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THE IMPACT OF CAPITAL ON BANK LENDING: CASE OF TUNISIA

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ABSTRACT: *Capital and lending are two important variables in the banking industry. On the one hand, capital increases the financial solidity of a bank whereas lending is essential to generate revenue from interests and satisfy the needs of customers. In this article, we studied a sample of 11 banks in Tunisia for the period (2005-2020). We used a method of panel static. We found that capital has a positive and significant impact on bank lending.*

KEYWORDS: Capital, Bank lending, Panel.

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INTRODUCTION

Bank capital is meant to mitigate insolvency risk and banks that have risky portfolios from lending activities need to maintain adequate capital (Shim, 2013). Regulation of bank capital aims to ensure the stability of the financial system by protecting it from general system bank failure. The post crisis empirical literature can be divided into 3 groups based on the empirical results. The first group identifies a negative effect of high capital requirements on bank lending (Aiyar et al., 2014; Bridges et al., 2015); De Ramon et al., 2016). The second group found a negative effect of high capital ratios on bank lending (De Nicolo, 2015; Noss, 2014; Mag, 2010). The third group identifies a positive effect of higher capital ratio on bank lending (Berrospides and Edge, 2010) .

The authors used data on US banks. They find a positive effect of various bank capital ratios (the ratio of equity to total assets; the risk based total and Tier1 capital ratio; tangible common equity) and the capital surplus on economic growth, indicating that higher bank capitalization leads to higher credit supply. Dahir et al. (2019), and Abbas et al. (2020) find a negative linkage between capital and bank lending. Tran and Mc Millan (2020) document an inverse relationship between capital and lending growth in the USA in the pre-crisis period.

Indeed, the reinforcement of the bank capital is supported to help them to absorb less due to unexpected risks and to encourage them to better manage risks (Aiyar et al. 2015; Dugher et al., 2016). The main objective of this article is to identify the effect of capital on bank lending in Tunisia. We used an approach of three sections. The first section concerned the literature review; we studied the empirical research in the second section. We make a conclusion in the final part of the research.

LITERATURE REVIEW

Bank capital can influence the impact of monetary policy changes on lending in two ways, both based on adverse selection problems that affect banks' fund-raising: the “bank lending channel,” which relies on imperfections in the market for bank debt (Bernanke & Blinder, 1988; Kashyap & Stein, 1995). Capital acts like a financial cushion against losses. When, for example, many borrowers are suddenly unable to pay back their loans, or some of the bank’s investments fall in value, the bank will make a loss and without a capital cushion might even go bankrupt. However, if it has a solid capital base, it will use it to absorb the loss and continue to operate and serve its customers. Jackson et al. (1999) conclude that banks respond to tightened capital regulation in the least costly manner, possibly causing these financial institutions to reduce lending in response to external shocks to capital.

Gambacorta and Mistrulli (2004) claim that banks’ lending behavior depends on capital structure, implying that well-capitalized banks could withstand borrowers’ temporary difficult financial situations and sustain their long-term lending relationships. Van Hoose (2007) also argues that there is a general agreement about capital regulation decreasing the loan supply. Košak et al. (2015) conclude that banks having more capital could survive crises and better maintain their lending activities during stressed times.

Naceur and Kandil (2013) used a sample of 5 countries (Morocco, Jordan, Lebanon, Egypt, and Tunisia) to study the relationship between the implementation of Basel 1 agreement and credit

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rationing between 1989-2010). They noted that Basel 1 capital regulation led to an increase in the credit supply. Dan et al. (2021) studied the lending behavior of Vietnamese commercial banks between 2007-2019. They found that banks with higher capital ratios tend to expand lending more, while the risk of credit portfolio is controlled at lower levels at these banks.

Bridges et al. (2014) estimated the change of regulatory capital and bank lending. They used a sample of banks in the UK for the period between 1990-2011. They found that the requirements of regulatory capital increase bank lending. Makanile and Pastory (2022) used a sample of six commercial banks in Tanzania for the period between 2005-2019. They found that capital has a significant relationship with lending.

