THE DETERMINANTS OF BANK RISK: CASE OF TUNISIA

Mohamed Aymen Ben Moussa (1)
(1) Doctor in finance ; faculty of business administration Afif ; Shaqra University
Saudia Arabia
moussaaymen495@gmail.com

ABSTRACT

Banks are defined as financial intermediaries that borrow money from surplus spending units and lend to deficit spending units. During this process, they carry out four basic services: liquidity intermediation, denomination intermediation, risk intermediation, and maturity intermediation. The nature of this intermediation makes banks face many risks, including liquidity risk, operational risk, credit risk, interest rate risk and foreign exchange risk. In this study we attempt to identified the determinants of bank risk in Tunisian context. We measured bank risk with (RWTA. NPL and Zscore). We used a sample of 11 banks quoted in financial market of Tunis for the period (2014---2023). By estimation of 3 models with the technique of panel data, we found that liquidity; total credit; return on equity; size; capital; economic growth and inflation have a significant effect on bank risk.

Keywords: Bank, Zscore, NPL, Liquidty, Return on equity, capital

1-INTRODUCTION

Haq, Heany (2012) define risk as an appetite for selection among a variety of alternatives with different level of uncertainties. They indicate that the risk taking behaviour of banks refere to the appetite to choose; among varieties of projects ; investments or ventures with different levels of uncertainties and expected cash flows. Saldías (2013) argues that the level of risky decisions available to and made by banks as regards investments, projects and or ventures is greatly important as it determines their performance. As a result, banks have to make appropriate risk choices to maximise and maintain their performance in the form of profitability, stability and efficiency (Demirguc-Kunt, Detragiache, & Merrouche, 2013).

The level of risk that those that are charged with the responsibility of directing and controlling the banks are willing to tolerate can either harm or benefit the bank. For instance, the excessive risk-taking behaviour of the Lehman brothers was harmful to the bank and led to the 2008 Global Financial Crisis which invariably had a global impact and far-reaching effect. Also, the risk-taking appetite of banks is influenced by aggressive competition, corporate governance and banking regulations (Huang & Xiong, 2015) .

According to Bank for International Settlements (2013) , to manage the heavy risk appetite of banks, there have been some significant changes made to the Basel III Accord. First, the minimum capital requirement as highlighted in Basel II was amended and increased for banks to maintain a buffer of capital that could be used to absorb losses during periods of financial and economic stress. Second, the leverage requirements were improved to include a non-risk-based leverage ratio for the banks to prevent a banking crisis that could cause a lowered leverage which could result in a downward trend of asset prices and bank capital. Finally, the liquidity requirement was amended to include two new liquidity ratios; the liquidity coverage ratio (LCR), and the net stable funding ratio (NSFR). The LCR requires banks to hold sufficient high-liquid assets that can withstand a 30-day stressed funding scenario as specified by the bank supervisor, and the NSFR require banks to maintain stable funding above the

required amount for one year of extended stress. The NSFR is primarily designed to address liquidity mismatch in banks and to reduce liquidity crises in case of shocks. In this study we attempt to identify the factors affecting the bank risk inTunisian context. We employ a methodology of 3 sections.The first section is devoted to literature review; then we a make an empirical study in second section .Finally we make a conclusion.

2-LITERATURE REVIEW

There are several studies about the factors affecting the bank risk.Malvar and Pascal (2020) examined the main bank risk determinants in Latin America over theperiod(1999…2013). They used the system GMM estimator. According to their results; well capitalized; liquid and traditional commercial banks are less risky.Yusuf and al (2021) used a sample of 27 commercial banks in Malysia for the period (1998…2017). They found a positive relationship between leverage ; interest income and return on equity with credit risk while ROA ; bank size ; ratio of capital are negatively related to credit risk. Lee ;Hseih(2013) used the data from Asian banks to explore a statistical relationship between the level of capital and the risk of banks by using the Generalized method of moments (GMM) estimation technique.

They concluded that bank capital was significantly and positively related to the risk takingbehaviour of banks. They justified their findings by stating that a higher level of capital would lead to enhanced profits for banks and in turn the banks would take more risk.According to Boyd,Runkhle(1993) ;Demestez and Strahan (1997) large banks my use the leveraged investment to expand their assets. Demirguckunt and al (2010) found that higher bank capital would motivate bankers to takeon more risks. Charya and Naqvi (2012) suggested that banks with higher liquidity tends to be riskier by declining the lending standards to increase the volume of loans.

