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Banking Deregulation and Financial Stability : Lessons for Emerging Market Economies

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Abstract

Since the eighties, an increasing number of emergent countries have begun in the process of banking deregulation. This policy of liberalization of the financial systems was stimulated by the increase of the national debts and the inconsistency of the restrictions with the new economic and financial world. However, these last decades were marked by great financial crises which became world extensive. From there arose the question whether the process of deregulation, started by the developed countries since the sixties and accentuated in the eighties by the emergent and developing countries, contributed to the recent crises. Several theoretical and empirical studies studied this question to show that these crises concern various fields: macroeconomic imbalances, structural weakness of the financial systems, instability of international flows of capital, etc.

JEL codes: G18, G28, G01

Key Words: deregulation - financial stability - financial crises.

Introduction

Regulation and supervision aimed at assuring the stability of the financial system, and therefore the economic stability. However, the protection of banks made them not very competitive. So, these financial services had only one specialised and local activity, they dominated the national market but could not confront foreign markets.

This structure of markets was upset by the deregulation process adopted by almost all the developed and emergent countries. Financial liberalization began with the collapse of the international monetary system based on a generalised regime of adjustable fixed exchange rates, at the beginning of the seventies. The dismantling of the national controls of the flow of capital, during the eighties, in developed countries, increased the liquidity of financial markets. This evolution was even more stressed with the opening of the emergent countries to foreign capitals at the beginning of the nineties. The financial globalisation was marked by the advent of new markets and new significant actors in the international financial game.

The financial globalisation creates a new order for the economic agents and for the States as well. It means for States a drastic reduction of their room for manoeuvre in political, monetary and exchange rate matters. The masses of capitals exchanged every day on financial markets are, from now on, widely superior to interference capacities of the States. The economic theory teaches that the internationalisation of financial services augments the effectiveness of the national financial systems. Indeed, deregulation allows a better allocation of financial resources, a reduction of the cost of financings and an extension of the range of the offered products. It also enables to reinforce the free game play of competition by eliminating protectionist and Malthusians devices, and private income situations.

This new opportunity can be advantageous especially for the emergent countries, allowing the installation of a more efficient and more solid financial system. This ultimate objective can be accomplished only by adopting international practices and norms, and by improving financial services under the angle of quality, of output and of diversity.

The emergent countries, which constitute a more and more heterogeneous group, through their productive capacity, their human resources and their competitiveness, are not all ready to challenge financial and economic worldwide integration. Some of them, in South-east Asia, in Latin America, have started finding their place in the worldwide trends of financial exchange. Others have a potential which would allow them a more active part in these global movements. But, to reach that, they have to persist in their increasing efforts to reinforce their economic systems. Most emergent countries advanced well in the implementation of structural adjustment plans and economic reforms intended to stimulate market mechanisms and to fit progressively to liberalization and deregulation measures. But are these reforms sufficient to win the bet of deregulation? In other words, will the financial deregulation of banks contribute to the growth of the emergent countries, without risks of crises?

To answer this question it is necessary to do a close study some cases of emergent countries, while taking into account the worldwide context in which they are

included. Indeed, financial markets are strongly interconnected now and financial markets are characterised by behaviours of contagion. This manifests itself especially during financial crises, for example the stock exchange crash of October, 1987, Europe in 1992-93, Mexico in 1995, Thailand, Indonesia, Malaysia and Korea in 1997, Russia and Brazil in 1998. These financial crises often reveal deep weaknesses in the economic structures and the financial systems of these countries.

But isn't it possible to assure a financial deregulation, and more particularly a bank deregulation, in serene conditions, that is to say without risks of crises? Alas, economic history shows a strong correlation between financial deregulation and crises. The recent studies suggest the risks for a country to have a financial crisis increased with globalisation, probably because technological innovations allow the funds to move more easily.

Financial deregulation increases risks of crises, especially for the emergent countries, unprovided with powerful prudent mechanisms. Spread effects are persistent with opening and globalisation. But this fragility of the international financial system confers it at the same time a solidity element, by making the worldwide economic integration, the quick mobilisation of resources easier. For better settling this question we are first going to introduce empirical studies which studied the effect of banking deregulation on financial stability then to introduce an econometric model which estimates the effect of liberalization on banking crisis likelihood.

