

CHAPTER 2

DEVELOPMENT OF FINANCE, ACCOUNTING AND AUDITING

THE IMPACT OF RISK MANAGEMENT ON FINANCIAL PERFORMANCE OF BANKS: CASE OF TUNISIA

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Abstract. *The risk management play a vital role in absorbing the losses and inefficiencies of bank activities. It is interesting the study his effect on financial performance of banks. The aim of this research is to study the impact of risk management in financial performance in sample of 11 banks over the period (2000...2018). By using a method of panel static, we found the positive impact of credit risk management in ROA and ROE; and the significant impact of liquidity risk management on ROA and ROE. Credit risk management is the practice of mitigating losses by understanding the adequacy of a bank's capital and loan loss reserves at any given time – a process that has long been a challenge for financial institutions. The first step in effective credit risk management is to gain a complete understanding of a bank's overall credit risk by viewing risk at the individual, customer and portfolio levels. While banks strive for an integrated understanding of their risk profiles, much information is often scattered among business units. Also, effective liquidity risk management helps ensure a bank's ability to meet cash flow obligations, which are uncertain as they are affected by external events and other agents' behavior.*

Keywords: *risk management; bank; financial performance; Panel; ROA; ROE.*

JEL Classification: *G15, G21, G31*

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Introduction. The risk management has a big importance in banking industry. Credit and liquidity problems may adversely affect the financial performance of a banks as well as its solvency if not properly managed.

Credit risk management has been an essential part of the loan process in the banking sector. Deposit money banks continue to spend huge resources in credit risk management modeling with the objectives of maximizing profits (Oniagbo, Daniel (2021)).

Also, liquidity risk management for banks focuses on the ability of the bank to finance its activities and fulfill its obligations on time and at reasonable cost. It also means the comparability between financial reserves and employment in various assets in the medium and short term.

In this article we aim to study the impact of risk management on bank financial performance. We used a methodology of three sections. The first section is devoted to literature review; the second section is concerned the empirical study. We make finally a conclusion.

Literature review. There are many studies about risk management and bank financial performance. Hallunovi; Berdo (2018) indicated that there is negative relationship between credit risk and ROA in Albania.

Nwade; Okeke (2018) investigated the impact of credit risk management on the performance of deposit money banks in Nigeria using the period (2000...2014). The findings reveal that credit risk management had a positive and significant impact on total loans and advances; return on assets; return on equity of deposits money banks.

Hacini and al (2021) studied the impact of liquidity risk management on the financial performance of banks in Saudia for the period (2002....2019). The results show that liquidity risk has a significant negative impact on the financial performance of Saudia Arabian banks.

Alim and al (2021) tested the effect of liquidity risk management on the financial performance of commercial banks in Pakistan. Financial data of all commercial banks operating in Pakistan during the period of study was taken from the years (2006...2019).

It is concluded that higher liquidity increases bank performance in commercial banks of Pakistan.

Al Mamari and al (2022) studied the relationship between risk management and bank financial performance in Sultanate of Oman. The findings revealed that risk management has a significant relationship with the return of assets (ROA) but risk management has no significant impact on ROE (return on equity).

Abaraman and al (2021) indicated the significant impact of risk management on financial performance of banks in Jordan.

Adesu and al (2014) indicated that risk management strategies generally include the transfer of risk to other parties, risk avoidance; reduction in the probability and negative impact of the risk; or acceptance of a few or all the actual or potential results of certain dangers.

Fadun, Oye (2020) analyzed the impact of operational risk management practices on the financial performance of commercial banks in Nigeria (10 years) (2008....2017).

The results showed that there is a positive relationship between operational risk management and the financial performance of banks.

Saiful and Ayu (2019) examined the influence of credit liquidity and operational risk management on performance of Indonesian banks. The sample used consisted of 26 conventional banks and 11 Sharia banks in (2012...2016). This study found that credit risk; liquidity risk management positively influence Indonesian bank's performance that measured by (ROA; ROE).

Hene and Amoh (2016) found that risk management is positively related to performance of banks in Ghana. But Oiteno and Onditi (2016) found a negative relationship between credit risk management and performance of banks in Kenya.

