The Role of the Macro-economic Factors in the Credit Risk Management in Tunisian Deposit Banks

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Abstract

This article provides an evaluation of the effect of the macroeconomic factors on credit risk in Tunisian banks. These factors are mainly the financial liberalization and the monetary policy. The first is manifested through the liberalization of interest rates, competition and the entry of foreign banks. The second, on the other hand, is exerted by the supervising authorities and includes the interest rate, the injection of money and the regulatory ratio.

In order to empirically validate this work, we tested the impact of liberalization (concentration index) measured by the degree of penetration of foreign banks in Tunisia, the prudential regulation and the monetary policy on the credit risk in Tunisian banks.

A negative relationship between liberalization and credit risk was found. Accordingly, the entry of foreign banks in Tunisia reduces the risk by strengthening the adequacy of the borrowers selection and improving the regulations imposed by the Central Bank of Tunisia (CBT).

1 Introduction

In a national setting characterized by an increased financial and economic liberalization, successive insolvencies and intensified failures of bank loans, it becomes a necessity that the Tunisian banking system of credit upgrades and strengthens its internal and external mechanisms.

With reference to the guidelines being considered by the Tunisian authorities of control over the reform of the credit risk management policy which conforms to Basel I and Basel II schemes, this paper aims to provide certain justifications for the actions being

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undertaken so as to bridge any discrepancy that may exist between the outcomes achieved and the standards required to complete the credit policy upgrading.

In Tunisia, the economic situation is characterized by a financial liberalization manifested through the evolution of the financial market in economic funding. However and despite these changes, the financial intermediation has remained the primary source of funding for the Tunisian economy that is based on banks.

In the same respect and with the intensification of the economic liberalization and the increased competition, Tunisian banks have been increasingly suffering from financial difficulties. This situation urged the Central Bank of Tunisia to adopt the strategy of risk diversification and to set a solvency ratio specific to the Tunisian banking system but adopted from the international agreement Basle I of 1988.

As a matter of fact, financial liberalization is an indirect mechanism of credit risk management; it tends towards the notion of market discipline advocated by Basel II and is primarily based on the interest rate policy which entails that with the entry of foreign banks in a monopolistic market, the interest rate falls. Hence the emergence of two theoretical approaches: the first allows to mitigate credit risk by substituting the increase in interest rates by the score threshold so as to be more selective without attracting risky borrowers (Chen (2007)). The second helps maximize the credit risk that is attributed to the arbitrary fixing of the interest rates. Yayeti (2007).

The regulatory acts governing in this liberal context are the prudential regulation (Cooke ratio) and the injection of money. These two mechanisms are meant to directly control the credit risk. Indeed, these two acts are complementary, as when the authorities observe that the credit risk goes over the threshold they intervene to regulate it by increasing the regulatory ratio through money injection. These mechanisms result in a positive regulator effect (Jacques and Nigro, 1997) as well as a negative effect (Godlowski, 2005).

The current work mainly aims to present the theoretical framework of financial liberalization and its impact on the credit risk through prudential regulation. Therefore, the problematic issue is to recognize the effect of both the prudential regulation and the macro-economic factors on credit risk within the framework of financial liberalization.

2 Literature review

2.1 Financial Liberalization: Competitiveness and Liberalization of Interest Rates

Competitiveness is the outcome of a strong competition caused by the entry of foreign banks. Several theoretical researches came to the conclusion that competitiveness increases credit risk i.e. it contributes to the reduction of interest rates and bank profits. Therefore it negatively affects the borrowers selection (Chan et al (1986), Manove et al (2001), Gehrig (1998)) as it devalues the adopted criteria for granting credits (Marquez (2002); Gehrig and Stenbacka (2000)). This results in successive bank failures (Bolt and Tieman (2004)). Dermigug -Kunt and Detragiache (1999) and Gruben et al (2002) claimed that there exists a positive relationship between financial liberalization and financial crises. Gropp and Vesala (2004), on the other hand, argued that financial liberalization tends to reduce the quality of assets. However, the International Monetary Fund (2000) announced that since the nineties the presence of foreign banks has increased

in Central Europe, Latin America and Asia and attributed this to the globalization of financial services and the removal of entry barriers in front of such banks.

