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The Impact of Capital on Bank Liquidity: Case of Tunisia

Ben Moussa Mohamed Aymen

Doctor in Finance

Faculty of economic sciences and management of Tunis

University of Manar

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Abstract

Capital and liquidity are two important variables in banking industry. Capital is needed to allow a bank to cover any losses with its own funds. Also liquidity is fundamental to achieve the financial requirements of bank activity. The aim of this article is to determine the impact of capital on bank liquidity. We used a sample of 11 banks in Tunisia between (2005….2020). By applying a method of panel static (fixed effects) we found that capital has a positive effect on bank liquidity.

Keywords: Capital, bank, liquidity, Panel static, fixed effects

1. Introduction

The term "liquidity" has two related but distinct meanings in finance. An asset is liquid if it can be bought or sold quickly in size without moving the price. An institution is liquid if it can meet its scheduled payments or demands for funds without incurring high costs. Bank liquidity refers to the latter meaning but also depends on the former. A bank is liquid if it can repay borrowers when due, meet deposit withdrawals, and satisfy draws on lines of credit that it has extended without paying inordinately in funding markets or selling assets at fire-sale prices. Moreover, because banks provide funding to each other, liquidity problems at one bank can quickly spillover to other banks.

Capital is supposed to protect a bank from all sorts of uninsured and unsecured risks apt to turn into losses. This is where we get to the two prin- cipal functions of capital – to absorb losses and to build and maintain con- fidence in a bank. Capital is needed to allow a bank to cover any losses with its own funds.

The objectif of our article is to analyse the impact of capital on bank liquidity. We will use a methodology of 3 sections. The first section is devoted to literature review. In second sectionwe will make the empirical study. We finish by conclusion of research.

2. Literature review

A-Bank liquidity

Diamond; Rajan (2001) defined bank liquidity as the degree of ease of converting assets into cash so that banks can meet their obligations on time without incurring any unexceptable losses. Liquidity can also be defined as the cash available with the banks to meet requests for withdraws from depositors or requests for borrowers when granting credit to individuals, companies or government.

Liquidity is the ability of the bank to fund asset growth and meet its obligations as they fall due without incurring acceptable losses (BIS (2008)). Indeed, the Basel Committee (2009) explained that the viability of commercial banks depends on the liquidity position of the bank.

Traditionally, banks basically function as financial intermediaries and collecting points of fund for different groups within the society. Therefore, banks are expected to maintain adequate liquidity in order to efficiently perform their daily obligations such as meeting depositors' demand or withdrawals, settling wholesale commitments and provision of funds when borrowers draw on committed credit facilities (FSC, 20□0).

B-Bank capital

First, capital is the accounting residual that remains after subtracting a bank's fixed liabilities from its assets. Second, it is what is owed to the banks' owners—its shareholders—after liquidating all the assets at their accounting value. Third, it is the buffer that separates the bank from insolvency: the point at which its liabilities exceed the value of assets.

More capital tends to absorb adverse shocks and thus reduces the likelihood of failure (Rime(2001)). Banks raise capital when the portfolio risk goes up in order to keep up their capital buffer as signed by Leaven and Levine (2002).

The asset portion of a bank's capital includes **cash, government securities, and interest-earning loans** (e.g., mortgages, letters of credit, and inter-bank loans). The liabilities section of a bank's capital includes loan-loss reserves and any debt it owes.

Asa buffer; capital will help to protect debtholders; including small depositors and their agents; the deposit insusrance agency, from the consequences of financial distress. By having more capital; it is easier for a bank to absorb losses when hit by an adverse stock; avoid the risk of default; and be able to go on.

C-The relationship between capital and bank liquidity

Using US data; Berger and Bouwman (2009) found that there is a positive relationship between capital and liquidity creation for the large banks; while there is a negative relationship for the small banks.

Hovarth and al (2012) examined the relationship between capital and liquidity creation. This issue is interesting because of the potential impact on liquidity creation from tighten capital requirements such those in Basel 3. They performed Granger causality test in a dynamic GMM panel estimation framework on exhausitive data of Czech banks; from (2000…2010). They show that capital negatively granger causes liquidity creation in this industry; where majority of banks are small.

Distinguin and al (2013) investigated the relationship between bank regulatory capital buffer and liquidity for European and US publicly banks. On the whole;they find that banks do not strengthen their regulatory capital buffer when they face higher illiquidity as defined in the Basel III accords or when they create more liquidity as measured by Berger; Bouwman (2009)). Their results show small banks do actuallay strengthen the solvency standards when they are exposed to higher illiquidity.