Liquidity risk reduces the ability of the bank to meet its financial obligations as they come due. When this risk remains unchecked; banks will lose customers thereby reducing the volume of deposits (Ahmdyan; 2017).

When deposits reduce the bank will share significant funds for other instruments, this significantly reduce the level of profitability.

Again, a high liquidity risk causes a run on the bank. This run is caused by the panic withdrawal of deposits from the bank.

Liquidity risk management is highly important for not only banks also for the total system since the consequences of liquidity insufficiency can be extremely fact on both scales form the bank to the full system.

Therefore, banks are responsible for sound management of liquidity risk; which focuses on conserving enough level of liquidity; more over being ready for face a range of preserve situations; probable losses; or weakness of funding sources (Sivaltana; Lara; 2017).

Shiftability theory says that bank's liquidity position can be maintained if its holds assets that be ready converted into cash or sold for cash. It can further be detailed that in order to ensure liquidity of a bank; the bank should always have assets that can be offered. Also, credit risk arises from a debtor being unlikely to pay its obligations or its financial capacity deterioration resulting in economic loss for the bank.

To loss could be equal to the entire amount of the loan on a part of the loan granted to the borrower. For the majority of bank loans are the most important and most visible source of credit risk. However, credit risk derives from other bank activities such as on and off-balance sheet activities.

Aims. The aim of this research is to study the impact of risk management in financial performance in sample of 11 banks over the period (2000...2018).

Methods. By using a method of panel static, we found the positive impact of credit risk management in ROA and ROE; and the significant impact of liquidity risk management on ROA and ROE.

Results. 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 models and their interpretations.

Sample. We will use 11 banks (BIAT; STB; BNA; BH; ATB; Amen bank; BH; BTEI; BT; Attijari bank) that below to professional association of banks in Tuniisa stock exchange over the period (2000...2018).

Estimation method. We will utilize panel static because it controls:

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

Specification of variables.

We will estimate the following model:

- (1) $ROA_{i,t} = b_0 + b_1 \cdot Size_{i,t} + b_2 \cdot CAPI_{i,t} + b_3 \cdot TLAI_{i,t} + b_4 \cdot CEAI_{i,t} + b_5 \cdot Tdepositi_{i,t} + b_6 \cdot NPLi_{i,t} + b_7 \cdot CDi_{i,t} + b_8 \cdot TPIBi_{i,t} + b_9 \cdot INFi_{i,t} + Ei_{i,t}$
- (2) $ROE_{i,t} = b_0 + b_1 \cdot Size_{i,t} + b_2 \cdot CAPI_{i,t} + b_3 \cdot TLAI_{i,t} + b_4 \cdot CEAI_{i,t} + b_5 \cdot Tdepositi_{i,t} + b_6 \cdot NPLi_{i,t} + b_7 \cdot CDi_{i,t} + b_8 \cdot TPIBi_{i,t} + b_9 \cdot TINFi_{i,t} + Ei_{i,t}$

$$ROA = \text{return on assets} = \text{net income} / \text{total assets} \quad (1)$$

ROA show how to generate income from the assets of the bank (Chin; 2011).

ROA is considered as the best proxy of profit (Flamini and al (2009); Samad (2005)).

$$ROE = \text{return on equity} = \text{Net income} / \text{total equity} \quad (2)$$

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

This ratio showed the profit earned per 1 dinar of investment. This is an indicator of how well bank uses investor's money or generate profit (Chowikh; Blagui (2017)).

$$Size = \text{Natural logarithm of total assets} \quad (3)$$

Size can show the economies of scale

$$CEA = \text{operating expenses} / \text{total assets} \quad (4)$$

It is including personal expenses and other expenses. CEA shows the weights of operating expenses compared to total assets.

$$T \text{ deposit} = \text{total deposits} / \text{total assets} \quad (5)$$

Deposit include demand deposit and term deposit. T deposit shows the share of deposits compared to total assets. The more the deposit a bank collect ; the more the loan opportunities ; it will be to generate further profits (Menucci and Paolucci (2016)).

$$NPL = \text{credits non performants} / \text{Total loans} \quad (6)$$

It is a credit risk management indicator (Brewer; Jackson (2006); Kauko (2012)). Low NPL is related to lower risk. Therefore, the allocation of bank risk management deeply relies on the diversification of credit risk to decrease the NPL amount (Ahmdyan (2017)).

$$CD = \text{total credits} / \text{total deposits} = \text{it is indicator of liquidity risk management} \quad (7)$$

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 and al (2017)).