Salas and Saurina(2002) using data for Spain over the period (1985…1997)empirically assess the impact of both bank specific and macroeconomic determinants on credit risk . They show that factors like branch expansion ;inefficiency , portfolio composition ; size and market power ; playing a key role in explaining credit quality. Obadire and al(2023) used the sample of 45 listed banks in Africa for the period (2010…2019). They found that minimum capital requirement ; capital buffer minimum and profitability were significant determinants of the risk taking behavior of the African banks.

On the other hand the Basel accord classifies the main bank risks as credit risk ; market risk ; liquidity risk and operational risk amongst other risks . In the bank decisions making process ; the attitude and amount of risk taken by the decision makers depend largely on their risk appetite ; consideration of other internal and external factors as well as other prudential regulatory guidelines such as the Basel 3 accord (Klomp and Haan (2012). SimilarlyJokipi and Milne (2011) used a sample of US banks and found a positive association between capital and risk takingbehavior of highly capitalized banks .Moreover Karim and al (2014) conducted a study on 26 banks in Pakistan and found that the Basel 3 capital requirements had a significant and positive effect on the risk takingbehavior of banks ; both in the long run as well as in the short run.

Specifically the results of the study revealed that the capital adequacy ratios (a proxy for bank capital) and the ratio of risk weighted assets (a proxy from risk taking) along with the bank size ; interest rate and profitability ratios were interrelated in the long run. El Domiaty and al (2022) examined country specific and bank specific factors that affect bank Z score (

being a proxy for overall banks risk) in the MENA region . They used a sample of 33 listed commercial banks operating in 6 countries (MENAregion) for the period (2000…2020) .. They found that unemployment rate had a negative effect on high overall bank risk ; the financial crisis had a positive effect on the MENA overall bank risk .

Morina (2020) analyzed the determinants of credit risk in commercial banks in Kosovo through the period (2012…2018). Interest rate on loans and profitability of bank (ROA) have the largest and most significant impact on credit risk .

AlsoAntony and Suresh (2023) examined the determinants of credit risk for 31 banks in India for the period (2012…2021). They found a statistically significant negative relationship between ROE and credit risk ; gross domestic product related to bank risk ; inflation negatively affect credit risk .

3-EMPIRICAL STUDY
3-1 METHODOLOGY

We will used a sample of 11 banks (Attijaribank ; Amen bank ;ATB ;BIAT ;BT ;BTEI ;BH .STB ;BNA,UIB ;UBCI) include in financial market of Tunisia for the period (2014…2023).

We used a methodology of panel data .Panel data can model both the common and individual behaviors of groups. Panel data contains more information, more variability, and more efficiency than pure time series data or cross-sectional data.

3-2 Specification of variables

(1) $RWATA_{i,t}= b0+ b1\ ROA_{i,t}+ b2\ ROE_{i,t} +b3\ NIM_{i,t} +b4\ Size_{i,t} +b5\ TLA_{i,t} +b6\ CAP_{i,t}+b7\ CEA_{i;t} +b8\ Tdeposit_{i,t} +b9\ TPIB_{i,t} +b10\ TINF_{i,t} +b11\ ALA_{i,t}+E_{i,t}$

(2) $NPL_{i,t}= b0+ b1\ ROA_{i,t} +b2\ ROE_{i,t} +b3\ NIM_{i,t} +b4\ Size_{i,t} +b5\ TLA_{i,t}$

$+b6\ CAP_{i,t} +b7\ CEA_{i,t} + b8\ Tdeposit_{i,t} +b9\ TPIB_{i,t} +b10\ TINF_{i,t} +b11\ ALA_{i,t} +E_{i,t}$

(3) $Zscore_{i,t} =b0+b1\ ROA_{i,t} +b2\ ROE_{i,t} +b3\ NIM_{i,t} +b4\ Size_{i,t} +b5\ TLA_{i,t} +b6\ CAP_{i,t} +b7\ CEA_{i,t} +b8\ Tdeposit_{i,t} +b9\ TPIB_{i,t} +b10\ TINF_{i,t} +b11\ ALA_{i,t} +E_{i,t}$

ALA= liquid assets / total assets
TLA= total credits / total assets
ROA= net income / total assets
ROE= net income / total equity
NIM = net interest margin / total assets
Size = log total assets
CAP= capital / total assets
CEA= operating costs / total assets
T deposit = total deposit / total assets
TPIB= economic growth
TINF= inflation rate
RWTA= risk weighted assets / total assets
NPL =non performing loans / total loans

Alton and Hazen (2001) stated that loans become non performants if the full payment of principal amount and interest is not done on due date and is no longer expected in future date. A low level of NPLS shows a strong monetary system on the country while high NPLS indicate a weak financial position .NPLs are defined as loans that have not received payments for at least 3 months (International Monetary fund 2015).