1. Deregulation and financial stability: a review of the literature

The impact of deregulation on financial stability was the object of many contributions. Studies of Barth, Caprio and Levine (2000), Demirgüç-Kunt and Detragiache (2000), Miskin (2001), Dekle and Kletzer (2001a, 2001b), Huang and Wajid (2002) and Feldstein (2002), had highlighted a relation between deregulation conditions, prudent structures and financial stability. Feldstein (2002) examined lessons which can be learnt from financial and exchange rate crises in the end of the 1990's. His study gives the modalities for preventing the crisis. This author examined the policies of the emergent savings which affect the likelihood of crises, including the exchange rate regimes, convertibility of the capital account, debts and exchange rate reserves, the structure of domestic credit and financial supervision. He then studies the policies of the industrial countries which affect the risk of crises in emergent savings, including instability of exchange rates, rates of interest, banking supervision, trade policy and the supply of a last resort lender.

The literature on banking crises is much less rich, since it is much more delicate. Indeed, given the numerous aspects of banking fragility, it is difficult to find a numerical indicator corresponding to the banking crisis. Demirgüç-Kunt and Detragiache (1997, 1998a, 1998b, 1999) are the first authors to apply this type of models to banking crises. Their study (1998a) deals with 53 countries between 1980 and 1995 and shows that financial liberalization increases the risk of banking crisis, especially in a fragile environment. Besides, for repressed countries financial liberalization improves financial development, even if they are affected by crisis. Barth, Caprio and Levine (2001), use a Probit model and annual data of 45 countries. Their study

suggests that countries with relatively weak governments and bureaucratic systems tend to impose more rigid restrictions on banking business. Besides, the impact of restrictions of regulation on the smooth running of the banking business is mitigated. Finally, the authors note that in the countries where the activities of banks on the stock market are restrained, the likelihood of a crisis is bigger, *ceteris paribus*.

Eichengreen and Arteta (2000), having performed a factual study of variables that can explain banking crises, estimated a probit model with these same variables. These authors note that the stability of the banks of emerging markets is threatened when macroeconomic and financial policies, cobined with financial deregulation create an explosion of loans (lending boom).

Like Demirgüç-Kunt and Detragiache (on 1998a), Eichengreen and Arteta (2000) find that banking crises are very probable if financial liberalization is combined with an unstable macroeconomic and financial environment. On the contrary results both the role of institutional environment and that of exchange rate regime are not robust.

Mehrez and Kaufmann (2000) studied the effect of financial liberalization on the likelihood of banking crises in an environment which is not very transparent. They built up a sample of 56 countries between 1977 and 1997. Empirical results show that the likelihood of crisis increases in the periods following liberalization, especially in the countries which are not very transparent.

Eichengreen and Rose (1998) studied the likelihood of banking crises in 105 developing countries over the period 1975-1992, thanks to the multivarious probit model and graphic method. Their results especially stress the influence exerted by the interest rate of the countries of the COED on banking crisis likelihood. On the contrary the study of Eichengreen and Arteta (2000) questions again the role of the interest rates in developed countries on banking crisis likelihood in developing countries. Hardy and Pazarbasioglu (1998) estimated the probability of the banking crisis between 1980 et1997 in 38 developed and developing countries. They draw out a group of variables which explain the likelihood of banking crises.

Hutchison and McDill (1999), showed the positive effect of financial liberalization, deposits insurance, price-cutting of assets, the weak growth and independence of the central bank on the likelihood of banking crises. Their study concerns a wide sample of 97 developed and developing countries, over the period 1975-1997. On the contrary Rossi (1999) found that barriers at the exit of capitals increase the likelihood of banking crises. Indeed, the controls of capitals increase the risk taking of banks, which produce banking crises. But it is necessary to point out that these results are obtained on a reduced sample composed of 15 developing countries and 8 years of study (from 1990 to 1997).

In a study performed on sixty countries, Barth, Caprio and Levine (2000), found that market expansion values, particularly the liquidity of equity capitals on the market, the programme of equity capitals (on the primary market) as part of the GDP, and the programme of long-term obligation (on the primary market) as part of the GDP, bring down the likelihood of a banking crisis.

2. Building of the variable of financial liberalization

To prove the effect of liberalization on banking crises, different liberalization indexes were built up through the method of discriminating factorial analysis (DFA). This method helps predict a qualitative variable using several quantitative variables, called explicative variables. It therefore gets closer to multiple regression in the case where the endogenous variable is a qualitative variable describing groups.