When the ratio is higher; it shows more risky conditions because the funds from deposits has been collected in more of credits.

Conversely the lower ratio indicated effective banks in lending decisions.

$$TPIB = \text{growth rate of gross domestic product}$$

$$INF = \text{rate of inflation}$$

It is known as a specific or sustained index in the actual price of the commodities in the economy over economic or certain period.

Inflation has a lot to do with the bank as it fluctuates of the bank to balance the economy (Almansour et al (2021)).

Table 1. Descriptive statistics

	Observations	Mean	Standard deviation	Minimum	Maximum
ROA	209	0.0117	0.0100	0	0.0975
ROE	209	0.1047	0.06077	0	0.2976
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
T deposit	209	0.7421	0.1519	0.0205	0.756
CD	209	1.5192	2.83	0.1852	36.75
NPL	209	0.054	0.0176	0.015	0.084
TPIB	209	0.03310	0.0147	0.0012	0.0811
Tinf	209	0.05529	0.05356	0.03	0.0781

Econometric Tests. Multicollinearity test.**Table 2. Correlation between variables**

	ROA	ROE	Size	CAP	TLA	CEA
ROA	1.000					
ROE	0.3930	1.000				
Size	0.0158	0.3964	1.000			
CAP	0.2433	-0.2316	-0.4941	1.000		
TLA	0.0933	0.0639	0.1256	0.09781	1.000	
CEA	0.0524	-0.0157	0.1215	-0.0841	-0.0628	1.000

Table 3. Suit of correlation between variables

	ROA	ROE	Size	CAP	TLA	CEA	T deposit
T deposit	-0.0463	0.3751	0.534	0.7636	0.0528	-0.0738	1.000
NPL	-0.054	-0.1662	-0.081	-0.063	-0.074	-0.056	-0.0945
CD	0.2313	-0.1557	-0.3739	0.7434	0.0517	0.1049	-0.59
TPIB	0.0685	-0.1856	-0.3635	0.0522	-0.1881	-0.0532	-0.1314
TINF	0.0427	0.0486	0.1247	-0.0160	0.1440	0.0418	0.0753

Table 4. Suite of correlation between variables

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

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 substantial measure. The test of the p value is used to identify the significant independent variables. All coefficients between variables are inferior to 80%. There are no problems of multicollinearity.

Table 5. Test of VIF

	VIF	1/ VIF
CAP	3.87	0.25
T deposit	2.97	0.33
CD	2.27	0.44
Size	1.74	0.57
TPIB	1.26	0.79
CEA	1.18	0.84
TLA	1.15	0.86
TINF	1.08	0.91
NPL	1.37	1.05

VIF quantifies the extent of correlation between one prediction and other predictions in a model.

High value signifies that is difficult to assess accurately the contribution of predictors to a model.

Hausman test. It is developed to give existence in deciding on electing between the field effects and random effects approach. The hypothesis of the Hausman test are: **H 0: Random effect are consistent and efficient.**

H1: Random effect are inconsistent

In model 1 : $P_v = 0.05058$

In model 2: $P_v = 0.073$

Table 6. Estimation of result of model 1 and their interpretations

ROA	Coefficient	Z	Z inferior to P
Size	0.0015	2.072***	0.015
CAP	0.049	1.073	0.000
TLA	0.0023	0.663	0.0004
CEA	-0.1998	2.077***	0.014
T-deposit	0.0213	0.003	0.00013
NPL	-0.0084	2.756***	0.015
CD	0.00050	0.149	0.0006
TPIB	0.1090	2.029***	0.019
TINF	0.0064	0.611	0.0054
Constant	-0.040	0.002	0.0071

There is a positive relationship between ROA and Size (if Size increase by 1%); ROA will be increased by 0.0015%). The increase of size has a positive effect on return on assets. This result is similar to result found by Menicucci and Paoulucci (2016); Serwadd (2018) but contrary to result found by Pasiouras and Kosmidou (2007); Athansgolou and al (2008).