Financial liberalization is mainly characterized by the liberalization of interest rates. Therefore, many researchers studied the latter's impact on competitiveness and hence on the effectiveness of granting credits decision. Chan et al (1986); Gehrig (1998); Bolt and Tieman (2004) Reppulo (2004) and Hellman et al (2000) studied the liberalization of interest rates in a competitive market that is either free or deregulated and found out that the interest margins were incompatible and that the credit risk was high. On the other hand, Lindgren et al (1996) and Honohan (2000) proved that deregulation in countries undergoing a change of reforms has a negative impact on bank credit risk which is primarily due to political changes and incomplete reforms. Cordella and Yevati (2002) asserted that an increased competition raises the risk excess unless the information about the risk portfolio is publicly available or the insurance premium is risk-adjusted.

In another respect, Boyd and Nicolo (2005) found that competition increases the bank's concentration. The existence of a competitive credit market increases concentration, which, in turn, increases the interest rate of credit and as a result the credit risk goes up. Indeed, high interest rates attract riskier borrowers where an excessive credit risk stems from.

Caminal and Matutes (2002) and Chen (2007) studied the relationship between financial liberalization and bank failures. They dealt with two types of market structure: monopoly and competition. They showed that the entry of foreign banks in a monopolistic market lowers the interest rate. Indeed, this low interest rate encourages investment and therefore promotes economic growth. However, it may cause an excess in the credit risk. In front of such a situation, domestic banks should intensify the borrowers selectivity score threshold instead of the interest rates so as to minimize the credit risk.

Yayeti and Micco (2007) used the Z-Score model by regressing the concentration index and other specific variables on the probability of the bank default. Results showed that the entry of a foreign bank reduces credit risk in a monopolistic market, but promotes its excess in case of competition.

Chen (2007) carried out a research on banks that belong to the European Union and argued that thanks to globalization, the interest margin decreased and the competitiveness index increased thus improving the quality of loans and minimizing the credit risk. After liberalization, the lender's interest rate decreased despite the increase in the monetary market rate (MMR) and the decrease in the volatility of interest. This result shows that the bank behaves prudently given that it does not rely on the interest rate it rather depends on information technology and the threshold increase.

Grop and Vesala (2004) showed that the deregulation promotes the concentration which results in an excess in the credit risk.

Bikker and Haaf (2002) argued that competition was intensified in larger banks after the deregulation and attributed this to the specialization of the banking services particularly the commercial loans. Cabral et al (2002) asserted that commercial loans generate a low credit risk.

Many authors argued that the entry of foreign banks strengthens competition and reduces the interest rate as well as the effectiveness of the banking selectivity which leads in an excess in the credit risk. They also found out that financial liberalization takes the form of arbitrary interest margins which generates an excessive credit risk. The change of the monopolistic market to a competitive market promotes the increase in the income until it reaches the selective optimal threshold and then decreases. (Chan et al (1986), Gehrig

(1998), Dermigug-Kunt and Detragiache (1999) Marquez (2002) Fernandez de Guevara (2004) ELYayeti (2007), Grop and Vesala (2004), Hellman et al (2000), Reppulo (2004)). In 2004, the European Central Bank showed that since the nineties, mergers and acquisitions have led to an increase in the bank concentration and that they may affect the bank management including credit risk.

In addition to liberalization, such factors as the monetary policy and the deposit insurance affect the credit risk.

2.2 Prudential Regulation: Cooke Ratio

The rise in the regulatory capital may increase credit risk. Thus, when the authorities ask the banks to raise the Cooke ratio, it allows them a sufficient safety margin. This situation provided managers with a freer space in their selection process and projects monitoring which results in an increase in the credit risk (Benanko Kanatas and (1996), Blum (1998), Shrives Dahl (1991), Heid et al (2004), Van Roy (2005), Bishel, Blum (2004), 2005 Godlowski).