2.1. DFA methodology

The discriminating factorial analysis (DFA) is a descriptive and explanatory method. It makes it possible to predict a qualitative variable using several quantitative variables, called explanatory variables. This method thus approaches the multiple regressions if the endogenous variable is a qualitative variable that describes the groups.

The DFA makes it possible, moreover, to model the membership of individuals (liberalization or not) according to the values taken by several variables. It allows to describe the connections between the character to be explained and the explanatory characters, while distinguishing between the various groups (or classes). Its objective is to create new variables which are particularly effective to separate the groups. These new variables, known as "discriminating Axes", or "discriminating Factors", are obtained as linear combinations of the initial variables.

The discriminating analysis covers two aspects: a descriptive aspect and an estimated aspect. Indeed, the DFA makes it possible to describe data observed on individuals by, as well as possible, classifying them in various groups. It also makes it possible to exploit the built discriminating axes starting from these data to envisage the classification of new individuals. In other words, it makes it possible to determine the most probable group for an individual, knowing only the values of the variables which characterize it. This second inferential aspect helps much make the decision and show a significant characteristic of this method. However, we will not present this aspect since we are interested only in the descriptive aspect of the DFA.

Presentation of the model

For a variable *x*, we have: $y_{ij}(x) = \mu(x) + \alpha_i(x) + \varepsilon_{ij}(x)$, with

$y_{ij}(x)$: the dependent variable i.e. the index of liberalization

$\mu(x)$: a fixed parameter which measures the average effect of variable *x*

$a_i(x)$: a fixed parameter which measures a variation of group i for variable *x*

$\varepsilon_{ij}(x)$: are random variables of null hope and constant variance. These random variables are independent two by two and their distribution is normal.

$\varepsilon_{ij}(x) \approx N(0, \sigma_x^2)$

We admit the following assumptions for this model.
For each variable x (or observation), we have:

T_x (Total) = B_x (Between or inter) + W_x (Within or intra)

Equivalent to:

$$\sum_{ij}\left[y_{ij}(x)-y_{..}(x)\right]^2=\sum_{i.} n_i\left[y_{i.}(x)-y_{..}\,x\right]^2+\sum_{ij}\left[y_{ij}(x)-y_{i.}(x)\right]^2$$

with
i = 1,…, g : index of group;
j = 1,..., n_i : index of the observation in group i;
x = 1,…, p with p the index of variable x;
n_i : a number of observations in each group (0 or 1), it is the number of group i;
y_{ij} (x) : element of R^p, is the individual j of group i, it is the endogenous variable to classify in group 0 (no liberalization) or in group 1 (if there is liberalization);
$y_{i.}$ (x): element of R^p, is the centre of gravity of group i;
$y_{..}$(x): element of R^p, is the centre of gravity of the data set;
T_x : represents the sum of the variations squares of all the observations to the noted general average $y_{..}$ (x).
B_x : represents the sum of the variations squares of each average of g groups, noted $y_{i.}$(x), to the average $y_{..}$ (x); and
W_x : represents the sum of the variations squares inside each group.
With $T_x = B_x + W_x$
The summary of the analysis is represented in the following table:

	Sum of Variations Squares (SVS)	Degree Of Freedom (DOF)	Average Squares	Test F
TOTAL VAR.	T_x	*n-1*		
GROUPS VAR.	B_x	*g-1*	$B_x/(g-1)$	F_x
RESIDUAL VAR.	W_x	*n-g*	$W_x/(n-g)$	

$W_x/(n-g)$ is an estimate of the variance of the terms ε_{ij} (x) of the preceding statistical model. The expression of the F test (Fisher-Snedecor), is as follows:

$$F_x=\left[B_x/W_x\right]\times\left[(n-g)/(g-1)\right]$$

This test allows to be ensured for variable x if there are differences between g groups ensuring discrimination. This statistical test is defined as follows:

H_0 : a_i (x) = 0, for all the groups, against

H_1 : a_i (x) is different from 0.

We compare the value of F_x with a threshold F {α; g-1, n-g} where F is the value of Fisher-Snedecor with g-1 and n-g degrees of freedom for a fixed level of significance α. In this case, it is advisable to remove the variables having a significance (for the F-test) higher than 5%.

2.2. Index of liberalization of capitals

This indicator is constructed by using the balance of payment data in Chelem base. The choice method of variables is based on the availability of data. Indeed, after

collecting all data on capital flows, all fluxes where there was not a lot of information were eliminated. Details on used data are in an appendix.

