ON THE INTERACTION BETWEEN BANK RISKS AND BANK PERFORMANCE: EVIDENCE FROM TUNISIAN BANKS

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Abstract - The main purpose of this paper is to investigate the interactional relationship between operational risk, credit risk, liquidity risks and the Tunisian bank performance. We used a sample of Tunisian banks over the period 1990-2017. Results of the panel data analysis show that an increase in required capital charge to hedge operational risk significantly increases the level of bank performance. Findings also indicate that the interaction between operational risk and loan activities exerts a positive and significant effect on the level of bank performance. However, no significant effect of the interaction between operational and liquidity risk was found. These results could bring some important policy recommendations to policymakers toward the reinforcement of the capital charge and for improving the analysis and the management process of bank risks.

Keywords - Operational Risk, Loans Activity, Liquidity Risk, Tunisian Banks, Panel Data Analysis

I. INTRODUCTION

It is obvious that banks play a crucial role in the economy financing. This role becomes more announced in emerging economy when financial markets are less developed and less dynamic. For these economies, the most important role of finance is devoted to the banking sector. From the one hand, banks operate and search to be more efficient since it is even the raison d'être of this activity. From the other hand, banks are faced to multiple and complex risks that threaten their stability and their survival.

Literature on the effect of credit and liquidity risks on bank performance is strongly documented (Arif and Nauman, 2012; Hakimi and Zaghdoudi, 2017; Hamdi and Hakimi, 2019; Kargi, 2011). However, less abundant studies those are focused on the operational dimension, its determinants and its effect on the bank performance. Furthermore, the few empirical studies that are focused on the relationship between operational risk and bank performance provide mixed and inconclusive results. Some authors have found that operational risk does not have any significant effect on the level of bank performance (Muriithi and Waweru, 2017; Micco et al, 2007; and Athanasoglou et al, 2008). In contrary, others studies have concluded that operational risk increases the level of bank performance (Al-Tamimi et al., 2015; Bikker et al., 2002, Pasiouras and Kosmidou, 2007)).

The controversy around the effect of operational risk on bank performance motivates us to study this relationship for the Tunisian context. Basically, the purpose of this paper is to study the dynamic relationship between operational risk and bank performance. Moreover, we investigate the interaction effect of operational risk, credit and liquidity risk on the Tunisian bank performance.

To achieve these goals, we used bank-level data relating to the ten (10) largest Tunisian banks over the period 2000-2017. We choose these banks since they are the most involved in the financing of the Tunisian national economy. Also, they are the most ranked in terms of the volume of their total assets and total deposits. To control the macroeconomic environment in which operate Tunisian banks, we include two macroeconomic variables: the growth rate of GDP and the inflation rate. The main sources of data are the annual reports of banks, and the World Bank databases.

Taking into the individual and the temporal dimensions and since the number of years (N=18) is greater than the number of banks (i=10), we performed the static panel data analysis instead of the dynamic panel data. The empirical strategy of this paper is based on three steps. In the first step, we separately test the impact of the operational risk proxied by the capital requirements in the basic indicators approach on the level of bank performance. The second step is therefore to test the impact of the interaction effect of operational risk-loans activities on the level of bank performance. While in the third step, we examine the interaction effect between operational risk and liquidity risk.

This study contributes to the existing literature in several ways. First, to the best of our knowledge, there is no study that is focused on the effect of operational risk on the Tunisian bank performance. Second, this study is based on the Tunisian context when banking sector plays a crucial role in the economy financing. Third, contrary to previous studies those carry out either on the credit or liquidity risk, this current focuses on one of the most complex risk. It is the operational risk. Forth, besides testing i) the effect of operational risk on bank performance, we also test the interaction effect between ii) operational risk and credit risk, iii) operational risk and liquidity risk.

The rest of this paper is articulated as follow. The methodology adopted for this paper is introduced in section 2. We present and we discuss descriptive and empirical results in the section 3. Section 4 concludes and addresses some policy implications.

II. METHODOLOGY

In this section, we present the methodology adopted for this study. In other words, we introduce our data, their sources and the empirical approach. Second, we specify the empirical models and we define precisely all variables and their measurements.