Zscore =EATi,t +ROAi,t/ 6(ROAi,t)
EATi,t= equity /assets
ROA= return on assets
6(ROA) = standard deviation of return on assets
i= bank ; t= time
Zscore measured for insolvency risk that is represented for bank's stability (Adusei (2015) ;Ali ; Puch (2018) ;Yin(2019)).
The Z-score is an overall measure of bank risks. This metric has been examined in various related empirical studies (Hannan and Hanweck 1988; Lepetit and Strobel 2015; Ghenimi et al. 2017; Chen 2018; Hamdi and Hakimi 2019; De-Ramon et al. 2020; Pham et al. 2021).

A high value of Z-score indicates high banking stability, which is inversely related to the probability of default (Li et al. 2017). As far as the Z-scores are positively skewed, the natural logarithm of the Z-scores is used, which approximates the values of the z-score to normal distribution (Laeven and Levine 2009).

3-3 Analysis of descriptive statistics

Table1: Descriptive statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
ROA	110	0.015	0.0178	0.0089	0.0983
ROE	110	0.143	0.0753	0.0034	0.3615
NIM	110	0.034	0.0189	0.0085	0.1746
Size	110	16.45	0.95	14.56	18.36
TLA	110	0.793	0.1457	0.14	0.9817
CAP	110	0.1456	0.0738	0.0092	0.49
CEA	110	0.084	0.029	0.00233	0.38
Tdeposit	110	0.8615	0.1583	0.7514	0.973
TPIB	110	0.031	0.0465	-0.1052	0.067
TINF	110	0.075	0.0169	0.0350	0.08674
RWTA	110	0.015	0.043	0.012	0.019
NPL	110	0.253	0.086	0.23	0.27

Zscore	110	0.028	0.023	0.014	0.042
ALA	110	0.0324	0.0254	0.0135	0.01642

-ROA (mean = 0.015) . The net return represent an average 1.5% of total assets . Standard deviation is low .There is no big difference in term of ROA

-ROE (mean = 0.143) . The net return represent an average 1.43% of total equity . Standard deviation is high . There is big difference in term of ROE between banks

-NIM (mean = 0.034) . The net interest margin represent 3.4% of total assets an average . Standard deviation is low . There isn't a big difference between banks in term of NIM

-Size (mean = 16.45) .Thre is big difference in term of size between banks . Standard deviation is high

-TLA (mean = 0.793)). The total credit represent 79.3% an average of total assets . There is big difference between banks in term of TLA

-CAP (mean = 0.1456) . Total capital represent 14.56% of total assets . There isn't huge difference in term of capital

-CEA (mean = 0.84) . Operating costs represent 84% of total assets an average . Standard deviation is not high . There isn't big difference between banks in term of CEA

-T deposit (mean = 0.8615) . Total deposits represent an average 86.15% of total assets . Standard deviation is high . There is big difference between banks in term of T deposit .

-TPIB (mean = 0.031). The average of economic growth is 3.1%

-TINF (mean =0.075) . The average of inflation is 7.5%

-RWTA (mean = 0.015) . The average is 1.5% . The standard deviation is low . There is no big difference between banks in term of RWTA

-NPL (mean =0.253). The average is 25.3%. The standard deviation is high . There is big difference between banks in term of NPL

-Zscore(mean = 0.028) . The average of Zscore is 2.8%. The standard deviation is low . There is no big difference between banks in term ofZscore

-ALA (mean = 0.0324) . The average of ALA is 3.24% . The standard deviation is low . There is no big difference between banks in term of liquid assets

