other hand; Size (mean = 15.013). In the average; size of bank equal to 15. Standard deviation is high. There is a big difference between banks in size.

CAP (mean = 0.1162). In the average; capital of bank equal to 11.62% of total assets. Standard deviation is high. There is a big difference between banks in Capital. Also TLA (mean = 75.69%). In the average total credit represents 75.69% of total assets. There is a big difference between banks in TLA. The banks is differently in TLA.

CEA (mean =0.02841). The operating expenses represent an average 2.841% of total assets. There is a low standard deviation. There isn't big differences between banks in term of CEA. On the other hand; CFC (mean =0.03677). In average financial expenses represent 3.677% of total credits.

T deposit (mean =0.7421). In average total deposits represent 74.21% of total assets. The standard deviation is high. There is a big difference between banks in term of deposits.

ALA (mean =0.034) . In average asset liquid represent 3.4% of total assets. There is not high standard deviation. There isn't big difference between banks in term of ALA. Besides CD (mean= 1.52) . In average total credit represent

1.52 of total deposits. There is a high standard deviation. There is a big difference between banks in term of CD.

TPIB (mean=0.033). In average economic growth equal to 3.33% in the period of study (2000...2018). There is a low standard deviation. There is no big difference between years in economic growth except the years after revolution of 2011 who the economic growth has dropped.

TINF (mean =5.52%). In average the rate of inflation equal to 5.52% in the period of study (2000...2018). There is a low standard deviation. There is a big difference between banks in inflation except the years after revolution of 2011 who the inflation has increased.

3.4 Multicollinearity Test

Multicollinearity occurs when there is a high correlation between the independent variables in the regression analysis which impacts the overall interpretation of the results it reduces the power of coefficients and weakens the statistical measure to test the p value is identify the significant independent variables.

All coefficients between variables are inferior to 80%. There is no problem of multicollinearity.

VIF quantifies the extent of correlation between one predictor and other predictors in a model. High value signifies that is difficult to assess accurately the contribution of predictors to a model.

3.5 Hausman Test

The Hausman test is developed to give existence in deciding on electing between the field effects and random effect approach.

Table1. Correlation between variables

	ROA	ROE	NIM	Size	CAP	TLA	CEA	CFC
ROA	1.000							
ROE	0.3930	1.000						
NIM	0.1159	-0.0525	1.000					
Size	0.0158	0.3964	-0.2448	1.000				
CAP	0.2435	-0.2316	0.2949	-0.4941	1.000			
TLA	0.0933	0.0639	0.0502	0.1256	0.09781	1.000		
CEA	0.0524	-0.0157	-0.1554	0.1215	-0.0841	-0.0628	1.000	
CFC	-0.0056	0.0089	-0.0789	0.1200	-0.0915	-0.2040	0.2885	1.000

Table 2. Suit of correlation between variables

	ROA	ROE	NIM	Size	CAP	TLA	CEA	CFC	Tdeposit
Tdeposit	-0.0463	0.3751	-0.3008	0.534	-0.7636	0.0528	-0.0738	0.0303	1.000
ALA	-0.0920	-0.1441	0.0539	-0.0794	-0.0619	-0.0700	-0.374	-0.036	-0.0849
CD	0.2313	-0.1557	0.1430	-0.3739	0.7434	0.0517	-0.1049	-0.063	-0.59
TPIB	0.0685	-0.1856	0.0814	-0.3656	0.0522	-0.1881	-0.0532	0.021	-0.1314
TINF	0.0427	0.0486	-0.0582	0.1247	-0.0160	0.1440	0.0418	-0.0038	0.0753

Table 3. Suit of correlation between variables

	ALA	CD	TPIB	TINF
ALA	1.000			
CD	-0.0598	1.000		
TPIB	0.1226	0.0628	1.000	
TINF	-0.0834	-0.0186	-0.2389	1.000

The hypotheses of the hausman test are: 0.049%) The increase of capital has a positive effect on return on assets of bank This result is similar to result found by [29]; Dhouibi (2017)).

H0: Random effects are consistent and efficient

H1: Random effects are inconsistent A high volume of equity will reduce the cost of capital; causing a positive effect on profitability . Therefore well capitalized banks achieve greater profitability [25].

When the pvalue is greater to 0.05 the random effect is chosen

In Model 1: Pv+ 0.0534
 Model 2: Pv + 0.0568
 Model3: Pv= 0.0592

There is a positive relationship between ROA and TLA (if TLA increase by 1% ; ROA will increase by 0.0023%) . The increase of total credits by total assets has a positive effect on return on assets of bank. This result is similar to result found by [25].

3.6 Estimation of Result of Models and Interpretations

There is a positive relationship between ROA and size (if size increase by 1%: ROA will be increase by 0.0015%). The increase of size has a positive effect on return on assets . This result is similar to result found by [25,26] but contrary to result found by [27,28]

There is a positive relationship between CEA and ROA (if CEA increase by 1% : ROA will decrease by 0.1998%). The increase of operating expenses has a negative effect on bank return on assets. This result is similar to result found by [28,8].

