Volume 30, Issue 1

Financial Crises and Banking Deregulation: the Case of Tunisia

Ben m'barek Hassene Jr
ESSEC Business school Tunisia

Ben romdhane Hager Jr
university of Tunisia

Abstract

The aim of this paper is to determine banking deregulation level as a function of the variations of the internal and external fundamentals of the economy. Variations of these variables constitute an indicator of the internal and external vulnerability of the Tunisian economy. At a particular level, this vulnerability may indicate the start or the reinforcement of a financial crisis. Following this line of thinking, we propose a serial/ordered multinomial logit model that links qualitative deregulation variables to variations of several economic variables. The main results show that starting from a particular critical threshold the variations of these internal and external fundamentals indicate a triggering of a financial crisis and subsequently induce a significant intervention from the part of monetary authorities through tightening the level of control and then through a severe deregulation. However, if these variations do not exceed the confidence level, this leads the central bank to follow a progressive deregulation process.

1. Introduction

During the last ten years, financial crises have been shaking the international economy. (See Erken Celik and Karatepe. 2007, Saleem. 2009). They have been particularly frequent and profound for the economies which have recently been integrated into international financial movements. However, economies which are inscribed within a progressive liberalization and financial deregulation have been less severely affected. Indeed, the Mexican crisis, at the end of 1994 and the beginning of 1995, opened up a new a cycle. It was followed two years later in July 1997 by the Thai crisis, which spread over a large part of Asia in 1997 and 1998, hitting Korea, Malaysia, Indonesia and the Philippines. (See Bussiere and Fratzscher 2006). In August 1998, it was the Russian crisis which destabilised Brazil at the end of 1998 and at the beginning of 1999. Turkey was hit as well by the end of 2000. Recently, in 2008, the US crisis affected financial equilibriums of the American and European markets.

We start with the idea that the existence of a financial crisis risk forces national authorities to revise their policies relative to internal and external financial deregulation. However, in our study, we rather show a particular interest to answer the following question; when is it possible to undertake financial deregulation without the risk of a crisis? In order to answer this question, we propose a serial/ordered logit model through which we determine deregulation level as a function of the variable "deviation" indicator of a financial crisis. This study distinguishes itself by the fact that it specifically concerns itself with identifying deregulation policy in terms of the determinants of a financial crisis (exchange reserves, balance sheets, interest rate, exchange rate, private loans, and long term indebtedness)

2. Review of literature:

2.1 Financial crisis:

Each crisis seems specific as it occurs in different contexts and combines in many ways a certain number of general mechanisms. The first studies on the cause of the crises have highlighted the pre-existent fragility of the fundamentals (an expansionist monetary policy, public deficit, excessive indebtedness, and deficiencies of banking systems) (See Reinhart & Rogoff .2009, Quagliariello .2008, Caprio & al. 2007, Kroszner & al. 2007).

At the origin of this financial fragility, there is a heavy credit, triggering a financial accelerating mechanism which spreads to different markets, stock markets, real estates and

exchange. This fragility is converted into a highly probable open crisis. However, recent studies are putting more and more a focus on the important role that financial liberalization plays on crisis-related risks. These studies suggest that crisis risks have increased with globalization. Lambregts & Ottens .2006 claims that bank crises and twin crisis are much more frequent during the 1990s than during the 1970s.

A more recent study conducted by Hamdane .2006 confirms these results. Using a probit model over a panel of emerging countries, the author estimates the probability of a financial crisis as a function of the explanatory variables which are; GDP per capita growth rate, inflation rate, Direct Foreign Investments, portfolio investments, monetary aggregate M_2 in relation to exchange reserves, and bank deposits growth rate. The results of this study confirm the positive effect of the variation of international interest rates over bank crises, which effect is confirmed with an error risk of 1%. The same holds for external commitments, private debts, public debts and liberalization variables.

2.2 Deregulation policy in Tunisia:

Deregulation policy has been implemented taking into account the evolution of economic fundamentals which have evolved following the reforms adopted Tunisian authorities mainly starting in 1986. World Bank (2004)

In fact, Tunisia, within the context of its economic politics, has opted for openness over the international market, given its need for importations to satisfy national demand and its need for capital to satisfy the need for financial investments due to lack in national savings. This openness imposes a certain adjustment to the performance of the partner countries at the level of economic efficiency. Furthermore, inadequacies of economic fundamentals induce authorities to revise their policies related to internal and external deregulation.