Our study includes 24 emergent countries over the period 1970-2002, the endogenous variable being an indicating variable (0,1). From the first year of liberalization of capitals there is 1, on the contrary if the account of the capital is still controlled, there is 0. The used method is the method of step by step, by replacing missing data with averages.

Besides, we kept the results of the second estimate which consists in replacing the original classifications with classifications got from the first specification, to get a better classification of data. Results are introduced in what follows and show that 93 % of original data are classified well and 92,1 of crossed validated observations are correctly classified (table1).

Table 1: Coefficients of standardised canonical differential functions

	Function
	1
FDI_KS_E	0,810
IP_E	0,763
RSV_DEV	-0,867

So the increase of the liberalization of capitals can be noticed through an increase of the foreigners' investments, and more precisely an increase of FDI kept by the foreigners within the economy (increase of the authorised capital of FDI). The increase of obligations and of other assimilated bonds kept by the non residents also reflects the abolition of the financial barriers between countries. Besides, the fall of reserve kept by the central bank and the commercial banks in foreign exchanges reflects a more massive appeal to get financed at the level of the financial market.

The signs expected from this liberalization indication are positive, that is to say the increase of external liberalization augments the risk of banking crisis, in our econometric estimate, the signs are positive, which corroborates the theory.

2.3. Index of liberalization of interest rates

The index of liberalization of interest rates is built up with the same method as that of capitals (DFA). The data used are those of International Financial Statistics (IFS). As for capitals, the choice of variables is based on the availability of data, that's how the bank rate (759 observations) was kept; the money-market rate (659 observations); the interest rate on deposits (758 observations) and the interest rate on credits (759 observations).

However, after several estimates only 50 % of the original observations which are correctly classified one found on average. Moreover, by performing several trials through the step by step method they find only one single variable represents the indicator of interest rates. Statistical results are not very pertinent, that is why there was no interest in that method so the results were not kept. As a result, we represented

the index of liberalization of interest rates directly by a rate of interest in the final econometric model (probit model).

2.4. Combined index of liberalization of capitals and of interest rates

Some works (Eichengreen and Arteta, 2000) showed the combined effect of the liberalization of interest rates and of capitals on banking crises. Indeed, according to their results internal liberalization (liberalization of interest rates) augments the likelihood of banking crises. However, external liberalization (liberalization of capitals) only has effect if it is associated with internal liberalization. This combined effect of internal and external liberalization is measured by a composite indicator which was called combined index of liberalization of capitals and of interest rates. This indicator is constructed by using at the same time data on capital flows and data on rates of interest. Thus we retained as exogenous variables the 12 variables which were already used in the construction of the index of liberalization of the capital plus the data on the discount rate, the rate of the money market, the interest rate on the deposits and the interest rate on the credits.

The endogenous variable is constructed by using the data base that has already been worked out on the dates of liberalization of capitals and of interest rates. This endogenous variable is a binary variable, it is equal to 1 if we have at the same time liberalization of capitals and of interest rates, it is equal to 0 if there is no liberalization in both sectors at the same time.

In the building of this indicator the method step by step was first used, but since this method did not lead to any results, the method of simultaneous introduction of data was used. The results of the second estimate were also kept, where the original classification was replaced by the classification got from the first specification. This method is often used by econometrists to lead to better results. The classification table shows that 100 % of original data are correctly classified and 91.5 of crossed validated observations are classified well (table 5).

The results of the estimate are introduced in appendices (table 6 and 7). The interest rate variables on credits (TCRE), the interest rate on deposits (TDEP), and direct investments from abroad in the economy, authorised capital, commitments (FDI_KS_E) have very high coefficients. However, as it is can be seen in table 6, only the interest rate variables on credits (TCRE) is significant. Besides, the table of correlation shows us a strong correlation between the interest rate on credits and the interest rate on deposits (0,833); as well as a rather high correlation between the interest rate on deposits and direct investments from abroad in the economy (0,67). Therefore only the interest rate variable on credits for discrimination is going to be kept.

3. Estimate of the Probit model with composite errors

The valued model is written as follows:

$$Y_{it} = X_{it}\,\beta + \varepsilon_{it} \qquad (1)$$

with i = 1,….., N ; t = 1,……..T.

Y: the matrix of the indicatory variables of banking crises,

β: the vector of N unknown coefficients to estimate,

X: the matrix of explicative variables,

ε_{it}: the matrix of residues, with $\varepsilon_{it} = u_i + v_{it}$

u_i: the random effect specific to the countries,

v_{it}: the residual random effect.