On the other hand, there exists a contradictory relationship between risk and capital. In fact, an increase in the credit risk leads to capital reduction and an increase in capital leads to a reduction of risk. Therefore, when the authorities increase the level of regulatory capital, banks become more and more cautious, which results in a mitigation of the credit risk. (Park and Peristiani (2007), Furlong and Keely (1989)).

2.3 Capital Injection

When investigating the effect of money injection variation in relation with that of the credit risk, Chen (2007) showed that the recapitalized profit of a bank increases the injection of money. Therefore, the marginal cost of credit risk increases and the marginal return of risk remains stable.

In addition, the variation of credit risk with respect to the variation of the injected capital is negative. Thereby, the risk increase generates a capital injection as a preventive measure taken by the state in order to face the probable losses and reciprocally the capital injection, in turn, reduces the credit risk.

3 Methodology

3.1 Sample

The sample in the present work includes the most recognized banks which are the leaders of the banking system in the Tunisian country. Many banks were chosen by banking supervision experts from the CBT. Then only ten Tunisian bank Leaders were selected for the period from 1993 to 2012.

3.2 The Study Models and Variables

The model chosen to study the relationship between credit risk and the macroeconomic factors is based on the models dealt with by Shrives and Dahl (1992) Jaques and Nigro (1997) Aggarwal and Jacques (1998; 2001) Rime (2001) Hassan and Hussain (2004)

Murinde and Yassen (2004) Godlowski (2004) Van Roy (2005) Ben Hamida (2006) Iwastubo (2007) and Chen (2007).

$$\{Risk_{it} = \alpha_0 + \alpha_2 REG + \alpha_4 INRA_{i,t-1} + \alpha_5 \ H + \alpha_6 MMR$$

This model is detailed as follows:

1. **The NPLs rate (Risk):** The primary measure of credit risk is the part of bad debts (class 2, class 3, class 4) in total loans. This type of debt is known as the related or charred receivables. Indeed, measuring bad debts requires knowledge of the different classes of receivables. However, such data are available only in some banks reports from 1999. To solve this problem, the monitoring direction of the CBT was consulted and provided us with the rates of bad debts without giving any amounts.
2. **The regulation (REG):** The regulation indicates if the regulatory ratio fixed at 8% is fulfilled by the bank each year. In this case, the Dummy variable is proposed. It takes the value of the difference between the regulatory ratio achieved by the bank (CAR) and the regulatory ratio imposed by the CBT (8%), this variable is formulated as follows:

$$REG \begin{cases} CAR \text{ - } 8\% & Si \ CAR \succ 8\% \\ 0 & Sinon \end{cases}$$

In order to measure the corrective actions of Tunisian banks, we introduced the REG variable that measures the degree of detention and respect for the regulatory capital. This variable was meant to measure both the quantitative aspect of regulatory capital and the qualitative aspect of the compliance of the cooke ratio imposed by the CBT.

3. **Injection risk-adjusted (INRA):** This is the relationship between the liquidity injected by the BCT and risk-adjusted assets.
4. **The vectors of the economic variables:** the monetary market rate **(MMR)** and the concentration index **(H)** which is determined by the following equation **H = β + γ + δ** obtained by estimating the following model:

$$\frac{Interest \ Margin}{Total \ assets} = \beta_{it} \frac{Interest \ paid}{Total \ funds} + \gamma_{it} \frac{Personnel \ charges}{Total \ balance}$$
$$+ \ \delta_{it} \frac{Capital \ cost}{Real \ assets}$$

3.3 Results

By estimating the model presented below through the STATA software, we found the following results

DEPENDANT VARIABLE : RISK		F(4,108) = 23.54	
RANDOM EFFECT		PROB >F= 0.000	
R^2 INTRA : 34.27%			
R^2 INTER : 1.29%			
R^2 GLOBLAL : 28.89%			
PR (KURTOSIS) = 0.005			
PR (SKEWNESS) = 0.856			
PROB > CHI 2 = 0.0281			
VARIABLES	**COEFFICIENT**	**T-STUDENT**	**P > |T|**
REG	-1.52	-6.26	0.000
INRA	-14.157	-2.80	0.005
Concentration index	-0.012	-1.84	0.066
MMR	2.09	2.39	0.017
CONSTANT	0.24	4.2	0.000

This model is statistically significant and decisive as the overall explanatory coefficient (R2) is 34.27%. The Fisher probability is null thus indicating that the variables are generally significant. kurtosis and skewness test showed that the residuals are normally distributed.