2.1 Data

To investigate the effect of operational risk and its interaction with credit and liquidity risks on the level of performance, we use bank-level data related to ten (10) banks over the period 2000-2017. We have selected only 10 banks since they are considered as the most dynamic and the most involved in the Tunisian economy financing. Also, these banks monopolize the most important share in term of total assets, total credit and total deposit.

Variables relative to bank specifics are collected from the annual report of each bank during the period 2000-2017. However, variables that represent macroeconomic conditions are collected the World Bank Indicators (WDI) databases during the same period.

The presence of the two dimensions; individual (10 banks) and temporal (18 years), in our sample motivates us to perform the panel data analysis. We apply for the static panel data instead of dynamic panel data since the number of years (N) is greater than the number of banks (i).

2.2 Model specification and variables definition

To investigate the impact of the interaction between operational risk and other banks risks for the Tunisian context, we follow an empirical approach based on three steps.

In the first step, we test separately the impact of operational risk proxied by the capital charges within the Basic Indicator Approach (KBIA), loans activity (credit risk) and liquidity risk on bank performance. We aim at this step to examine the individual effect of each bank risk. The econometric model relative to the first step can be written as follow:

$$NIM_{i,t} = \beta_0 + \beta_1 KBIA_{i,t} + \beta_2 LOACT_{i,t} + \beta_3 CAP_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 LIQR_{i,t} + \beta_6 HHI_{i,t} + \beta_7 GDPG_t + \beta_8 INF_t + \varepsilon_{i,t}$$ (Model 1)

Besides the individual impact of bank risks, we think that the interaction between operational risk and loans activity (credit risk) may affect the level of bank performance. Hence, the second step consists to test the impact of this interaction on bank performance for the Tunisian banks. The second model can be expressed as follow:

$$NIM_{i,t} = \beta_0 + \beta_1 KBIA*LOACT_{i,t} + \beta_2 CAP_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LIQR_{i,t} + \beta_5 HHI_{i,t} + \beta_6 GDPG_t + \beta_7 INF_t + \varepsilon_{i,t}$$ (Model 2)

In the third step, we examine the impact of the interaction between operational risk and liquidity risk. The model 3 is presented as follow:

$$NIM_{i,t} = \beta_0 + \beta_1 KBIA*LIQR_{i,t} + \beta_2 CAP_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LIQR_{i,t} + \beta_5 HHI_{i,t} + \beta_6 GDPG_t + \beta_7 INF_t + \varepsilon_{i,t}$$ (Model 3)

In this study, we use variables relative to bank specifics and others relative to macroeconomic conditions. All definitions and measurements of these variables are given in Table1.

Variables	Definition	Measurement
NIM	Net Interest margin	Ratio of interest margin to total Assets
KBIA	Capital charges to hedge operational risk	Basic Indicator Approach: the average over the previous three years of a fixed percentage (denoted α) of positive annual gross income.
LOACT	Loans activity	Total loans to total assets.
KBIA*LOACT	Interaction variable	The interaction between operational risk and loan activities.
KBIA*LIQR	Interaction variable	The interaction between operational risk and liquidity risk.
CAP	Capital adequacy ratio	Ratio of total equity to total assets
SIZE	Bank size	Napierian logarithm of total assets
LIQR	Liquidity risk	Loans to deposit ratio.
HHI	Hirshmen Herfindahl index	The squared sum of market share of total assets.
GDP	Gross domestic product	Growth rate of Gross domestic product
INF	Inflation rate	Customer index price

Table 1. Definition and measurement of variables

III. DISCUSSION OF RESULTS

In this sub-section, we firstly analyze our data. Some descriptive statitics are given to have more information about the sample used in this study. For each variable, we interpret the average value, the minimum and the maximum value. Second, we discuss empirical findings. Table 2 informs about descriptive statistics.

Variable	Obs	Mean	Std, Dev,	Min	Max
Nim	180	0.026	0.010	0.004	0.059
Kbia	180	8844.129	4772.449	2203.483	30458.170
Loact	180	0.771	0.095	0.513	0.965
Liqr	180	1.174	0.360	0.636	2.597
Kbiaxloact	180	6944.299	4007.285	1561.303	24584.670
Kbiaxliqr	180	10197.73	5438.807	1935.136	28616.46
Cap	180	0.090	0.031	0.003	0.175
Size	180	14.934	1.007	7.609	16.421
hhi	160	0.107	0.009	0.088	0.116
Gdpg	180	0.033	0.020	-0.019	0.067
Inf	180	0.039	0.011	0.020	0.058

Table 2. Descriptive statistics

Table 2 indicates that the average level of bank performance (NIM) is 2.6%. The maximum value for our sample during the period 2000-2017 was 5.9%. However, Tunisian banks record 0.4% as a minimum value of net interest margin. From this level, we conclude that Tunisian banks registered positive value of NIM during all the period of our study.