3-4 Multicolinearity test

Table2 : multicollinearity between varaibles

	ALA	**TLA**	**ROA**	**ROE**	**NIM**	**Size**	**CAP**	**CEA**	**Tdeposit**
ALA	1.000								
TLA	0.254	1.000							
ROA	0.741	0.451	1.000						
ROE	0.015	0.523	0.178	1.000					
NIM	0.018	0.025	0.157	0.176	1.000				
Size	0.234	0.032	0.183	0.195	0.28	1.000			
CAP	0.345	0.018	0.024	0.026	0.029	0.25	1.000		
CEA	0.017	0.251	0.263	0.284	0.324	0.27	0.29	1.000	
Tdeposit	0.273	0.029	0.034	0.038	0.043	0.281	0.081	0.25	1.000
TPIB	0.291	0.034	0.054	0.056	0.064	0.32	0.084	0.27	0.264
TINF	0.324	0.085	0.075	0.069	0.073	0.35	0.093	0.29	0.281
RWTA	0.015	0.25	0.078	0.015	0.156	0.191	0.15	0.315	0.342
Zscore	0.019	0.243	0.083	0.027	0.178	0.298	0.18	0.324	0.035

| **NPL** | 0.025 | 0.276 | 0.094 | 0.029 | 0.194 | 0.325 | 0.23 | 0.327 | 0.356 |

Table 3: suite of correlation between variables

	CEA	T deposit	TPIB	TINF	RWTA	Zscore	NPL
CEA	1.000						
Tdeposit	0.25	1.000					
TPIB	0.17	0.29	1.000				
TINF	0.35	0.49	0.04	1.000			
RWTA	0.156	0.178	0.156	0.26	1.000		
Zscore	0.046	0.052	0.042	0.53	0.59	1.000	
NPL	0.046	0.063	0.074	0.76	0.65	0.69	1.000

All the coefficients are inferior to 0.80% . There is no problem of multicollinearity.

Table4 : VIF of variables

Variable	VIF	1/VIF
ALA	1.25	0.8
TLA	2.37	0.42
ROA	3.06	0.32
ROE	1.85	0.54
NIM	1.14	0.87
Size	2.67	0.37
CAP	3.25	0.30
CEA	3.08	0.32
Tdeposit	1.27	0.78
TPIB	1.49	0.67
TINF	2.15	0.46
RWTA	2.24	0.44
Zscore	1.15	0.86
NPL	1.38	0.72

Variance inflation factor (VIF) is a measure of the amount of multicollinearity in a set of multiple regression variables .Mathematically ; the VIF for a regression model variable is equal to the ratio of the overall model variance to the variance of a model that includes only that single independent variables. This ratio is calculated for each independent variable . A high VIF indicates that the associated independent is highly collinear with the other variables in the model.

VIF inferior to 5There is no problem of multicollinearity

3-6 Hausman test

In panel data analysis (the analysis of data over time). The hausman test can help you to choose between fixed effect models or a random effect models . The null hypothesis is that the preferred model is random effect ; the alternative hypothesis is that the model is fixed effect. Essentially; the test looks to see if there is a correlation between the unique cross and the regressors in the model . The null hypothesis is that there is no correlation between the 2.
In our caseprob chi 2 = 0.075 (model 1) ; prob chi 2 = 0.083 (model 2)
Prob chi2 = 0.017 (model 3)
The model 1 and model 2 (random effect) ; the model 3 (fixed effect)

3-7 Results of estimations and interpretations of models

Table 5: results of estimation of model 1

RWTA	Coefficient	Z	Z<p
ALA	-0.153	2.43	0.0227
TLA	0.248	2.56	0.0547
ROA	0.342	1.25	0.46
ROE	0.415	2.49	0.0229
NIM	0.027	1.42	0.48
Size	0.038	3.25	0.0117
CAP	0.0425	3.17	0.0113
CEA	-0.029	0.53	0.94
Tdeposit	-0.056	0.14	0.83
TPIB	0.028	3.85	0.016
TINF	-0.0143	2.14	0.0342

