Prudential Capital Regulation Impact on Tunisian Bank Behavior

Inene Kanzari[1]

[1] Faculty of Law, Economics and Management of Jendouba, Tunisia

Abstract

The purpose of our paper is to analyze the behavior of banks in terms of capital and risk in front of the prudential capital regulation constraints. Our study is based on a panel of Tunisian banks over the period 1996-2014. The findings show that the capital adequacy requirements affect significantly and negatively the capital and positively the risk which adjust simultaneously.

Index terms— prudential capital regulation, capital, risk, panel and simultaneous equations.

1 Introduction

n an environment as turbulent as that which characterizes the present world economy, developed and developing countries seek to establish a financial system which can adapt and absorb all the disturbances that may affect it. To achieve this goal, all efforts are directed towards understanding or even mastering the relations that can take place between the trilogy: capital, risk and regulation.

It seems interesting to examine the banks behavior in terms of capitalization and risk since prudential reform is in the process of being applied. The international adoption of the Basel I and Basel II agreements on capital adequacy rules or minimum capital standards, presents one of the main financial innovations known by the banking sector since the nineties. The agreement was published by Basel committee on banking. Indeed, the 1988 Basel Accord published by Basel Committee on Banking Supervision, was amended to take into consideration the market risk in addition to credit risk. Basel II agreement introduced three pillars: supervisory review process, market discipline and minimum capital standard. It implies the incorporation of the operational risk into risk capital norm. Through Basel III, especially after the last financial crisis, the new standardization guidelines are being applied in many countries: the accord seeks the improvement of the regulation. It is based on three pillars, similar to Basel II, and introduces a leverage ratio as a supplement to the capital requirements. It addresses the quality, consistency and transparency of the capital base. Also, it covers mico-prudential and macro-prudential elements.

The analysis of bank reactions to the directives I and II relating to the capital standard is important in order to anticipate the expected implications of Accords III and the application of the new capital ratio.

Our paper is organized as follow: section 2 presents an overview of studies that have focused on the theme of our study. At the section 3 level, the methodology followed is illustrated. In section 4, empirical results and interpretation are presented.

2 II.

3 Literature Review

Studies that seek to analyze the behavior of banks in the presence of capital regulation are ambivalent. Referring to a portfolio approach, Kahane (1977) asserted that the use of regulatory practices, the requirement for a minimum level of capital and the constraint of the composition of the asset portfolio can only be beneficial if they are combined. **??**oehn and Santomero (1980) have shown that, under regulatory capital standards, changes

in capital and portfolio risk are positively correlated. According to the authors, a risk-averse bank, faced with an increased capital requirement, will try to invest more in riskier assets. Kim and Santomero (1988) have concluded that capital regulation can be effective if and only if the weights used in the calculation of the capital ratio are proportional to the risks. They proposed a risk-adjusted capital ratio. As to Blum (1999), he suggests, within a dynamic framework, that the rules of capital adequacy can increase the risk of a bank. According to Jacques and , the rule of regulatory standards designated to minimize the likelihood of bankruptcy pushes banks to choose high-risk assets.

The study of Shrieves and Dahl (1992) constitutes a pioneer work which tried to analyze the effect of the regulatory pressure on the capitalization and the risk-taking. Several works have been based on the econometric specification developed and modeled by these authors who characterized the risk-capital relation by a simultaneity effect. According to the authors, this relation depends on the underlying economic rationality, the algebraic sign and the impact of regulatory pressure on changes in capital and banking risk. Indeed, by studying a sample of US commercial banks for the period 1983-1987, the authors concluded that there was a significantly positive simultaneous relationship between the change in capital and that of risk and that regulatory pressure can contribute to increase the level of capital and limit the bank risk taking.

Jacques and have contributed to the study of the regulatory standards impact on bank capital and portfolio risk. They analyzed the case of commercial banks during the first year of implementation of these standards (risk-adjusted capital ratio). They concluded that banks with capital ratios in excess of the minimum required, respond by increasing the capital ratio and reducing their portfolio risk. In a work in 2001, carried out over the period 1991 to 1996, the authors reached the same conclusion.