Large banks might benefit from economies of scope economies [25]. Also there is a positive relationship between ROA and CAP (if CAP increase by 1%; ROA will be increase by

The negative effect of cost means that there is a lack of competence in expense management since banks pass part of increased costs to customers and the remaining parts to profits;

Graph 2. Test of VIF

Variables	VIF	1/VIF
CAP	3.87	0.25
Tdeposit	2.97	0.33
CD	2.27	0.44
Size	1.74	0.57
TPIB	1.26	0.79
CEA	1.18	0.84
CFC	1.15	0.86
TLA	1.15	0.86
TINF	1.08	0.91
ALA	1.07	0.93

Graph 3. A – Estimation of result of model 1 and their interpretations

ROA	Coeff	Std.error	Z	Z < P	95% CI
Size	0.0015	0.00085	0.072	0.072	-0.00013 0.0032
CAP	0.049	0.013	0.000	0.000	0.022 0.075
TLA	0.0023	0.0053	0.663	0.663	-0.0081 0.0128
CEA	-0.1998	0.112	0.077	0.077	-0.021 0.42
CFC	-0.0079	0.033	0.814	0.8140	-0.074 0.058
Tdeposit	0.0213	0.0070	0.003	0.003	0.0074 0.035
ALA	-0.0063	0.0181	0.726	0.726	-0.042 0.029
CD	0.00050	0.00034	0.149	0.149	-0.00018 0.0011
TPIB	0.1090	0.049	0.029	0.029	0.011 0.206
TINF	0.0064	0.01270	0.611	0.611	-0.0184 0.031
Cons	-0.040	0.0142	0.002	0.002	-0.072 -0.0165

possibly due to the fact that competition does not allow them to over charges [27]. Besides there is a negative relationship between CFC and ROA (if CFC increase by 1% ; ROA will be decrease by 0.0079%) . The increase of financial expenses by credits has a negative effect on return on assets.

There is a positive relationship between T deposit and ROA (if T deposit increase by 1%; ROA will increase by 0.0213%). The increase of deposit has a positive effect on return on assets of banks. This result is similar to result found by

There is a negative relationship between ALA and ROA (if ALA increase by 1%; ROA will increase by .0063%). The increase of asset liquid has a negative effect on return of assets.

Also there is a positive relationship between CD and ROA (if CD increase by 1%; ROA will increase by 0.0050%). The increase of credits by deposits has a positive effect on return on assets. This result is similar to result found by [30]; Bawacha (2018))but contrary to result found by (Pruwoko ; Sudyatno (2013)).

There is a positive relationship between TPIB and ROA (if TPIB increase by 1%; ROA will increase by 0.1090%). The increase of economic growth has a positive effect on return on assets of bank .This result is similar to result found by [31]; Jawad, Lahsen (2018)) but contrary to result found by [22].

There is a positive relationship between TINF and ROA (if TINF increase by 1%; ROA will increase by 0.0064%). The increase of rate of inflation has a positive effect on bank return of assets.

3.7 Estimation of Results and Interpretations of Model 2

There is a positive relationship between size and ROE (if size increase by 1% ROE will increase by 1.66%). The increase of size has a positive effect on return on equity of bank. This relationship is statistically significant at 1%. This result is similar to result found by [32,33,34].This result is contrary to found by Gadagbi [35].

Finance literature suggests that large banks are said to exhibit lower returns because of the enhanced economies of scale which they may pass on their customers in the form of lower lending rates.

There is a positive relationship between CAP and ROE (if CAP increase by 1%; ROE will increase by 7.38%). The increase of capital has a positive effect on bank return on equity .This result is similar to result found by [28,33]. There is contrary to result found by Gadegbi (2017).

Banks with a high capital ratio are consistent to be insured against bankruptcy to have access to cheap funds to be more flexible in pursuing business opportunities and have to ability to absorb any unexpected losses.

There is a negative relationship between ROE and TLA (if TLA increase by 1% ; ROE decrease by 0.0068%). The increase of TLA has a negative effect on return on equity of bank. This result is similar to result found by Yuksul; al (2018)).Therefore high level of loans means a possible deterioration of the bank asset quality with a negative effect on bank profitability [36].

There is a negative relationship between ROE and CEA (if CEA increase by 1% ROE decrease by 0.062%) . The increase of operating costs has a negative impact on bank return on equity.

There is a negative relationship between ROE and CFC (if CFC increase by 1%; Roe decrease by 0.068%). The increase of financial expenses has a negative impact on bank return on equity.

There is a positive relationship between ROE and T deposit (if T deposit increase by 1%; ROE will increase by 0.1295%). The increase of deposits have a positive impact on bank return on equity.

There is a negative relationship between ROE and ALA (if ALA increase by 1%; ROE will decrease by 0.1297%). The increase of asset liquid has a negative impact on bank return on equity.

There is a positive relationship between ROE and CD (if CD increase by 1%; ROE will increase by 0.0013%). The increase of credits by deposits have a positive impact on bank return on equity.

There is a negative relationship between TPIB and ROE (if TPIB increase by 1%; ROE will decrease by 0.19%). The increase of TPIB have a negative impact on bank return on equity.