We have $Var\,[u_i + v_{it}] = [\varepsilon_{it}] = \sigma_u^2 + \sigma_v^2$

(2)

$$Corr\left[\varepsilon_{it}, \varepsilon_{is}\right] = \rho\left(Rho\right) = \frac{\sigma_u^2}{\left(\sigma_u^2 + \sigma_v^2\right)} \qquad (3)$$

If ρ (Rho) = 0, therefore there is no random effect and it is necessary to estimate the model with fixed effects, on the contrary if Rho is different from zero, the model of random effects is justified.

Y_{it} is the matrix of the indicatory variables taking the value 1 when there is a banking crisis and the value 0, in the absence of a banking crisis. In that case the model can be written as follows:

$$P\left(Y_{it} = 1/X_{i1}, X_{i2}, ..., X_{iN}\right) = \Phi\left(X_{it}\,\beta\right) \qquad (4)$$

where Φ is the spreading function this of ε_{it}

The likelihood associated with model can be written:

$$L = \prod_{t=1}^{T}\prod_{i=1}^{N} P\left(Y_{it} = 1/X_{i1}, X_{i2}, ..., X_{iN}\right) \qquad (5)$$

$$L = \prod_{t=1}^{T}\prod_{i=1}^{N} \Phi\left(X_{it}\,\beta\right)^{Y_{it}} .\left[1 - \Phi\left(X_{it}\,\beta\right)\right]^{1-Y_{it}} \qquad (6)$$

Our study is based on annual data covering the period 1970-2002 and concerning 24 emergent countries(Table 3). The choice to work on annual data is explained by the difficulty in dating the periods of banking crises. Indeed, contrary to crises of exchange rate, there is not index that can be built up to assess banking crises. Even the rare studies which assessed the dates of banking crises like that of Demirgüç-Kunt and Detragiache (in 1998a), introduce annual dates of banking crises. These authors introduced several phenomena which point out the starting up of the banking crisis. These indicators are generally noticed over a period of time and cannot be determined at a precise time like the fluctuation of the exchange rate. As Hutchison and Glick (1999) specify it, it seems arbitrary to try to date banking crises using monthly or quarterly data.

The initial choice of variables is inspired from the economic theory and works performed in this domain. Then the method from general to specific was used, based the from Student to determine explicative variables. This method first consists in estimating the general model, with all explicative variables. Then, significant variables will be kept only, and other variables, according to their importance in the economic theory and their econometric significativity will be progressively reintroduced again.

The final model retained contains all significant variables and non significant variables, but which are important according to the economic theory.

The specification of the model includes as explicative variables: the growth rate of the real GDP per capita, the inflation rate, FDI, portfolio investments, monetary aggregate M2 in comparison with exchange rate reserves, the growth rate of the real bank deposits, external commitments of banks in comparison with the GDP, claims on private sectors in comparison with the GDP, claims on central government in comparison with the GDP, the international interest rate and the liberalization indexes. Details on the variables of the model are in an appendix.

The results of the estimates are summed up in the following table.