Kolanova and Malvana (2019) studied the impact of higher capital requirements on loan growth to the private sector of banks in the Czech Republic. The empirical results indicate that there is a negative effect of higher additional capital requirements on loan growth of banks with relatively low capital surplus. Makanile and Pastory (2022) studied six commercial banks in Tanzania for the period between 2015-2019. They found that capital has a significant impact on bank lending.

Bridges et al. (2014) studied the banks in the United Kingdom for the period between 1990-2011. They found that capital requirements affect lending with heterogeneous responses in different sectors of the economy in the year following an increase in capital requirements, banks on average cut loan growth for commercial real estate, other corporate, and household secured lending.

Kim and Sohn (2017) use a sample of US commercial banks to conduct their research. Their principal findings show that the impact of bank capital buffers on credit growth, measured by the growth rate of net loans and unused funding commitments, are positively correlated with liquidity positions for large banks.

The results also highlight that bank capital significantly drives lending activities only after large banks keep enough liquid assets. Roulet (2018) investigates the impact of capital on bank lending in Europe after the 2008 financial crisis. The study reveals that capital buffers posit a negative impact on retail lending growth and other loans. In the context of the credit crunch in Europe, more stringent capital safety standards have forced banks to replace risky loans with high liquid assets that have less risk exposures. There is a positive and significant relationship between the improvement of equity capital and credit supply in the USA and Germany (Carlson et al., 2013; Bush & Prieto, 2014). Nguyen and Nguyen (2022) studied a sample of banks in Vietnam for the period (2005-2021). They found out that capital has a positive impact on lending growth.

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EMPIRICAL STUDY

A-Sample

We studied a sample of 11 banks in Tunisia for the period (2005-2020).

B-Econometric method

We used a panel static because it controls the heterogeneity and temporal dimension of variables.

C-Model

TLA I,t = b0+ b1 **ROAi,t** +b2 **ROE i,t** +b3 **NIMi,t** +b4 Size, t+b5 CAPi,t +b6 ALAi,t +b7 CDi,t +b8 CEAi,t +b9 **Tdepositi,t** +b10 **CFC i,t** +b11 **TPIBi,t** +b12 **TINFi,t +**Ei,t

B0=constant

TLA = total credits / total assets

ROA = net profit / total assets

ROE = Net profit / total equity

NIM = net interest margin / total assets

Size = log of total assets

CAP= equity / total assets

ALA= asset liquid / total assets

CD= Total credits / total deposits

CEA= operating costs / total assets

T deposit = Total deposits / total assets

CFC = Financial expenses / Total credit

TPIB =Economic growth

TINF= rate of inflation

E= Error term

i= bank t= time

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D-Descriptive statistics

Table1: Descriptive Statistics

	Observations	Mean	Standard deviation	Minimum	Maximum
ALA	176	0.028	0.0225	0.0028	0.10
CD	176	1.19	0.724	0.47	8.40
TLA	176	0.77	0.1142	0.12	0.9817
ROA	176	0.012	0.0094	0.0088	0.0975
ROE	176	0.111	0.0631	0.0029	0.2976
NIM	176	0.026	0.0132	0.0083	0.16391
Size	176	15.35	0.92	12.52	18.29
CAP	176	0.1051	0.063	0.0086	0.498
CEA	176	0.032	0.026	0.00023	0.35
CFC	176	0.038	0.0153	0.018	0.1689
Tdeposit	176	0.76	0.11	0.099	0.956
TPIB	176	0.022	0.036	-0.1051	0.064
TINF	176	0.061	0.016	0.0340	0.08543

E-Multicollinearity test

Table 2: Correlation between Variables

	ALA	CD	TLA	ROA	ROE
ALA	1.000				
CD	0.073	1.000			
TLA	-0.0844	0.1949	1.000		
ROA	-0.1684	0.1631	0.1191	1.000	
ROE	-0.2150	-0.1616	0.1176	0.3923	1.000
NIM	0.0158	-0.0833	0.2478	0.1073	0.0834
Size	0.0973	-0.27	0.1577	0.0857	0.3653