In regards to Aggrawal and Jacques (1998), they carried out a study on commercial banks over the period 1990-1993 to analyze the effect of corrective action (PCA) on bank capital and risk, and conclude that in front of regulation, banks increase their capital ratio and reduce their portfolio risk. Jackson and al (1999) concluded that capital regulation, inducing banks to maintain higher capital ratios than they would otherwise have held in the regulation absence, constitutes limited definitive evidence. Rime (2001), based on Shrieves and Dahl methodology has studied the Swiss banks reaction to capital constraints over the period 1989-1995. The results show that regulatory pressure drives banks to increase their capital without affecting the level of risk taking.

According to Kabir (2002) who examined the effect of capital regulation on commercial banks for developing countries, the results showed that such regulations did not lead to an increase in capital ratios. But, they have reduced the bank portfolio risk.

Murinde and Yaseen (2004) studied the banking case in the Middle East and North Africa (MENA) regions over the period 1995-2003.They concluded that the Basel Accord in terms of capital adequacy as regulatory pressure did not push the banks to increase their capital but it positively affected the risk level. Van Roy (2005) tried to analyze the reactions of the big countries banks following the Basel agreement advent. He concluded that undercapitalized banks generally increased their capital but not their risks. According to the Basel II agreement, the standardized approach to risk is similar to the Basel I. In this context, works interesting to bank response to the need for minimum capital, while relying on the notion of risk-adjusted assets, are rare.

Zhang, Wu and Liu (2008) and Awdeh, ElMoussawi and Machrouh (2011) works have been based on the Shrieves and Dahl (1992) principle. Concerning the first work, on the basis of a sample of Chinese banks over a period from 2004 to 2006, the results showed that the change in capital is negatively correlated with that at the level of risk. The second work results, while focusing on the case of 41 Lebanese commercial banks from 1996 to 2008, have shown that a greater capital requirement is linked to an increase in the level of risk.

Sobreira and De Paula (2010) considered prudential regulation as an international movement involving and reacting to competitive advantages of banks internationally active. Basel accord implies establishing policies for behavior of banks and calling for the disclosure of information to avoid direct intervention, mainly after amendment, and to allow banks to innovate and to increase their relationships.

Francis and Osborne (2012) suggest that regulation has led to an active bank behavior in the context of risk management. To satisfy regulatory requirements, the bank can resort to arbitration, a technique that has exploited the gaps and anomalies of the Basel Accord.

The study of Lee and Chin (2013), realized between 2004 and 2011, has shown the relevance of the Leverage ratio and the capital adequacy ratio relating to the prudential requirement.

According to Bhatta (2015), financial institutions are in better situation if they have higher level of equity. This level allows to banks to absorb losses, repay deposits in a timely manner, to manage risk and behavior. He advanced: "A higher capital requirements might also constrain the lending capacity of a bank". Tanda (2015) argue that capital regulation acts as an external force in the bank capital and risk levels determination. Bank's decisions can be influenced by changes in the regulatory framework.

Louati, Abida and Bojelbene (2015), in order to compare the behavior of islamic and conventional banks in relation to the capital adequacy standard, they studied a MENA sample during the period 2005-2012. Their study's results show that capital regulatory requirements have a significant impact on the credit behavior of the two types of banks.

Bougatef and Mgadmi (2016), interested to banks in the MENA region during 2004 -2012, concluded that prudential regulation has failed to reduce the level of risk and to increase the level of capital.

Ashraf, Arshad and Hu (2016) argued that riskbased capital requirements have been reinforced in the new

Basel III Accord to counter excessive bank risk taking behavior. Ashraf and al, on the basis of a panel of commercial banks, have found that same banks having risk-based capital ratios either lower or higher than the regulatory required limits, have decreased portfolio risk in response to stringent risk-based capital requirements. According to Chen (2016), bank capital regulation is a key determinant of the levels of capital held by banks III.