A review of the evolution of the Tunisian economy's fundamentals shows that the performances recorded remain far behind those of partner countries. Indeed, at the beginning of the 1980s, all indicators of internal equilibrium and mainly external equilibrium seem untenable. Adjustment measures have been adopted in order to stabilise equilibriums and facilitate insertion into the world economy. The Tunisia signatory of international economic agreements has proceeded to macroeconomic restructuring efforts through putting in place the Structural Adjustment Plan (SAP) in order to improve productivity and microeconomic

initiales by implementing the Up Dating Program. It is in this way that Tunisia has modified its regulations to put an end to a protectionist economic policy and to develop a policy of liberalization targeting trade facilitation.

At the level of exchange politics, maintaining an administered exchange rate, authorities have created the convertible Dinar, then decided the current convertibility of the Dinar in 1992 and launched the inter-bank exchange market in 1994. With this change of the exchange regime, exchange rate, which has been so far administered, may evolve in an unpredictable way as a function of offer and demand. Volatility of exchange rate becomes consequently more important resulting in a higher exchange risk which must be considerably managed in order to avoid eventual negative repercussions.

2.2.1 Evolution of deregulations levels

- The period 1973-1985. Control was rather tight given the important deficit in budge balance. Thus each listed importer is constrained to ask for a currency transfer request from the Central Bank. Authorization is often granted as a function of exchange reserve availability.

- The period 1986-1988: Control was reinforced during this period in order to mitigate disequilibrium which is becoming substantial whereas exchange reserves were at their lowest with 23 importation days during the year 1986.

- The period 1989-1994: Adjustment measures allowed controlling external deficit already recorded as from 1987, thus a number of measures were granted to operators, mainly exporters. Industrial companies which export at least 15% of revenues are allowed to transfer amounts necessary to importation of raw materials. Likewise, international trade companies have been authorised since 1988 to conduct compensations between their revenues and expenses in foreign currency.

- The period 1995-2002: Significant measures have been adopted following the current convertibility decision authorising thus transfer entitled to current operations or capital assets for non-residents and a limited transfer entitled to current operations for residents. The amount of transfers has been recently expanded.

- The period 2003-2007: Significant measures reinforced capital operations for non-residents.

2.2.2 Determining deregulation policy in terms of the determinants of financial crisis : An empirical analysis:

As we mentioned earlier, national authorities must revise their deregulation policies in terms of a 'deviation' variable. This deviation variable constitutes an indicator of a financial crisis occurrence. We have thus approached deregulation policy conduct by explaining the deviation with reference to critical thresholds. Determination of the deviation is done through exchange reserves, interest rate, exchange rate, long term debts, private loans, and current operations balance.

Suppose the endogenous variable (deregulation) translating the degree of exchange control softening defined by a discrete size representing the diverse levels of control softening.

3. The models:

3.1 Model of identifying the level of deregulation as a function of the deviation variable

As mentioned earlier, the econometric analysis includes two stages. The first seeks to identify the financial crisis indicator through a co-integration relationship between exchange rate evolution and economic fundamentals. The second stage focuses on deregulation variable (dereglemt) as a qualitative variable, linked to real exchange rate, exchange reserves, interest rate, long term debts, private loans, current operations balance. Suppose that control proceeds through a very severe level (level 4) to a weak level (level 1). We should note that more the control decreases, more deregulation is high. Given the discrete nature of control level, it is advisable to adopt an ordered/serial logit model defined by the following probabilities:

$$p(dereglemt = f) = F(\alpha_j - x_t'\beta) - F(\alpha_{j-1} - x_t'\beta)..$$
$$.pour..j = 2,3$$
$$p(dereglemt = 1) = F(\alpha_1 - x_t'\beta)$$
$$p(dereglemt = 4) = 1 - F(\alpha_3 - x_t'\beta)$$

Where F is a repairing function which we retain in a logistic form, $x_t^{'}$ is a vector of the explanatory variables whose coefficients constitute the column vector. $\beta, \alpha_1, \alpha_2, \alpha_3$ represents unknown parameters.

In fact, this specification corresponds to the existence of a non observable latent variable in the form of a linear combination of exogenous variables $x_t^{'}\beta$ whose values are adjacent to control deregulation level with reference to threshold levels which we will determine through the model.