Table 3: Suite of Correlation between Variables

	ALA	CD	TLA	ROA	ROE
CAP	-0.0775	0.6962	0.1346	0.2912	-0.1852
CEA	0.2036	0.0159	-0.0661	-0.0267	-0.0754
CFC	-0.0378	-0.0258	-0.1179	-0.0076	-0.0447
T deposit	-0.2385	-0.5547	0.0531	0.0169	0.3814
TPIB	0.0604	0.0589	-0.1125	0.0670	-0.0117
TINF	-0.1196	-0.0893	0.3426	-0.038	0.2111

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Table 4: Suite of Correlation between Variables

	NIM	Size	CAP	CEA	CFC	Tdeposit	TPIB	TINF
NIM	1.000							
Size	0.0255	1.000						
CAP	0.0615	-0.35	1.000					
CEA	-0.0641	0.12	-0.0076	1.000				
CFC	-0.1476	0.1384	-0.0227	0.3142	1.000			
Tdeposit	-0.0711	0.4336	-0.491	-0.1459	-0.1598	1.000		
TPIB	-0.0250	-0.25	0.0123	0.0123	-0.1314	-0.2233	1.000	
TINF	0.0434	0.42	-0.1064	-0.1064	0.1031	0.1271	-0.5512	1.000

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

VIF test

VIF= variance inflation factor

VIF= $1/1-Ri^2$

Where $\mathbf{R_i^2}$ represents the unadjusted coefficient of determination for regressing the i^{th} independent variable on the remaining ones. The reciprocal of VIF is known as **tolerance**. Either VIF or tolerance can be used to detect multicollinearity, depending on personal preference.

If R_i^2 is equal to 0, the variance of the remaining independent variables cannot be predicted from the i^{th} independent variable. Therefore, when VIF or tolerance is equal to 1, the i^{th} independent variable is not correlated to the remaining ones, which means multicollinearity does not exist in this regression model. In this case, the variance of the i^{th} regression coefficient is not inflated.

Generally, a VIF above 4 or tolerance below 0.25 indicates that multicollinearity might exist, and further investigation is required. When VIF is higher than 10 or tolerance is lower than 0.1, there is a significant multicollinearity that needs to be corrected.

However, there are also situations where high VFIs can be safely ignored without suffering from multicollinearity. The following are three of such situations:

1. High VIFs only exist in control variables but not in variables of interest. In this case, the variables of interest are not collinear to each other or the control variables. The regression coefficients are not impacted.

2. When high VIFs are caused as a result of the inclusion of the products or powers of other variables, multicollinearity does not cause negative impacts. For example, a regression model includes both x and x^2 as its independent variables.

3. When a dummy variable that represents more than two categories has a high VIF, multicollinearity does not necessarily exist. The variables will always have high VIFs if there is a small portion of cases in the category, regardless of whether the categorical variables are correlated to other variables.

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Table 5

Variable	VIF	1/VIF
CAP	2.93	0.34
Tdeposit	2.60	0.38
CD	2.09	0.47
Size	1.84	0.54
TINF	1.75	0.57
ROE	1.59	0.62
TPIB	1.53	0.65
ROA	1.49	0.67
ALA	1.40	0.71
CFC	1.32	0.75
CEA	1.20	0.83
NIM	1.07	0.93

All the coefficients are inferior to 5. There is no problem of multicollinearity .

F-Hausman test

It is useful to choose between the fixed effect model and random effect model .

- Fixed effect model: It is the statistical model in which the model parameters are fixed. In a panel data where longitudinal observation exists for the same subject, fixed effects represent the subject or specify means. In the panel data analysis, the term fixed effect estimator, also known as the within estimator, is used to refer to an estimator for the coefficients in the regression model including those fixed effects (one time invariant intercept of each subject). The assumption that if p value is inferior to 0.05 because all coefficients of this model are not equal to 0.

- Random effect model: It is also called a variance component model. It is the statistical model where the parameters are random. It is a kind of hierarchical linear model which assumes that the data being analyzed are drawn from a hierarchy of different populations whose differences relate to that of hierarchy (Makanile & Pastory, 2022.