-There is a negative relationship between RWTA and ALA (if ALA increase by 1% ; RWTA will decrease by 0.153%) . The increase of liquid assets has a negative impact on bank risk
-There is a positive relationship between TLA and RWTA (if TLA increase by 1% ; RWTA will increase by 0.248%) . The increase of total credits has a positive impacton bank risk
-There is a positive relationship between ROA and RWTA (ifROAincrease by 1% ; RWTA will increase by 0.342%) . The increase of return on assets has a positive impact on bank risk
-There is a positive relationship between ROE and RWTA (if ROE increase by 1% ; RWTA will increase by 0.415%) . The increase of return on equity has a positive impact on bank risk
-There is a positive relationship between NIM and RWTA (if NIM increase by 1% ; RWTA will increase by 0.027%) . The increase of net interest margin has a positive impact on bank risk .
-There is a positive relationship between Size and RWTA (if Size increase by 1% ; RWTA will increase by 0.038%) . The increase of size has a positive impact on bank risk
-There is a positive relationship between capital and RWTA (if capital increase by 1% ; RWTA will increase by 0.0425%) . The increase of capital has a positive impact on bank risk
-There is a negative relationship between CEA and RWTA (if CEA increase by 1% ; RWTA will decrease by 0.029%). The increase of operating costs has a negative impact on RWTA
-There is a negative relationship between Tdeposit and RWTA (ifTdeposit increase by 1% ; RWTA will decrease by 0.056%). The increase of deposits has a negative impact on bank risk .

-There is a positive relationship between TPIB and RWTA (If TPIB increase by 1% ; RWTA will increase by 0.028%). The increase of economic growth has a positive impact on bank risk

-There is a negative relationship between TINF and RWTA (if TINF increase by 1% ; RWTA will decrease by 0.0143%) . The increase of inflation has a negative impact on bank risk .

Table6 : Results of estimation of model 2

NPL	Coefficient	Z	Z<p
ALA	-0.174	2.57	0.0235
TLA	0.278	3.04	0.0554
ROA	-0.427	1.38	0.51
ROE	-0.468	2.76	0.0417
NIM	0.029	1.53	0.49
Size	0.047	3.36	0.0119
CAP	0.053	3.25	0.0112
CEA	-0.035	0.15	0.83
Tdeposit	-0.084	0.184	0.91
TPIB	0.038	3.89	0.0153
TINF	-0.0176	2.25	0.0348

-There is a negative relationship between NPL and ALA (if ALA increase by 1%;NPL decrease by 0.174%) . The increase of liquid assets has a negative influence on credit risk of banks .

There is a positive relationship between NPL and TLA (if TLA increase by 1%, NPLl increase by 0.278%) .The increase of total credits has a positive influence on credit risk of bank.

There is negative relationship between NPLA and ROA (if ROA increase by 1% ; NPL will decrease by 0.427%) . The increase of return on assets has a negative impact on credit risk of bank . This result is similar to result found by Godlewski (2008) ;Boudriga and al (2010), Al Nabulsi and al (2022). When ROA decreases then the bank starts to make investments in high riskprojects ; the level of NPLs increases .

There is negative relationship between NPL and ROE (if ROE increase by 1%NPL will decrease by 0.468%). The increase of return on equity has a negative impact on credit risk of bank . This result is similar to result found by AlNabulsi and al (2022). Profitable banks face less issues on loan repayment system ; ensure good management in their operation system. Higher profitable banks do not consider borrowers having low credit worthiness (Godlewski(2008); Fan and Shaffer (**2004) ;Louzis and al (2012))**

Banks with low profitability have propensity to increase their risk ; adopt credit policy more liberally to recover their proceeding loss long with maintaining minimum current profitability ; which can be happened only at the cost of increased future NPLS (Bhowrik ; Sarker (2021)).

There is positive relationship between NIM and NPL (if NIM increase by 1% ; NPL will increase by 0.029%) . The increase of net interest margin has a positive impact on credit risk of bank

There is positive relationship between Size and NPL (if Size increase by 1% ; NPL will increase by 0.047%). The increase of size has a positive impact on credit risk of bank .This result is similar to result found by AlNabulsi and al (2022) . Large banks are not necessarily more effective in screeing loan customers when compared to their smaller competitors. With the increase of bank size ; banks tend to use their funds in various proposals with less monitoring loan policy which increase bank NPLs .This findings is similar to the findings of Khemarajand Pasha (2009),Abid and al (2014) ;Rajha(2016) and contradicts to Salas ;Saurina(2002) ; Hu and al (2004) ;Louzis and al (2012).