4 Methodology a) Model and variables

Our work is, mainly, inspired by the study of Rime (??001 pioneer work. Indeed, according to the authors changes in capital and risk levels can be decomposed into a discretionary adjustment and a change due to exogenous factors. These variations are assumed proportional to the difference between the targeted levels and those existing during the period t-1. Thus, these variations, in terms of capital and risk during the period t, are based on the targeted levels, the delayed levels and exogenous factors.

It should be noted, at this level, that the objective of prudential capital regulation is to limit bank risk taking. This assumes that an increase in the level of capital may lead to a reduction in the level of risk. According to Shrieves and Dahl (1992) + ? + + + + = ? ? , , 1 , 5 , 4 , 3 , 2 1 , 1 0 , t i t i t i t i t i t i t i t i RISK b VCAP b SIZE b NPA b REG b b VRISK ? + ? + + + + = ? ?

According to the previous model, we are interested to the following variables:

VCAP and VRISK represent, respectively, changes in capital and risk levels. CAP: Defined as the ratio of total capital to risk-adjusted assets. This definition became interesting following the consideration of credit, market and operational risks by the Basel agreement. RISK: Defined as the ratio of risk-adjusted assets to total assets. Indeed the risk is mainly determined by the allocation of assets to the different risk categories that the weightings correctly reflect. REG: Regulatory pressure can be apprehended by several measures that reflect the adjustment of the bank's solvency ratio to the regulatory standard. We opt fora simple approach where regulatory pressure is approximated by 1 if the minimum threshold required by regulation is not met and 0 otherwise. This approaches is adopted by Shrieves and Dahl (1992), Rime (2001) and Bougatef and Mgadmi (2016). SIZE: Size can influence risk and capital levels. Indeed, the large banks are more willing to maintain less capital since they have a better ability to increase them if necessary. Again, they are more active and can diversify their portfolio, and therefore reduce their risk. This variable is measured by the logarithm of the bank total assets. ROA: The return on the bank's assets is included as an explanatory variable in the capital equation. The realized profits, measured as the return on the asset, can have a positive effect on the banks capital. Banks may prefer the increase of capital by incorporation of the result than the issuance of new shares. NPA: This variable is approximated by an indicator on the quality of assets; the ratio of new provisions to total assets. Banks with low quality assets are assumed to have a higher risk. Therefore, this variable is included in the risk equation.

Our work is interested to the Tunisian banks behavior during the period 1996-2014. Concerning the prudential standard is 5% for the period1996-1998 and 8% for the period1999-2012.According to the Tunisian Central Bank, banking regulation has modified the prudential standard concerning the solvency ratio. Indeed, it has demanded respect for the value of de 9% starting from 2013 and 10% starting from 2014.

5 b) Descriptive analysis

We notice that, by referring to the table 1, the change in bank capitalization amounts to an average of0.002 with respective maximum and minimum values of 0.759 and -0.795. Regarding the risk, the banks show an average variation of 0.053, a maximum value about 0.991 and a minimum value of -0.714. Banks recorded a volatility of 0.082 and 0.243, respectively, for capital and risk changes. Move to the regulatory level, an average of 0.184 is displayed with a deviation of0.388. ROA and NPA ratios have respective averages of 0.008 and 0.0107. We note, also, according to the coefficients which appear at the table 2, that the correlation between most variables is relatively low. At the level of this study, we will try to see if the endogenous variables are adjusted simultaneously by using the simultaneous equations and the double least square method which takes account of this simultaneity. A regression in panel data is applied. The Hausman test makes it possible to check whether it is a fixed (I) or random (II) effect.

IV.

6 Results and Interpretation

The estimation of models (table 3) allows us to choose the fixed effect for the two equations. The results show that capitalization and risk taking are interdependent and adjust simultaneously. Focusing on the first equation, we note that the regulatory pressure acts negatively and significantly on the change in capital. It results in a decrease in capitalization. Banks with solvency ratios below the prudential standard increase their equity less rapidly than other banks, hence the weakness of regulatory incentives. This report does not confirm those of Rime (2001) and Zhang and al (2008).As for ROA and Size ratios, they affect positively and significantly the capital change. In accordance with Zhang and al (2008) and Awdeh and al (2011), the banks increase their equity by resorting to profits and not by issuing new shares. Large institutions with easier access to capital markets hold more of these funds than small ones. By passing to the second equation, we find that the regulatory pressure affects positively and significantly the risk change: banks risk taking, under regulatory constraints, increase rapidly, compared to other banks. This confirms the contributions of Saadaoui (2010) and Awdeh, El Moussawi