For the capital charge necessary to hedge operational risk, Tunisian banks maintain on average 8844.129 MD to hedge this risk. The maximum value is 30488.17 MD while the minimum value is about 2203.483MD. From these levels of capital charge, we conclude that Tunisian banks grant a great of importance for this risk.

	Model (1)		Model (2)		Model (3)	
Nim	Coef,	z-stat	Coef.	z-stat	Coef,	z-stat
Kbia	0.080	2.600***	—	—	—	—
Loact	0.031	3.110***	—	—	0.022	2.060**
Liqr	-0.008	-4.450***	-0.007	-3.850***	—	—
Cap	-0.022	-0.810	-0.026	-0.940	-0.040	-1.360
Size	-0.001	-1.010	-0.002	-1.050	0.003	0.160
Hhi	0.220	2.290**	0.132	1.450	0.065	0.650
Gdpg	0.104	2.301**	0.089	2.460**	0.090	2.310**
Inf	-0.472	-6.670***	-0.431	-6.120***	-0.488	-6.370***
Kbia*loact	—	—	0.037	3.083***	—	—
Kbia*liqr	—	—	—	—	-0.002	-0.130
_cons	0.023	0.860	0.055	2.140	0.019	0.640
Hausman test	3,66		2.320		7.40	
Prob	0,822		0.888		0.285	
Wald chi 2	106,95		96.010		65.87	
Prob > chi 2	0.000		0.000		0.000	
R2	0,425		0.403		0.318	
OBS	180		180		180	

Table 4. Empirical findings

Results displayed in table 4 indicate that the capital charges required to hedge operational risk is positively and significantly correlated with the net interest margin. An increase of 1% in capital charges increases bank performance by 8%. Banks with sufficient level of capital are able to hedge and to well manage their risks. However, banks with less required capital charge recorded less profitability since they are more exposed to negative consequences of this risk and to more bank fragility.

With regard to the effect of the interaction between capital charges (operational risk) and loans activity

(credit risk), findings indicate a positive and significant association with the net interest margin. This result can be explained as follow. Having sufficient capital charge and dynamic loans activity with sufficient required guarantees, banks can more profit from interest revenues that increase bank performance. However, no significant effect of the interaction between operational risk and liquidity risk.

Loans activity as proxy of credit risk exerts a positive and significant effect on the level of bank performance. The fundamental objective of each financial institution is realizing higher profit and minimizing risks. Tunisian banks are based on classic activities. Hence, more loans with sufficient guarantees generate more interest revenues that increase the net interest margin.

Contrary to the effect of loans activity, findings indicate that liquidity risk measured by the loans to deposit ratio decreases significantly the Tunisian bank performance. An increase of 1% in the liquidity risk decreases bank performance by 0.8% for model (1) and 0.7% for model (2). Banks operate on the basis of liquidity which is considered as the main important input. Hence, banks with insufficient level of liquidity are enabling to response partial or integral withdraw. Also, Banks with insufficient liquidity may undergo the decline in their interest income that decreases the level of bank performance. Moreover; less liquid banks are more prone to banking fragility and crises. These results are in line with Athanasoglou et al. (2008), Bourke (1989), Hakimi and Zaghdoudi (2017), Hamdi and Hakimi (2019).

For the effect of macroeconomic variables, results show that the growth rate of GDP is positively and significantly correlated with the dependent variable for the three models. An increase of 5% in the GDP increases the net interest margin by 10.4% for model (1), 8.9% for model (2) and 9% for model (3). In the period of growth, it results an increase in the ability of borrowers to pay their loans that reduces non-performing and improves bank performance. Furthermore, stable macroeconomic conditions motivate and stimulate investment when banks can grant more good loans. The good quality of these loans increases the interest income and bank performance. These findings are in line with the works of Athanasoglou et al. (2008) and Calza et al. (2003).