Ilyas and Sarwar (2018) explored the impact of bank capital on liquidity creation in Pakistan by using data set of the banks of Pakistan from (2004…2013). The analysis is based on various classifications of the banks (overall; small; medium; large).

Using generalized least squares (GLS) model; the results show the positive relationship between the desired variables for large banks and negative for small and medium banks.

Danisman (2018) explored the impact of bank capital on bank liquidity of 21 Turkish banks for the period (2001…2017). The findings indicate that the liquidity creation of Turkish banks has dramatically increased over time and it is primarily driven by large banks.

Besides Xie (2016) investigated the relationship between liquidity creation and capital in China. This issue is interesting because of the potential impact on credit weakness problems from tighten capital requirements while proposed by new capital rules in China. He performed regression analysis in simultaneous equation model on the panel data of

chineasebanks; which mainly includes 28 commercial banks from (2004…2014). He found that state owned commercial banks do not have significant relationship between liquidity creation and capital.

Higher capital tends to mitigate the financial fragility and enhances the bargaining power of the banks, which hampers the credibility of its commitments to deposits. Thus higher capital tends to decrease liquidity creation.

In addition; Gorton, winton (2017) show that a higher capital ratio can reduce liquidity through another effect "the crowding out of deposits ".

Le (2018)investigated the interrelationip between liquidity creation and bank capital in Vitenamese banking between (2007…2015). The findings show that large banks mainly contributed a strong growth in liquidity cration in Vietname between (2007…2015). The findings alos indicate that off balance sheet activities only played a small role in liquidity creation. In addition the findings indicate a negative 2 way relationship between liquidity creation and bank capital in Vietnam.

Kayan and al (2021) examined the effect of regulatory capital and ownership structure on banking liquidity creation in emerging Asian economies. We find a positive association between regulatory capital and bank liquidity creation, while inconsistent with the risk absorption hypothesis.

3. Empirical study

3.1 Methodology

We will use a sample of 11 banks (Attijari bank; Amen bank; ATB; BIAT; BT; BTEI; BH, STB, BNA,UIB; UBCI)included in financial market of Tunisia for the period (2005..2020). We make a methodology of panel static (estimation by fixed effects).

The temporal and individual dimension of our sample allows us to use the approach of panel data which offers great potential analysis by tracking individual behavior over time. Panel data have also the advantage of increasing the sample size, this leads to increase the number of degree of freedom and reduce the problem of collinearity between explanatory variables improving hence results estimates. (Zaghdoudi and Hakimi (2017)).

3.2 Specification of model

We estimated The following model:

(1) ALA i,t = b0+b1 **ROAi,t** +b2 **ROEi,t** +b3 **NIMi,t** +b4 **Sizei,t** +b5 **TLAi,t** +b6 **CAPit** +**b7CEAi,t**

+b8. **CFCi,t** +b9.**Tdepositi,t** +b10 **TPIBi,t** +b11 **TINFi,t** +Ei,t

B0= constant

B1, b2……b11: Parameters to be estimated

i= bank ; t= time

Ei,t = Error term

Table 1.specification of variables

Variable	Name	Measure
ALA	Liquid assets	Liquid assets / total assets
ROA	Return on assets	Net income / total assets
ROE	Return on equity	Net income / total equity
NIM	Net interest margin	Net interest income / total equity
Size	Bank size	Logarithm of total assets
CAP	Capital	Total capital / total assets
CEA	Operating costs	Operating costs / total assets
CFC	Financial credits	Financial expenses / total credits
Tdeposit	Part of deposits	Total deposits / total assets
TPIB	Economic growth	GDP Growth
TINF	Rate of inflation	Growth of inflation

We will estimate the following hypothesis:

H 1: Bank capital have a significant effect on bank liquidity

H2: Bank capital don't have a significant effect on bank liquidity

Table 2. Descriptive statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
ALA	**176**	**0.0285**	**0.0225**	**0.0028**	**0.10426**
TLA	**176**	0.775	0.1142	0.12	0.9817
ROA	**176**	0.012	0.0094	0.000881	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	0.0632	0.0086	0.48
CEA	**176**	0.032	0.026	0.000237	0.35
CFC	**176**	0.038	0.0153	0.01849	0.1689
T deposit	**176**	0.7657	0.1181	0.099	0.956
TPIB	**176**	0.022	0.0361	-0.1051	0.064
TINF	**176**	0.061	0.0167	0.0340	0.08543

ALA (Mean = 0.0285). The liquid assets represent on average 2.85% of total assets. The standard deviation is not high. CD (mean = 1.193). Total credits represent on average 1.193 of total deposits. The standard deviation is high. There is big difference between banks in term of part of credits to deposits.