[165] and Machrouh (2011).Concerning the provisioning of banks, the relative ratio appears to have no significant [166] effecton risk variation (Rime (2001)).The results suggest that large banks assume more risk. They are not able [167] to lead an efficient risk management through diversification. This confirms the conclusions of Jacques and Nigro [168] (1997), Zhang and al (2008) but not those of Murinde and Yaseen (2004) and Awdeh (2011).
[169]   V.

7 Conclusion

[171] This study aimed at analyzing the bank reaction to the prudential regulation by focusing on the capital and risk [172] taking is based on a sample of Tunisian banks over the period 1996-2014.Through a panel methodology and a [173] simultaneous equations model, the results show that the capital adequacy requirements affect significantly and [174] negatively the capital and positively the risk. The level of capitalization and risk taking are interdependent and [175] adjust simultaneously.

8 Bibliography

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Variables	Obs	Mean	Std. Dev.	Min	Max
Vcap	190	.0027211	.082802	-.795	.759
Reg1	190	.1842105	.38868	0	1
Tail	190	14.77773	.6293032	13.526	15.985
Vrisq	190	.0535211	.2436956	-.714	.991
Cap	190	.1068474	.068609	-.05	.857
Npa	190	.0107105	.0108845	-.008	.102
Roa	190	.0081579	.0122982	-.104	.035
Risq	190	.7665	.1860421	-.261	1.176

Figure 1: Table 1 :

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Variabls	Vcap	Reg1	Tail	Vrisq	Risq	Roa	Cap	Npa
Vcap	1.0000							
Reg1	0.1157	1.0000						
Tail	-0.0235 -0.1284		1.0000					
Vrisq	-0.1338 -0.0152		0.2338	1.0000				
Risq	0.0823	0.0308	-0.3673	0.2141	1.0000			
Roa	0.0932	-0.2341 -0.0965		0.0420	0.0231	1.0000		
cap	-0.6213 -0.4405		0.1297	0.0000	-0.3533	0.1308	1.0000	
Npa	-0.1203	0.1703	0.0066	-0.0546	0.0397	-0.8401 -0.0585		1.0000

Figure 2: Table 2 :

[177]   [1] [2]

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Variables	VCAP (I)	(II)	Variables	VRISK (I)	(II)
Vrisk	-0.073	-0.058	Vcap	-0.547	-0.518
	(-3.76)***	(-3.01)***		(-2.91)***	(-2.54)**
Reg	-0.023	-0.033	Reg	0.113	0.044
	(-1.70)*	(-2.46)**		(2.51)**	(0.98)
Roa	0.661	1.230	Npa	-1.749	-2.376
	(1.69)*	(3.18)***		(-1.18)	(-1.51)
Size	0.037	0.015	Size	0.304	0.156
	(3.47)***	(1.89)*		(8.16)***	(5.11)***
Cap	-1.052	-0.900	Risk	0.625	0.495
	(-13.75)***	(-12.04)***		(6.32)***	(5.10)***
Constant	-0.429	-0.127	Constant	-4.931	-2.611
	(-2.73)***	(-1.06)		(-8.37)***	(-5.38)***
N	180	180	N	180	180
Wald Chi2	208.75	161.62	Wald Chi2	96.75	39.12
Prob> Chi2	0.0000	0.0000	Prob> Chi2	0.0000	0.0000
R 2			R 2		
Within	0.5580	0.5359	With in	0.3362	0.2952
Between	0.0209	0.0336	Between	0.0916	0.0144
Overall	0.4539	0.4816	Over all	0.1741	0.1979
Hausman		29.66	Hausman		49.97
Prob> Chi2		0.0000	Prob> Chi2		0.0000

Figure 3: Table 3 :

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