There is positive relationship between CAP and NPL (if CAP increase by 1% NPL will increase by 0.053%). The increase of capital has a positive impact on credit risk of bank . This result is contrary to result found by Al Nabulsi and al (2022)

The effect of bank capital onNPLS is in the opposite direction . On the one side ; the incentive and encouraging managers of low capitalized banks tend to get involved in high risk investments and give loans that are issued without proper credit rating and monitoring (Keeton(1999)). On the other side ; banks with a high level of capital tend to give loans easily they known that due to these loans banks are not going to be bankrupt and fail ,therefore ; banks are highly engaged with these kinds of risky credit activities suggestion a positive association between capital and NPLS (Rajan(1994).

There is negative relationship between CEA and NPL (if CEA increase by 1% ; NPL will decrease by 0.035%). The increase of operating costs has a negative impact on credit risk of bank

There is negative relationship between Tdeposit and NPL (ifTdeposit increase by 1%NPL will decrease by 0.084%). The increase of deposits has a negative impact on credit risk of bank

There is positive relationship between TPIB and NPL (if TPIB increase by 1% . NPL will increase by 0.038%). The increase of economic growth has a positive impact on credit risk of bank . This result is contrary to result found by (Fgolia(2022) ;Jabbouri ; Naili(2019) : Zheng and al (2017)

There is negative relationship between TINF and NPL (if TINF increase by 1% ; NPL will decrease by 0.0176%).The increase of inflation has a negative impact on credit risk of bank.This result is contrary to result found by AlNabulsi and al (2022).

Table7 : Results of estimation of model 3

Zscore	Coefficient	Z	Z<p
ALA	-0.187	2.63**	0.0249
TLA	0.285	2.84**	0.0559
ROA	0.417	1.29	0.53

ROE	0.532	2.53**	0.0236
NIM	0.029	1.17	0.49
Size	0.042	3.37***	0.0148
CAP	0.058	3.25***	0.0127
CEA	-0.034	0.64	0.98
Tdeposit	-0.059	0.27	0.91
TPIB	-0.034	3.94***	0.0145
TINF	0.0156	2.28*	0.0251

-There is a negativerelationship between Zscore and ALA (if ALA increase by 1%Zsocre will decrease by 0.187%) . The increase of asset liquid has a negative impact on Zscore .

-There is a positive relationship between Zscore and TLA (if TLA increase by 1% ,Zscore will increase by 0.285%) . The increase of credit has a positive impact on Zscore

-There is a positive relationship between Zscore and ROA (if ROA increase by 1% ;Zscore will increase by 0.417%) . The increase of return on asset has a positive impact on Zscore . This result is similar to result found by Mkadmi and al (2021).

-There is a positive relationship between Zscore and ROE (if ROE increase by 1% ;Zscore will increase by 0.532%) . The increase of return on equity has a positive impact on Zscore . This result is contrary to result found by Mkadmi and al (2021)

-There is a positive relationship between NIM and Zsocre(if NIM increase by 1% ;Zscore will increase by 0.029%) . The increase of net interest margin has a positive impact on Zscore.This result is similar to result found by Mkadmi and al (2021)

-There is a positive relationship between Zscore and Size (if Size increase by 1% ;Zscore will increase by 0.042%) . The increase of size has a positive impact on bank risk . This result is similar to result found by Pham and al (2021) . A larger bank size will positively enhance its stability . A larger bank can own a lower bankruptcy cost and enhancement of a high growth rate which is consistent with a bank stability (Nguyen (2020)

-There is a positive relationship between Zscore and capital (if capital increase by 1% Z score will increase by 0.058%) . The increase of capital has a positive impact on bank risk . A bank with a high level of equity in capital structure is positively consistent with a higher level of stability .(Pham and al(2021))

-There is a negative relationship between Zscore and CEA (if CEA increase by 1% ;Zscore will decrease by 0.034%) .The increase of operating costs has a negative impacton bank risk

-There is a negative relationship between Zscore and Tdeposit(ifTdeposit increase by 1% ;Zscore will decrease by 0.059%) . The increase of deposit has a negative impact on bank risk .

-There is a negative relationship between Zscore and TPIB (if TPIB increase by 1% ;. Zscore will decrease by 0.034%) . The increase of economic growth has a negative impact on bank risk .This result is consistent with the result found by Yitaw and al (2023).