Also TLA (mean = 0.775). Total loans represent on average 77.5% of total assets. The standard deviation is not high. There is no big difference between banks in term of credits. ROA (mean = 0.012). Net income represent on average 1.2% of total assets. The standard deviation is low. There is no big difference between banks in term of ROA.

Besides ROE (mean = 0.111). The net income represent on average 11.1% of total equity.The standard deviation is not high. Also NIM (mean =0.026). Net interest margin represent 2.6% of total assets. The standard deviation between banks is low. The net interest margin is not very different between the banks of sample.

Size (mean =15.35). The most of banks are medium size.

CAP (mean =0.1051). The equity represent on average 10.51% of total assets.

CEA (mean = 0.032). The operating costs represent on average 3.2% of total assets. The standard deviation is low. There is no big difference of CEA between banks of sample.

CFC (mean =0.038). The financial expenses represent on average 3.8% of total credits. The standard deviation is low. There is no big difference of CFC between banks of sample

Tdeposit (mean =0.7657). Total deposits represent on average 76.57% of total assets.

T PIB (mean = 0.022). The average economic growth is 2.2% in the period (2005…2020)in Tunisia. There is negative economic growth in 2022 because of negative effect of COVID19.

TINF (mean =0.061). The average inflation is 6.1% in the period (2005…2020) in Tunisia

Table 3.Multicolinearity test

	ALA	**CD**	**TLA**	**ROA**	**ROE**	**NIM**	**Size**	**CAP**
ALA	1.000							
CD	0.0730	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	0.3921	1.000			
NIM	0.0158	0.0833	0.2478	0.1073	0.0834	1.000		
Size	0.0973	-0.2745	0.1577	0.0857	0.3635	0.255	1.000	
CAP	-0.0775	0.6962	0.1346	0.2912	-0.1852	0.0615	-0.3575	1.000
CEA	0.2036	0.0159	-0.0661	-0.0267	0.075	-0.0641	0.1237	-0.0076
CFC	-0.0378	-0.0258	-0.0117	-0.0076	-0.047	-0.1476	0.1384	-0.0227
Tdeposit	-0.2385	-0.5547	0.0531	0.0169	0.3814	-0.0711	0.4336	-0.6191
TPIB	0.0604	0.0589	-0.1125	0.0679	-0.0117	-0.0250	-0.2505	0.0123
TINF	-0.1198	-0.0893	0.3496	-0.0374	0.2111	0.043	0.4291	-0.1064

Table 4.suite of correlation between variables

	CEA	CFC	Tdeposit	TPIB	TINF
CEA	1.000				
CFC	0.3142	1.000			
Tdeposit	-0.1459	-0.1598	1.000		
TPIB	-0.1394	-0.2233	-0.0303	1.000	
TINF	0.1031	0.1271	0.1602	-0.5512	1.000

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

Table. VIF

Variable	VIF	1/VIF
T deposit	**2.20**	**0.4542**
CAP	2.13	0.4689
TINF	1.90	0.5260
Size	1.67	0.5992
ROE	1.56	0.6422
TPIB	1.53	0.6519
ROA	1.43	0.6720
TLA	1.31	0.762
CFC	1.27	0.788
CEA	1.17	0.825
NIM	1.12	0.8902

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 variable. This ratio is calculated for each independent variable. A high VIF indicates that the associated independent variable is highly collinear with the other variables in the model.

VIF inferior to 5. There is no problem of multicolinearity.

Hausman test

In **panel data analysis** (the analysis of data over time), the Hausman test can help you to choose between fixed effects model or a random effects model. The null hypothesis is that the preferred model is random effects; The alternate hypothesis is that the model is fixed effects. Essentially, the tests look to see if there is a correlation between the unique errors and the regressors in the model. The null hypothesis is that there is no correlation between the two.

In your case prob Chi2 = 0.075(it is superior to 5%). There for we use estimation of model random effect.