There is a negative relationship between TINF and ROE (if TPIB increase by 1%; ROE will decrease by 0.027%). The increase of TINF have a negative impact on bank return on equity.

3.8 Estimation of Results of Model 3 and Interpretations

There is a negative relationship between NIM and size (if Size increase by 1%; NIM will decrease by 0.001562%). The increase of size has a negative effect on bank net interest margin. This result is similar to found by Gadabi (2017) but contrary to result found by Ram; Mesfin [37]. This could be that as banks increase in size they enjoy economies of scale with reflects in their net interest margin.

There is a positive relationship between NIM and CAP (if CAP increase by 1%; NIM will increase by 0.05543%). The increase of capital has positive effect on bank net interest margin. This relationship not statistically significant .This similar to result found by Gadagbui [35], Mesfin and Ram [38]; Hoai; Kieu [39].

The capital adequacy ensures the financial soundness of banks in absorbing a reasonable amount of loss before insolvency of banks happen (Fatim (2014)).

There is a positive relationship between TLA and NIM (if CTLA increase by 1% ; NIM will increase

by 0.0109%). The increase of total credits has positive effect on bank capital. This relationship is not statistically significant.

There is negative relationship between NIM and CEA (if CEA increase by 1% ; NIM will decrease by 0.6145%). The increase of CEA has negative effect on bank net interest margin.

This relationship is statistically significant at 5%.

There is positive relationship between NIM and CFC (if CFC increase by 1%; NIM will increase by 0.0021%). The increase of CFC has positive effect on bank net interest margin.

There is negative relationship between NIM and T deposit (if Tdeposit increase by 1%; NIM will decrease by 0.034%). The increase of net interest margin has negative effect on bank deposits.

There is positive relationship between NIM and ALA (if ALA increase by 1%; NIM will increase by 0.0159%). The increase of asset liquid has positive effect on bank net interest margin. This contrary to result found by Mesfin; Ram [38].

Table 4. Estimation of results of model 2

ROE	Coeff	Std .error	Z	Z<P	95% CI
Size	0.01668	0.0049	3.37***	0.001	0.0069 0.026
Cap	0.07381	0.077	0.95	0.341	-0.078 0.22
TLA	-0.0068	0.031	-0.22	0.827	-0.067 0 .054
CEA	-0.062	0.65	-0.10	0.923	-1.34 0.21
CFC	-0.068	0.19	-0.35	0.728	-0.45 0.30
T deposit	0.1295	0.0409	3.16***	0.002	0.049 0.20
ALA	-0.1297	0.1054	-1.23	0.2180	-0.33 0.076
CD	0.0013	0.002	0.66	0.511	-0.0026 0.0032
TPIB	-0.19	0.2891	-0.67	0.505	-0.75 0.37
TINF	-0.027	0.0736	-0.38	0.7060	-0.17 0.11
Const	-0.23	0.082	-2.79	0.005	-0.39 0.066

Table 5. Estimation of results of model 3

NIM	Coefficient	Standard error	Z	Z<P
Size	-0.001562	0.0020	-0.75	0.452
CAP	0.05543	0.032	1.70	0.088
TLA	0.0109	0.013	0.84	0.399
CEA	-0.6145	0.273	-2.24**	0.025
CFC	0.0021	0.082	0.03	0.979
Tdeposit	-0.034	0.017	-1.99**	0.046
ALA	0.0159	0.044	0.36	0.719
CD	-0.0017	0.00084	-2.02**	0.043
TPIB	0.0362	0.12	0.30	0.765
TINF	-0.012	0.0308	-0.41	0.683
Cons	0.08046	0.034	2.32	0.020

There is negative relationship between NIM and CD (if CD increase by 1%; NIM will decrease by 0.0017%). The increase of credits by deposit has negative impact on bank net interest margin.

There is positive relationship between NIM and economic growth (if TPIB increase by 1%; NIM will increase by 3.62%). The increase of net interest margin has positive effect on deposits. This result is similar to found by Mesfin; Ram [38].

There is negative relationship between NIM and inflation (if TINF increase by 1%; NIM will decrease by 0.012%). The increase of inflation on bank net interest margin.

4. CONCLUSION

Bank capital is considered by regulatory consensus as a tool that guarantees the ability of a bank to protect itself against risk (Demirguc-Kunt et al., 2013). Banks holding more capital are capable of absorbing losses with their own business by using their own resources, without experience insolvency or need for a bailout with public funds (Demirguc-Kunt et al., 2013). Also, it is stated that the bank's probability of financial distress can be diminished by possessing greater capital [40].

The relationship between bank capital and bank profitability is important of financial soundness and guarantees of better opportunities of banks.

In this article; we studied a sample of 11 banks between (2000---2018) in Tunisia. We employ a panel static; we found that Bank capital has only significant effect on ROA. A high volume of equity will reduce the cost of capital; causing a positive effect on profitability. Therefore well capitalized banks achieve greater profitability but not significant in ROE and NIM.

Banks with a high capital ratio are consistent to be insured against bankruptcy to have access to cheap funds to be more flexible in pursuing business opportunities and have to ability to absorb any unexpected losses.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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