Large banks might benefit from economies of scope (Menicucci and Paoulucci (2016)). Also, there is a positive relationship between ROA and CAP (if CAP increase by 1%; ROA will be increased by 0.049%). The increase of capital has a positive effect on return on assets of bank. This result is similar to result found by (Trujillo; Ponce (2013); Dhouibi (2017)).

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 banks.

There is a negative 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 (Athansoglou and al (2008); Kosmidou and al (2005)).

The negative effect of cost means that there is a lack of competence in expense management since banks part of increased costs to customers and the remaining part to profits, possibly due to the fact that competition does not allow them to overcharges (Athansoglou and al (2008)).

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 deposits has a positive effect on return assets of banks. Besides there is a negative relationship between ROA and NPL (if NPL increase by 1%; ROA will decrease by 0.0084%). The increase of credits non performants has a negative impact on return on assets of bank. This result is similar to result found by Konde and al (2018). The higher the bank's NPL means that the lower the bank's performance.

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 Hassan; Bashir (2003); Baraoca (2018), Hadian; Phety (2021) but contrary to result found by Pruoko and Sudyatuo (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 (Dietrich and Wanzenried (2011); Jawad and Lahsan (2018)).

But contrary to result found by (Blagui; Cheikh (2017)). 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. This result is similar to result found by (Pasiouras; Kosmidou (2007)); Karadazic and Davlovic (2021) but contrary to result found by Almansour and al (2021); Ebhrahimi and al (2021)).

Table 7. Estimation of result of model 2

ROE	Coefficient	Z	Z inferior to P
Size	0.01668	3.37***	0.001
CAP	0.07381	0.95	0.341
TLA	-0.0068	-0.22	0.827
CEA	-0.062	-2.536***	0.015
T deposit	0.1295	3.66***	0.018
CD	0.0013	2.66***	0.017
NPL	-0.01495	2.25	0.0143
TPIB	-0.19	-2.67	0.011
TINF	-0.027	-0.38	0.7060
Cons	-0.23	-2.79	0.0050

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 (Topak and Talu (2017); Abobaker (2018); Bogale (2019)).

Financial 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 (Athansoglou and al (2008); Abobaker (2017)). This 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 will 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 Yaksul, al (2018)).

Therefore high level of loans means a possible deterioration of the bank asset quality with a negative effect on bank profitability (Alper; Anbar (2011)).

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

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

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

There is a negative relationship between NPL and ROE (if NPL increase by 1%; ROE will decrease by 0.014%). The increase of credits non performants has a significant impact on bank return on equity. This result is similar to result found by (Collaku; Aliu (2021)).

There is a negative relationship between TPIB and ROE (if TPIB increase by 1%; ROE will decrease by 0.19%). The increase of economic growth has a negative impact on return on equity. Also, there is a negative relationship between TINF and ROE (if TINF increase by 1%; ROE will decrease by 0.027%). The increase of inflation has a negative impact on bank return on equity.

Conclusion. Credit risk management is the practice of mitigating losses by understanding the adequacy of a bank's capital and loan loss reserves at any given time – a process that has long been a challenge for financial institutions. The first step in effective credit risk management is to gain a complete understanding of a bank's overall credit risk by viewing risk at the individual, customer and portfolio levels. While banks strive for an integrated understanding of their risk profiles, much information is often scattered among business units. Also, effective liquidity risk management helps ensure

a bank's ability to meet cash flow obligations, which are uncertain as they are affected by external events and other agents' behavior.

The main purpose of this article is to determine the effect of risk management on bank performance. We employ a sample of 11 banks in Tunisia between (2000...2018). By using a method of panel static, we found the significant impact of credit risk management (NPL) and liquidity risk management (credits/deposits) on bank performance (ROA; ROE).

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