Table 2: Results of the Probit model

	(1)	(2)	(3)	(4)	(5)
Constant	-4,175 ***	-5,586 ***	-3,965 ***	-5,320 ***	-6,454 ***
	(-3,044)	(-3,609)	(-2,487)	(-4,117)	(-4,728)
LGDPRT	0,060	0,307*	0,062	0,277*	0,399 **
	(0,347)	(1,602)	(0,308)	(1,647)	(2,185)
T^XINF	-0,173 ***	-0,155 ***	-0,173 ***	-0,158 ***	-0,062
	(-3,472)	(-3,006)	(-3,123)	(-2,684)	(-0,745)
FDI	-8,590 **	-11,917 ***	-6,419	-9,081*	-6,945
	(-2,332)	(-3,010)	(-1,584)	(-1,707)	(-0,877)
IPF_GDP	-5,598	-2,113	-5,265	-3,862	-0,491
	(-0,809)	(-0,192)	(-0,741)	(-0,401)	(-0,100)
M2RC	0,9791E-02 **	0,737 E-02	0,871E-02 **	0,649E-02*	0,656E-02
	(1,944)	(1,985)	(1,911)	(1,866)	(1,377)
T^XCRER	-0,774 ***	-0,745 ***	-0,776 ***	-0,748 ***	-0,142
	(-3,811)	(-3,290)	(-3,509)	(-4,239)	(-0,712)
ENG	-0,045 ***	-0,035 ***	-0,041 ***	-0,035 ***	-0,028 ***
	(-3,221)	(-2,952)	(-2,511)	(-2,541)	(-3,744)
CRPV_GDP	3,719 ***	3,409 ***	3,791 ***	3,614 ***	3,412 ***
	(7,784)	(7,030)	(6,452)	(9,055)	(7,886)
CR_GDP	4,107 ***	5,432 ***	4,095 ***	5,223 ***	3,751 ***
	(8,113)	(6,641)	(6,797)	(5,464)	(5,675)
IUSA	0,046	0,069 **	0,049	0,061 **	0,100 ***
	(1,421)	(2,026)	(1,540)	(2,114)	(3,885)
LIBC	1,260 ***		1,238 ***		
	(2,638)		(3,005)		
LIBI	0,363 ***		0,312 ***		
	(3,884)		(3,393)		
LIBIC			-0,453 **		
			(-1,936)		
LIBC0		0,227		0,977 ***	0,908 ***
		(0,879)		(2,366)	(2,407)
LIBI0		0,403 ***		0,679 ***	0,534 ***
		(2,468)		(3,440)	(2,349)

LIBIC0				-1,079 *** (-2,736)	-0,971 *** (-2,841)
Number of obs	792	792	792	792	792
Number periods	33	33	33	33	33
Log Likelihood	-345,720	-349,626	-343,200	-343,976	-342,042
Pseudo R^2	0,120	0,095	0,117	0,100	0,109
Total LR test (χ^2)	72,526	85,315	80,695	93,438	82,408
Probability (LR STATISTIC)	0,000	0,000	0,000	0,000	0,000

*: significant variable in 10 %
**: significant variable in 5 %
***: significant variable in 1 %
values in parentheses are t-student.

(1) corresponds to the estimate of the model, using the index of liberalization of capitals constructed by the method of factorial differential analysis. Into this first estimate we have not introduced the combined index of liberalization of capitals and of interest rates yet. The degree of freedom of this specification is therefore 12.

(2) corresponds to the estimate of the model, using the liberalization indexes, composed of indicatory variables, based on the dates of liberalization. In this estimate we have not introduced the combined index of internal and external liberalization yet. The degree of freedom of this specification is also 12.

(3) corresponds to the estimate of the model using the liberalization indicators estimated by the factorial differential analysis. This specification of the model corresponds to the first specification, but by introducing the combined index of internal and external liberalization in it. The degree of freedom of this specification is therefore 13.

(4) corresponds to the estimate of the model made up of 24 countries, using the liberalization indexes, composed of indicatory variables, based on the dates of liberalization. This specification of the model corresponds to the second specification, but by introducing the combined index of liberalization of interest rates and of capitals.

(5) corresponds to the estimate of the model which includes liberalization indexes constructed from indicatory variables and whose other explicative variables have a period delay. Therefore this specification of the model distinguishes itself from the previous specification due to the fact that all exogenous variables (except liberalization indexes) are delayed by one year. The degree of freedom of this specification is therefore 13.

Before obtaining the results introduced in the table above we tried to estimate different specifications of the model by introducing other exogenous variables there. For example the growth rate of the real GDP, the growth rate of the real bank deposits, the report of bank reserves in comparison with the banking assets, the surplus or the budget deficit in comparison with the GDP, the balance of common transactions in the GDP and the monetary aggregate in the strict sense were introduced. At the beginning of the estimates these variables seemed to us rather important to be introduced. Some of them were used in other empirical works to assess their effect on banking crises. For example the growth rate of the GDP was introduced into the logit model on the banking crises of Demirgüç-Kunt and Detragiache (1998a). This variable is more significant in this study. Bank reserves in comparison with the banking assets were used in several empirical works such as those of Demirgüç-Kunt and Detragiache (on 1998a) and, Komulainen and Lukkarila (2003), in these two studies this variable is not significant. Both variables budgetary surplus in comparison with GDP and the common transactions in comparison with the GDP were used in a probit model by Komulainen and Lukkarila (2003), to estimate factors affecting banking crises. The first variable is not significant, while the second is significant in 1 %, in this last study.