-There is apositiverelationship between Zscore and TINF (if TINF increase by 1% ;Zscore will increase by 0.0156%) . This result is similar to result found by El Domiaty and al (2020) . This result could be interpreted a higher inflation level reduced the value of loans over the

years ; which strengthened the borrower's repayment capacity ;thus increasing the stability of banks , which drove the Zscore up and the overall risk fell . This result is contrary to result found by (Ghassan and Guendouz (2019) ;DeRamon and al (2020) ; Rahman and al (2021).

CONCLUSION

In theory and practicebanks are prone to credit;currency ; liquidity and country risk (Nhuen and al 2021) . With unique characteristics the bank's operations is always inherent in risk ; economic decisions based on risk and profits . The high risk may lead to more profits ; but it also makes the banking system accumulate more hazards. Hefferman (2005) showed that if the risks occursfrequently ; banks will lose capital and profits reduce the value of their assets ; thereby affecting the bank's operations. Haq and Heaney (2012) define risk as an appetite for selection among a variety of alternatives with different level uncertainties. They indicate that the risk takingbehaviour of banks refers to the appetite to choose among variety of projects; investments or ventures with different levels of uncertainties and expected cashflows. The Basel accord classifies the main bank risks as credit risk; market risk ; liquidity risk and operational risk among other risks .

In this article our objective is to studied the main determinants of bank risk in Tunisian context. We used a sample of 11 quoted banks over the period (2014…2023) . By applying 3 models of panel static we found that that liquidity; total credit; return on equity; size;capital ; economic growth and inflation have a significant effect on bank risk .

REFERENCES

-Abbas F ; S Ali ; SM U Haq ; M Naveed (2021)" Nexus between bankcapital and risk takingbehavior : empirical evidence from US commercial banks " Cogent business and management

-Abid L ;ouertaniMN ; Zouari Ghorbel S (2014)" Macroeconomic and bank specificdeterminantsofhousehold'snon performing loans in Tunisia : A dynamic panel data " Procedia Economic and finance ; vol 13 ; p58-68

-Acharya V ;H .Naqvi(2012)" The seeds of a crisis : a theory of bank liquidity and risk taking over the business cycle" Journal of Financial Economics ; vol 106, issue 2 , p 349-366

-AlNabulsi .K ; E Kozarevic ;A .Hakimi(2022) " Assessing the determinants of non performing loans under financial crisis and health crisis : evidence from The MENA banks " CogentEconomic and finance ; vol 10 , n°1

-Antony TM ; Suresh G (2023) " Determinants of credit risk : empirical evidence for Indian commercial banks " Banks and banks systems ; vol 18 ; n°2, p88-100

-Boudriga .A ; NB Taktak ; S Jellouli(2010)" Bankspecific ; business and institutional environment determinants of banks non performingloans : evidence from MENA countries " Workingpaper ;545 ; Economic research forum

-Boyd J H ; DE Runkle (1993)«Size and performance of banking firms : Testing the predictions of theory " Journal of Monetary Economics ; vol 31 , p47-67

-Demirguc Kunt A , H Huizinga (2010)" Bank activity and funding strategies : the impact on risk and activities" Journal of financial Economics ; vol 98 , issue 3 ; p626-650

-DemsetezRS ; PE Strahan (1997)" Diversification ; size and risk at bank holding companies " Journal of Money ; Credit and banking ; vol 29 , n°3, August ; p300-313

-De Ramon S JA ; WB Francis ; M STranghan(2020)«The link between bank competition and risk in the United Kingdom : Two views for policymakers " Bank of England ; working paper ; n°875

-El DomiatyT ; A Youssef ,HMchrous(2022)" The robustness of the determinants of overall bank risk in the MENA region" Journal of risk financial management ; vol 15 , n°10

-Ghassan H B ; A H Guendouz (2019)" Panel modeling of Zscore : evidence from Islamic and conventional Saudi banks " International Journal of Islamic and Middle Eastern Finance and management ; vol 12 ; n°3 ; p 448-468 ; July

-GhenimiA ; H Chaibi ; MA B Omri (2017) « The effects of liquidity risk and credit risk on bank stability : evidence from The MENA region " Borsa Istanbul Review ; vol 17 , n°4 , p238-248

-Godlewski CJ (2008)" Bankingenvironment ; agency costs and loan syndication "

-Hamdi H ; Hakimi A (2019)" Does liquidity matter on bank profitability evidence from a non linear framework for a large sample " Business and Economic research journal , vol 10 , n°2 ,p13-26