Findings indicate that bank performance is more sensitive to the inflation rates. We found that the net interest margin is negatively and significantly correlated with inflation. An increase of 1% in the inflation rate decrease bank performance by more than 40% for the three models. High inflation can distort bank financing decisions. Also, with high level of inflation, it results an increase of the interest income that increases NPLs and decreases bank performance. These results corroborate the work of Hakimi and Zaghdoudi (2017).

IV. CONCLUSION AND POLICY RECOMMENDATION

The aim of this paper was to explore the dynamic interaction between operational risk, credit risk, liquidity risks and the Tunisian bank performance.

The empirical results of the model (1) indicate that an increase in capital charge necessary to hedge operational risk significantly increases the level of bank performance. Findings of the model (2) show that the interaction between operational risk and loans activity exerts a positive and significant effect on the level of bank performance measured by the net interest margin. Results of the model (3) show no significant effect of the interaction between operational and liquidity risk.

Findings also indicate that liquidity risk was found to be negatively and significantly correlated with the net interest margin for the model (1) and model (2). Furthermore, we found that loans activity as proxy for credit risk increases significantly the level of performance for the model (1) and model (3). For the Tunisian context, Banks are considered as loans based activity. Hence, any increase in the loans granted with sufficient guarantees significantly improves the performance of the Tunisian banks.

With regard to the effect of macroeconomic condition, bank performance benefits from an improvement of the level of growth while it is very sensitive to any changes in the inflation rate. In this study, bank size and capital are found to be without any significant effect on the bank performance.

These results could bring some important policy recommendations to policymakers toward a better hedge of bank risks precisely the operational risk. Since capital charge increases bank performance, Tunisian banks should increase the necessary capital that is able to hedge and manage this risk. Also, Tunisian banks are recommended to more strengthen their loans activity since it improves their performance, but they should grant more importance to the level of guarantees. Policymakers should take several economic and financial reforms in order to stabilize the macroeconomic context precisely the inflation rate that negatively affects the level of bank performance.

REFERENCE

[1] Al-Tamimi. H, Minaoui. H & Elkelish. W-W (2016). financial risk and islamic bank's performance in the gulf cooperation council, The International Journal of Business and Finance Research, 9 (5), 103-112

[2] Arif, A. & Nauman Anees, A. (2012) Liquidity Risk and Performance of Banking System, Journal of Financial Regulation and Compliance, 20, 182-195.

[3] Athanasoglou, P. Brissimis, S. & Delis, M. (2008). Bank-specific. industry-specific and macroeconomic determinants of bank profitability, Journal of International Financial Markets. Institutions and Money, 18 (2). 121-136.

[4] Bikker, J.A. & Hu, H.,(2002). Cyclical patterns in profits, provisioning and lending of banks and procyclicality of the

new Basel capital requirements, BNL Quarterly Review, 221, 143–175.

[5] Bourke, P., (1989). Concentration and other determinants of bank profitability in Europe. North America and Australia, Journal of Banking and Finance, 13, 65–79.

[6] Calza, A., C. Gartner, & J. Sousa, (2003). Modelling the demand for loans to the private sector in the euro area, Applied Economics, 35, 107–117.

[7] Hakimi. A & Zaghdoudi. K (2017). Liquidity Risk and Bank Performance: An Empirical Test for Tunisian Banks, Business and Economic Research, 7(1), 46-57

[8] Hamdi. H & Hakimi. A. (2019). Does liquidity matter on bank profitability? Evidence from a nonlinear framework for a large sample, Business and Economics Research Journal, 10(1), pp. 13-26

[9] Kargi, H.S. (2011). Credit Risk and the Performance of Nigerian Banks. AhmaduBello University, Zaria.

[10] Micco, A., Panizza, U., & Yanez, M.,(2007). Bank ownership and performance. Does politics matter? Journal of Banking and Finance 31 (1), 219–241.

[11] Muriithi, J –G & Waweru, K-M (2017). Operational Risk, Bank Size and the Financial Performance of Commercial Banks in Kenya, Journal of Finance & Banking Studies, 6(3), 39-50

[12] Pasiouras, F. & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union, Research in International Business and Finance, 21 (2). 222-237.

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