Table 5. Results of estimation of model (1)

ALA	Coefficient	Z	Z<P
ROA	-0.149	-1.06	0.291
ROE	-0.028	-1.20	0.228
NIM	0.024	0.27	0.785
Size	0.005214	2.14	0.032
CAP	0.023182	2.56	0.0547
CEA	0.06535	1.45	0.148
CFC	-1.087	-1.20	0.229
Tdeposit	-0.025	-1.35	0.176
TLA	-0.00305	-2.22**	0.0228
TPIB	0.0133	0.36	0.718
TINF	-0.2026	-2.11**	0.035
Constant	-0.013	-0.46	0.648

There is a negative relationship between ALA et ROA (if ROA increase by 1%. ALA decrease by 0.149%). The increase of return on assets has a negative impact on bank liquidity. This result if similar to result found by Morina; Qarri (2021);AlQudah (2020) but contrary to result found by Al Homaidi and al (2019), Gjorgi and Goran (2019).

There is a negative relationship between ALA and ROE (if ROE increase by 1%, ALA decrease by 0.028%). The increase of return on equity has a negative impact on bank liquidity. This result is contrary to result found by Agawal (2019).Also there is a positive relationship between NIM and ALA (if NIM increase by 1%, ALA will increase by 0.024%). The increase of net interest margin has a positive impact on bank liquidity.

There is a positive relationship between Size and ALA (if Size increase by 1%, ALA will increase by 0.0052%). The increase of size has a positive effect on bank liquidity. This relationship is statistically significant at 1%. This result is similar to result found by Homaidi and al (2019); Mashamba (2022)

There is a positive relationship between capital and bank liquidity (if capital increase by 1% ALA increase by 0.023%). The increase of capital has a positive effect on bank liquidity.

This result is similar to found by (Gjorgi and Goran (2019)). Al Homaidi and al (2019), but contrary to result found by Xie (2016); Gorton and Winton (2017).Singh and Sharma (2016); Vodova (2011) found that bank capital has a positive impact on bank liquidity.

There is a positive relationship between CEA and bank liquidity (if CEA increase by 1%; ALA will increase by 0.065%). The increase of operating costs has a positive effect on bank liquidity.

There is a negative relationship between CFC and bank liquidity (if CFC increase by 1%, ALA will decrease by 1.087%).The increase of financial expenses has a negative effect on bank liquidity. Besides there is a negative relationship between deposits and bank liquidity (if deposits increase by 1%; liquidity will decrease by 0.025%). The increase of deposits has a negative impact on bank liquidity. This result is similar to result found by Bista and Basnet (2020)

There is a negative relationship between TLA and bank liquidity (if TLA increase by 1%; ALA will decrease by 0.00305%). The increase of total loans by total assets has a negative impact on bank liquidity.

Also there is a positive relationship between ALA and TPIB (if TPIB increase by 1%; ALA increase by 0.013%). The increase of economic growth has a positive impact on bank liquidity. This result is similar to result found by (Fola (2015)); Bunda and Desquilbert (2008)

There is a negative relationship between ALA and TINF (if TINF increase by 1%: ALA decrease by 0.2026%). The increase of inflation has a negative impact on bank liquidity. This result is similar to result found by Bista and Basnet (2020) but contrary to result found by Al Qudah(2020).

Conclusion

Bank capital is the difference between a bank's assets and its liabilities, and it represents the net worth of the bank or its equity value to investors. The asset portion of a bank's capital includes cash, government securities, and interest-earning loans (e.g., mortgages, letters of credit, and inter-bank loans). The liabilities section of a bank's capital includes loan-loss reserves and any debt it owes. A bank's capital can be thought of as the margin to which creditors are covered if the bank would liquidate its assets. On the other hand bank liquidity is very important to the ability of a bank to meet its financial obligations as they come due. It can come from direct cash holdings in currency or on account at the Federal Reserve or other central bank. More

frequently, it comes from acquiring securities that can be sold quickly with minimal loss. This basically states highly creditworthy securities, comprising of government bills, which have short term maturities.

If their maturity is short enough the bank may simply wait for them to return the principle at maturity. For short term, very safe securities favor to trade in liquid markets, stating that large volumes can be sold without moving prices too much and with low transaction costs.

Nevertheless, a bank's liquidity condition, particularly in a crisis, will be affected by much more than just this reserve of cash and highly liquid securities. The maturity of its less liquid assets will also matter. As of them may mature before the cash crunch passes, thereby providing an additional source of funds. (tutorialpoints.com)

In this article we studied the impact of capital on bank liquidity in Tunisia. We used a sample of 11 banks through the period (2005.2020). We found that capital has a positive and significantimpact on bank liquidity.

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