3.2 The Data:

The period retained for the study spreads from 1976-2007, characterised by different deregulation levels. Data relate to exchange reserves, current operation balance, interest rate, exchange rate, long term debts, and private loans. Data is provided by World Bank 2008 and IMF 2008.

3.3. The Results:

Regression of ITRE endogenous increase/size on exchange reserves, current operations balance, interest rate, exchange rate, private loans, and long term debts shows that the series are non-stationary. In fact, we note that these variables are stationary, due to primary differences. Thus, the variables are integrated with an order one.

Graph 1: Dependent variable regression
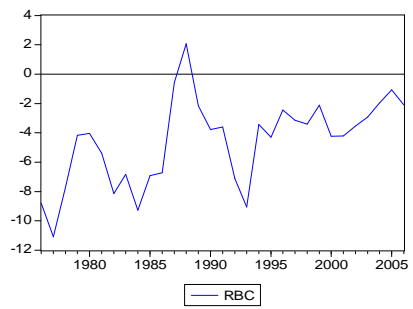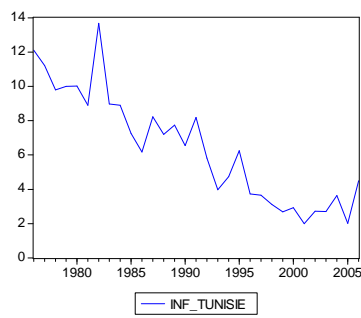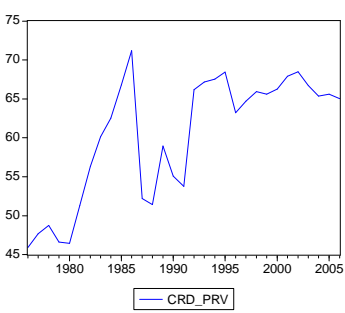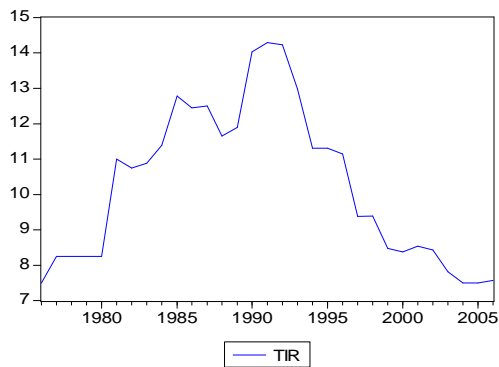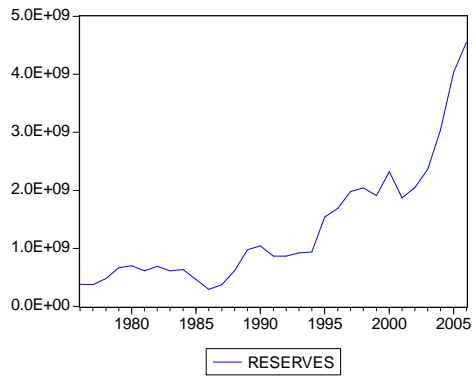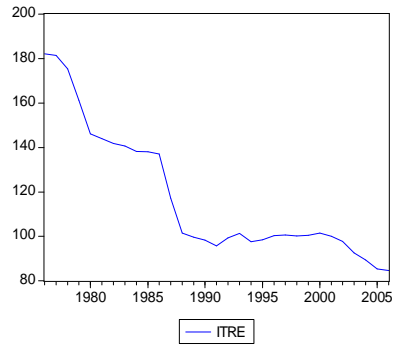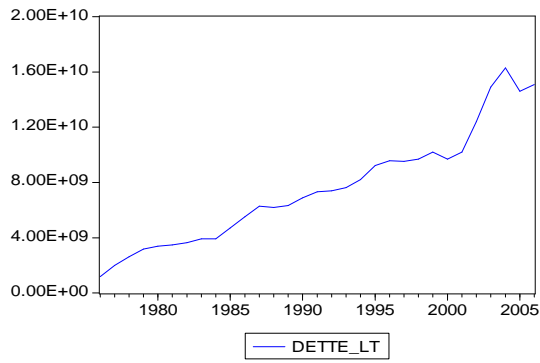
Graph 2: Primary-differences variables:
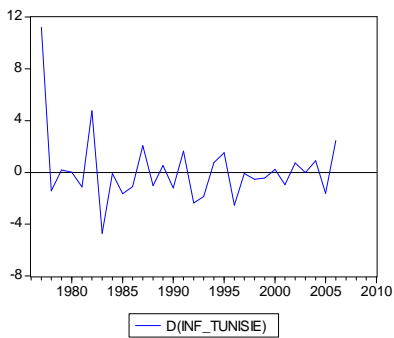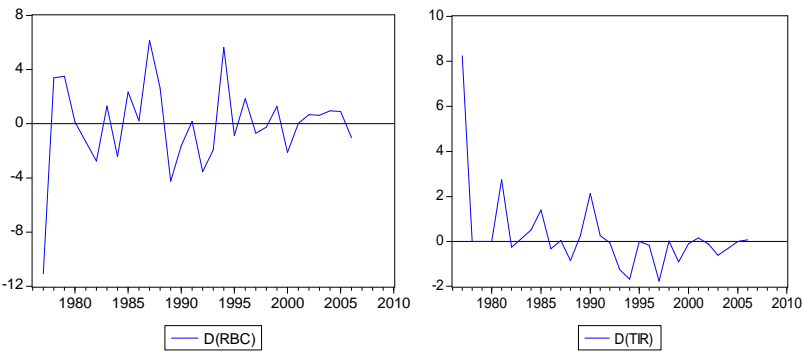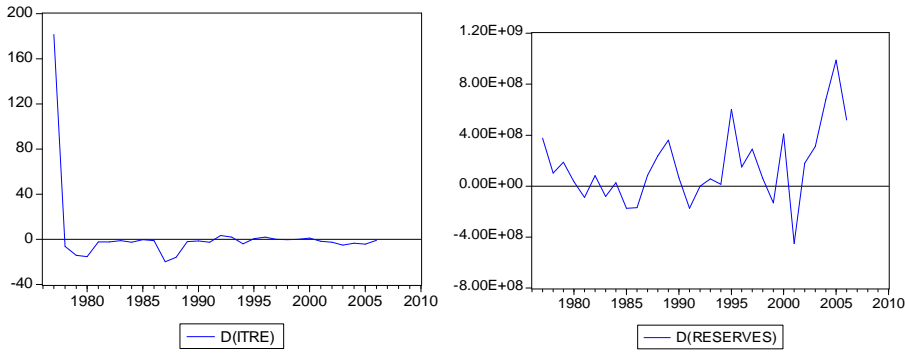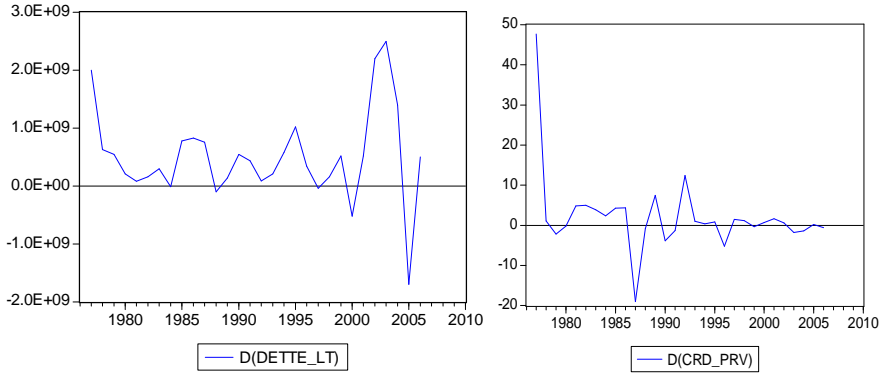
Once variables are integrated with an order one (1), we concern ourselves with testing the existence of a long term equilibrium relationship between variables. It is in these lines that we use the two-phase procedure of Engel and Granger. In the first phase we estimate the following model:

$$ITRE_t = \alpha_0 + \alpha_1 \mathrm{P}\, RVCRD + \alpha_2 LTDEBT + \alpha_3 INF + \alpha_4 RBC + \alpha_5 RESERVE + \alpha_6 INT + \upsilon_t$$

Results of the estimation are illustrated in the following table:

Table 1: Results of the estimation

Variables	Coefficients	t-stat	prob
PRVCRD	2.311391	4.838665	0.0001
LTDEBT	-2.69 E-09	-1.109941	0.27
INF	9.020532	7.528198	0.0000
RBC	-0.637905	-0.450896	0.65
RESERVE	-2.94 E-09	-0.411107	0.68
INT	-5.747697	-3.231235	0.0034

In the second phase, we test the residue of the relation (1) which measures the deviation between the observed exchange rate evolution and its equilibrium level to see whether it is stationary or not. The applied test is ADF test:

$$\Delta Ecart = (p-1)Ecart_{t-1} + \sum \Phi_i \Delta Ecart_{t-i} + \upsilon_t$$

The results of the test are reported in the following table:

Table 2 : Corrélogramm of deviation variable

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |*** |	. |*** |	1	0.426	0.426	6.1859	0.013
.*| . |	.**| . |	2	-0.061	-0.296	6.3162	0.043
.*| . |	. | . |	3	-0.124	0.047	6.8811	0.076
.*| . |	.*| . |	4	-0.093	-0.084	7.2087	0.125
.*| . |	. | . |	5	-0.062	-0.015	7.3607	0.195
.*| . |	.*| . |	6	-0.093	-0.104	7.7140	0.260
. |* . |	. |**. |	7	0.081	0.211	7.9953	0.333
. |**. |	. | . |	8	0.203	0.040	9.8212	0.278

ADF test of deviation variable
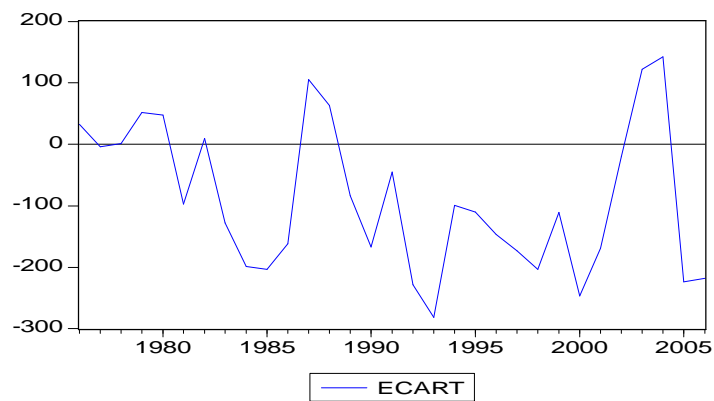
Null Hypothesis: ECART has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic based on SIC, MAXLAG=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.627577	0.0113
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

Graph 3: Evolution of the deviation variable during time

In order to establish a dependency relationship between the deviation variable and the level of deregulation, we have considered an econometric model where the endogenous variable is the level of deregulation defined by a discrete increase and the variable deviation mentioned above is measured by regression residue. The serial logit model as defined above allowed recording the following results:

Table 3: logit model results

	Coefficients	**Std.Error**	**z-static**	**Prob**
DEVIATION	0.002515	0.001732	2.452	0.0004
Limit Points				
LIMIT C(2)	-0 .53	0.285144	-1.86	0.0628
LIMIT C(3)	-0.011	0.273801	-0.04	0.966
LIMIT C(4)	0.26	0.273679	0.96	0.334

Examining these estimations shows:

i-) the variable deviation (RESID) has a positive effect over level of deregulation. This means that the authorities intervened with a very severe control when deviation is considerable. An important deviation is an indicator of the start of a financial crisis.

ii-) examining the three thresholds shows that the more the deviation is low, the more the control is low and vice versa.

The elaboration of this model has allowed determining the level of deregulation as a function of the deviation estimated through real exchange rate and its equilibrium level; the more the deviation is important, the more the level of control is severe and deregulation process is slow. In fact, with a deviation exceeding a positive critical threshold of 0,26% and a negative deviation of 0,53%, an exchange rate deviation in relation to economic fundamentals of 1% leads to an increase in probability of practising a strict deregulation of 0,25%.

Despite the importance of these results, this model does not allow assessing the weakness of each internal and external fundamental variable over the choice or reorientation of deregulation policy. In these lines, we consider a model (2) which links the qualitative variable deregulation to different internal and external deregulations. This model integrates itself within the type of serial multinomial logit models formulated as follows:

$$y_t^* = x_t^{'}\beta + \upsilon_t$$

$$y_t = 0...si...y_t^* \leq \gamma_1$$

$$y_t = 1...si...\gamma_1 \leq y_t^* \leq \gamma_2$$

$$y_t = 2...si...\gamma_2 \leq y_t^* \leq \gamma_3$$

$$y_t = 3...si...\gamma_3 \leq y_t^* \leq \gamma_4$$

Table 4 : Ordred multinomial Logit estimations

	Coefficient	Std. Error	z-Statistic	Prob.
D(CRD_PRV)	0.374456	0.150484	2.488341	0.0128
D(DETTE_LT)	-1.00E-09	7.71E-10	-1.299624	0.1937
D(INF_TUNISIE)	0.435154	0.256952	1.693521	0.0904
D(ITRE)	-0.140661	0.063879	-2.201997	0.0277
D(RBC)	0.654705	0.273992	2.389502	0.0169
D(RESERVES)	-3.69E-09	1.86E-09	-1.991399	0.0464
D(TIR)	2.040086	0.791616	2.577116	0.0100
Limit Points				
LIMIT_2:C(8)	-0.965749	0.808933	-1.193855	0.2325
LIMIT_3:C(9)	0.607262	0.775752	0.782804	0.4337
LIMIT_4:C(10)	1.429797	0.833116	1.716203	0.0861

Akaike info criterion	2.416960	Schwarz criterion	2.884025
Log likelihood	-26.25439	Hannan-Quinn criter.	2.566378
Restr. log likelihood	-38.39563	Avg. log likelihood	-0.875146
LR statistic (7 df)	24.28247	LR index (Pseudo-R2)	0.316214
Probability(LR stat)	0.001016		

The results show that the variables; variation of private loans, variations of current operations balance and variations of real interest rate are significant and positive. Thus, increasing the economic variables increases probability of practising a more severe level of deregulation.

We can explain as well the importance of deviation amplitude by varying loans and real interest, thus reorientation of authorities towards a strict control level is aimed at stabilizing the national economy. However, variation of exchange reserves and exchange rate are significant and negative, thus increasing these variables reduces the probability of practising a strict control level and leads to total liberalisation. We can thus conclude that deregulation policies in Tunisia are targeted at the level of exchange: variation of exchange reserves and real exchange rate. Thus, internal deregulation is not yet conceived at this phase for the country. The thresholds are significant which shows that beyond a critical threshold of 1,42 the internal and external fundamentals indicate the start of a financial crisis (exchange crisis) which incites national authorities to revise their deregulation policy towards tightening level of control over current operations and over capital-related operations.

Conclusion :

The first studies over the causes of crises have focused on the weaknesses of the internal and external fundamentals in the countries affected by the crises. They are the short term private loans and short term volatility of capital. Our study integrates itself within a research of an adequate policy in terms of the internal and external fundamentals of the economy. Critical thresholds determine the levels beyond which there is a triggering or a reinforcement of a financial crisis accompanied by evolution of the economy's internal and external fundamentals. Our empirical results confirm results obtained in previous studies where the level of control becomes more and more severe following the vulnerability of the economic fundamentals. Significance of these variables with the variable deregulation highlights the fact that deregulation policies as revised by national authorities and evolution of the real exchange rate (incomplete). The question under consideration is; when can we succeed such liberalization without the risk of a financial crisis? The answer was manipulated by determining critical thresholds that the variable deviation should not exceed.

REFERENCES

Caprio G., Laeven L. & Levine R. (2007) "Governance and bank valuation" Journal of Financial Intermediation, vol 16, pp 584-617

Erken Celik A. & Karatepe Y. (2007) " Evaluating and forecasting banking crises through neural network models: An application for Turkish banking sector" Expert Systems with Applications, vol 33, pp 809-815

Hamdane, H (2006) « déréglementation bancaire et stabilité financière dans les pays émergents » WP, University of Orléans, pp 1-37

Kroszner R.S., Laeven L. & Klingebield, D, (2007) " Banking crises, financial dependence, and growth" Journal of Financial Economics, vol 84, pp 187-228

Lambregts E. & Ottens D. (2006) " The roots of banking crises in emerging market economies: a panel data approach" DNB WP N°84, pp 1-28

Quagliariello M., (2008) "Does macroeconomy affect bank stability? A review of the empirical evidence" Journal of Banking Regulation, vol 9, pp 102-115

Reinhart C. & Rogoff K.S. (2009) "The aftermath of financial crises" NBER WP, N°14656, pp 1-14

Saleem K. (2009) "International linkage of the Russian market and the Russian financial crisis: A multivariate GARCH analysis" Research in International Business and Finance, vol 23, pp 243–256

world bank (2004) « République de Tunisie revue des politiques développement », pp 1- 137