-Haq. M ; RA Heaney (2012) " Factors determining European bank risk " Journal of International Financial markets ;institutions and Money

-Huang X ; Xiong Q (2015) " Bank capital buffer decisions under macroeconomic fluctuations : Evidence for the banking industry of China " International Review of Economic and Finance ; vol 36, p30-39

-JabbouriI ; M Naili (2019)" Determinants of non performing loans in emerging markets : Evidence from the MENA region " Review of Pacific basin financial markets and policies ;December ,vol 22 ,n°4, p1-33

-JokipiT ; A Milne (2011) "Bank capital buffer and risk adjustement decisions " Journal of financial stability ; vol 7 ; issue 3 ; p 165-178

-Karim MA ;HassanMK ; Hassan T ; Mohamad S (2014)" Capital adequacy and lending and deposit behavior of conventional and Islamic banks" Pacific basin finance journal ; vol 26 , p58-75

-Keeton WR (1999)" Does faster loan growth lead to higher loan losses " EconomicReview ; vol 84 , p 57-75

-Klomp J ; Haan Jj(2012)" Banking risk and regulation : Does one size fit all ?" Journal of banking and finance ; vol 36 , n°12 , p3197-3212

-Leaven .L ; R Levine (2009)" Bankgovernance ; regulation and risk taking " Journal of Financial Economics ; vol 93 ; issue 2 ;August ; p259-275

-Lee CC ;Hseih MF (2013) " The impact of bank capital on profitability and risk in Asian banking " Journal of International Money and Finance ; vol 32 , p251-281

-Lepetit L ; Strobel F (2015) " Bank insolvency risk and Zscoremeasures : a refinement" Finance research letters ; vol 13 ;C ; p214-224

-LouzisDP ; A T Vouldis ;Metxas VC (2012)«Macroeconomic and bank specific determinants of non performing loans in Greece : A comparative study of mortgage ; business and consumer loan portfolio" Journal of banking and finance ; vol 36 , n°4 ,p1012-1027

-Malvar MM ; LB Pascual (2020) " bank risk determinants in Latin America " Risks ; 2020, vol 8, n°3

-Megginson WL (2005) " The economics of bank privatization " Journal of banking and finance ; vol 29 , n°8-9, August ; p 1931-1980

-MkadmiJ ; N Baccari ; A Necib (2021) «The determinants of bank stability : The example of Tunisia" International Academic Journal of Accounting and financial management ; vol 8 ; n°1,p 1-10

-Morina D (2020) " Determinants of credit risk in commercial banks of Kosovo" international journal of economic and business administration ; vol 2 ; p179-190

-Nguyen Q K (2022) " Determinants of bank risk governance structure : A cross country analysis " ResearchinInternational Business and finance ; vol 60

-Obadire .A.M, K.Obadire(2023) " Determinants of bank risk taking behavior in Africa: A regulatory perspective " Open Journal of business and management ; vol 11 , p673-687

-Pham T T ; LK D Dao ; VC Nguyen (2021)«The determinants of bank stability a systemGMM panel analysis " Cogent business and management ; vol 8 ; issue 1

-Rajan, R G (1994) " Why bank credit fluctuate : A theory and some evidence " The Quarterly Journal of Economics ; vol 109 , p 399-441

-Salas V ;Saurina J (2002) " Credit risk in two institutional regimes : Spanish commercial banks and saving banks " Journal of financial services research ; vol 22 ; p203-224

-Salidas M (2013) " Amarket based approach to sector risk determinants and transmission theEuro area " ECB working paper ; n°1574

-Yitayaw M K ;YkMogess ; H L Feysia ; WB Mano ; S M Abdulahi (2023)" Determinants of bank stability in Ethiopia : a two step system GMM estimation " Cogent Economic and finance ; vol 11 , n°1 ; December

-Yusuf NHM ; MSM Shamsudin ; WM YM Abdouh ;NSB Shah ; RS Zain (2021) " Determinants of credit risk : evidence from commercial banks inMalaysia" JurnalIntelek ; vol 16 ; issue1 ; February

-ZhengC ; SM Uhuq ; MM Rahman ; BN Ashraf (2017) " The effect of ownership structure on bank capital and risk takingbehavior : empirical evidence from developing countries " Research in International business and finance ; vol 42 , n°10