In our model Pv = 0.035, we choose the model with fixed effects:

G-Estimation and interpretations of model

Table 6: Estimations of Model

TLA	Coefficient	t	p>t
ROA	-0.065	-0.08	0.933
ROE	-0.8454	-0.64	0.520
NIM	0.2476	0.50	0.616
Size	0.039	2.75	0.007
CAP	-0.34	-1.24	0.217

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CEA	-0.26	-1.06	0.293
CFC	-0.74	-1.47	0.144
Tdeposit	0.049	0.44	0.658
CD	0.024	1.83	0.069
ALA	-0.058	-0.13	0.897
TPIB	0.24	1.18	0.239
TINF	1.74	3.30	0.001
Constant	0.062	0.38	0.704

- There is a negative relationship between ROA and TLA (if ROA increases by 1%, TLA will decrease by 0.065%). The increase of return on assets has a negative impact on bank lending. This result is similar to the result found by Dan et al. (2021) but contrary to the result found by Nguyen and Nguyen (2022).

- There is a negative relationship between ROE and TLA (if ROE increases by 1%, TLA decreases by 0.84%). The increase of return on equity has a negative impact on bank lending.

- There is a positive relationship between NIM and TLA (if NIM increases by 1%, TLA will increase by 0.2476%) . The increase of net interest margin has a positive impact on bank lending

- There is a positive relationship between Size and TLA (if Size increases by 1%, TLA will increase by 0.039%). The increase of size has a positive impact on bank lending. This result is similar to result found by Dan et al. (2021) and Nguyen and Nguyen (2022).

- There is a negative relationship between CAP and TLA (if CAP increases by 1%, TLA will decrease by 0.34%). The increase of capital has a negative impact on bank lending. This result is similar to the result found by Berhe (2019) but contrary to the result of Dan et al. (2021), Makanile and Pastory (2022), Kim and Sohn (2017), and Roulet (2018).

- There is a negative relationship between CEA and TLA (if CEA increases by 1%, TLA will decrease by 0.26%). The increase of operating costs has a negative impact on bank lending

- There is a negative relationship between CFC and TLA (if CFC increases by 1%, TLA decreases by 0.74%). The increase of financial expenses to total credit has a negative impact on bank lending.

- There is a positive relationship between Tdeposit and TLA (if Tdeposit increases by 1%, TLA will increase by 0.049%). The increase of deposits has a positive effect on bank lending. This result is similar to the result found by Dan et al. (2021) but contrary to the result of Berhe (2019). An increase of deposits of a bank is likely to improve its ability to lend more funds to its customers.

- There is a positive relationship between CD and TLA (if CD increases by 1%, TLA will increase by 0.024%). The increase of (credits/deposits) has a positive effect on bank lending.

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- There is a negative relationship between ALA and TLA (if ALA increases by 1%, TLA will decrease by 0.058%). The increase of asset liquid has a negative relationship with bank lending. This result is similar to the result found by () but contrary to the result found by Dan et al. (2021).

- There is a positive relationship between TPIB and TLA (if TPIB increases by 1%, TLA will increase by 0.24%). The increase of economic growth has a positive impact on bank lending. This result is similar to the result found by Nguyen and Nguyen (2022), and Jessica et al. (2019).

- There is a positive relationship between TINF and TLA (if TINF increases by 1%, TLA will increase by 1.74%). The increase of inflation has a positive impact on bank lending. This result is similar to the result found by Nguyen and Nguyen (2022).

CONCLUSION

The capital is important for the financial solidity of a bank and to research new investments. Also, bank lending is necessary to increase the resources and profit of a bank. It is necessary to understand the relationship between bank capital and lending. For example Roulet (2018) investigated the impact of capital on bank lending in Europe after the 2008 financial crisis. The study reveals that capital buffers posit a negative impact on retail lending growth and other loans. In the context of credit crunch in Europe, more stringent capital safety standards forced banks to replace risky loans with high liquid assets that have less risk exposures. In this article, we used a sample of 11 banks in Tunisia over the period (2005-2020). We found that capital has a negative impact on bank lending .The increase of capital has a negative impact on bank lending .

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D-Estimation of Model

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