The regulations imposed by the Central Bank has a significant negative effect on the credit risk. The latter decreases when the CBT keeps increasing the regulatory capital and the Tunisian banks recapitalize by increasing the equities.

In addition, the regulation imposed by the CBT is favorable for the credit risk management. Compliance with the regulatory capital motivates banks to hold more capital which limits granting risky loans and minimizes credit risk. (Jacques and Nigro (1997); Furlong and Keely, (1989)).

The capital increase urges bank leaders to be more cautious due to their obedience of the banking regulations and the capital increase.

The monetary policy, on the other hand, has a significant impact on the credit risk. The CBT injection of money absorbs credit losses. This indicator has a very important and significant effect on the credit risk. Accordingly and in order to regulate the credit market, the CBT injects money in the interbank monetary market despite the immediate contradictory effect this liquidity operation has. This result is consistent with that found by Park and Peristiani (2007).

In fact, money injection is the most important variable in the model because it has a very significant and important weight on the credit risk. If the CBT notices an excess in the credit risk, it injects money in order to increase the banks regulatory capital and thus reducing the credit risk. Basel II has shown that this variable is not an effective answer to manage credit risk but a temporary solution to stabilize it.

The monetary market rate has a significant negative impact on the credit risk. An increase in the MMR unit reduces the credit risk of 0.96 units. The CBT, on the other hand, is interested in increasing the MMR to face the credit risk by opting for a more restrictive selection of borrowers.

As for liberalization, we used the coefficient of the concentration index **H** which indicates the nature of the interbank market and the degree of liberalization. Therefore, if **H <0**, the market is monopolistic, if **H** is between **0** and **1**, the market is at an imperfect competition and if H is equal to the unit the market is at a perfect competition. Therefore, the higher the **H**, the more liberalized the market becomes.

In this study, the relationship between the concentration index and the credit risk is negative and significant. Both the financial liberalization and perfect market competition reduce credit risk, the monopolistic market, however, allows to increase it.

If liberalization is faced, the credit risk of the Tunisian banks decreases. Indeed and with reference to the hypothesis of Chen (2007) who argued that financial liberalization is opted for in order to reduce the interest rate, we found that Tunisian banks face liberalization instead of increasing the interest rate so as to maintain risk. These banks proceed by applying other mechanisms such as the score threshold, money injection...etc. This result is consistent with that of Chen (2007).

Still to test the impact of the interest margins and the MMR volatility on credit risk. Previous empirical studies conducted by X.Chen (2007) showed that in order to face liberalization and the entry of foreign banks, domestic banks respond by lowering the interest rates and rising the threshold selection to minimize the credit risk.

4 Conclusion

All along this study, we have shown that the Tunisian banks adopt two basic mechanisms to manage the credit risk: the respect of Basel I through the Cooke ratio and the injection of money by the Central Bank which is not highly recommended by the new regulations of Basel II.

Liberalization has a negative effect on credit risk. Thus, the entry of foreign banks in Tunisia has reduced the risk by reducing the MMR and establishing proper regulation by the CBT essentially governed by the regulatory ratio (Cooke ratio).

As a matter of fact, the advent of the financial liberalization was meant to alleviate these prudential rules and deregulate the market by increasingly releasing the interest rate and replacing it by informational disciplinary mechanisms which are strongly based on the role of shareholders, creditors and borrowers within the tendency towards the new regulations of Basel II and III which haven't been implemented in Tunisia yet.

This study has some limitations: First, we have not studied the importance of the financial market and the information system in regulating financial credits. Second, we have not considered the interaction that may exist between the interest rate and liberalization. Third, we haven't dealt with the effect of bank performance on the credit risk and on any kind of regulatory mechanism that can better manage the credit risk.

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