In our model, by studying different variables closely, a strong correlation between the growth rate of the real GDP and the inflation rate (-0,82) was found. And a strong correlation between the growth rate of the real bank deposits and the growth rate of real credit: T^{X}CRER (0,88). As the variable growth rate of the head GDP was introduced into our model we preferred to eliminate the variable growth rate of the GDP and keep the inflation rate. On the contrary to cut between the growth rate of the real bank deposits and the growth rate of real credit variables, we had to perform two distinct estimates by keeping each time one of the two variables. These two variables were significant in 1 % and there was the same quality of the model, therefore the choice was made in an arbitrary way and the variable growth rate of real credit was kept.

For the other variables they were introduced into a general model, since the method from general to specific was adopted, then we preferred not to keep them for a better quality of the model. In the absence of a common economic theory on banking crises, the initial choice of variables was based on empirical and theoretical studies on financial crises. On the contrary the final choice of the model was made after several estimates and the introduction of several variables, to choose the best specification which highlights the variables, likely to lead to or point out the happening of a banking crisis. It is possible to note that, in some specifications of the model, variable M1 (monetary basis in the strict sense) was significant in 1 % and the variable budgetary surplus in comparison with the GDP was 10 %. On the contrary, in no specification the banking reserves in comparison with the banking assets variables or the balance of common transactions in comparison with the GDP was significant. In the study of Komulainen and Lukkarila (2003) this variable is significant in 1 % while in our study it is not, this can be explained by a redundancy phenomenon or by the difference of the basic sample.

The results of estimates show that the inflation rates variables, direct foreign investments and real credits variables and external commitments variables are

significant and negative, therefore the increase of these economic variables reduces the likelihood of a banking crisis. These results do not correspond to waited signs, since we expected a positive effect of these variables on the likelihood of banking crises. But other studies found the same result as ours, for example Komulainen and Lukarila (2003), used a sample of 31 emergent countries over the period 1980-2001 to discern reasons of banking crises. The results of their probit model show that inflation rate, direct foreign investments and real credits variables are significant in 1 % but negative. On the contrary, the claims on private sector, the claims on central government and the indexes of internal and external liberalization are significant and positive. Therefore the increase of the claims on private, the increase of claims on central government and liberalization increase the likelihood of a banking crisis. These last variables always come out significant to 1 % whatever the specification of the model.

The interest rate variables of U.S and head real GDP per capita variables are significant only in the second, fourth and fifth specification of the model, which corresponds to models with indicatory variables like liberalization indexes. The positive sign of the U.S interest rates confirms the idea according to which the increase in the interest rates of developed countries favours the risk of crisis in the emergent countries (Eichengreen and Rose, 1998).

The positive sign of the GDP per capita variable, on the other hand, was little awaited. Indeed, this last variable shows the wealth level of the country, and its increase normally reduces the risk of banking crisis. It is also opposite to results of other studies like those of Demirgüç-Kunt and Detragiache (1998a, 1998b) and Mehrez and Kaufmann (2000). This result seems, however, to be robust, since this variable is significant in 5 %, in the model delayed by a period. In the study of Rossi (1999) this variable is significant in 5 % and positive, suggesting that the crisis is more probable in developed countries. The author offers two arguments to support this result, even though it is opposite to other studies.

First it introduces the idea of Lindren, Garcia and Saal (1996), according to which banking crises can happen at any time and at different development stages, which implies that the economic development is not a good criterion to identify the countries which are relatively more disposes to banking fragility. Then, and it is the most important argument, Rossi (1999) studies only the case of developing countries. In these conditions the positive sign of the GDP per capita implies simply that the developing countries which are more developed, have financial markets better spread, and are therefore more exposed to banking crisis risks. Our study is also interested in the emergent countries only, so we can support Rossi's idea (1999). So the dimension of the banking system is directly linked to the development of the country and there can be a critical level, above which, the banking system becomes large enough to augment the risk of financial fragility.

In some specifications of the model the variable M2 in comparison with exchange rate reserves is positive and significant (in 5 % or 10 %). This result shows that the increase of this variable augments banking vulnerability. This result complies with those got by Demirgûç-Kunt and Detragiache (1998a, 1998b, 1999) and Eichengreen and Arteta (2000). Some authors use this variable to measure the escape of capitals. Therefore it can be said that the flight of capital augments the likelihood of

banking crises. This variable is among the most robust results of Eichengreen and Arteta (2000), which explains that banking crises are launched (among others) by a pressure on reserves (in comparison with the debt of the banking system, approximated by M2).

When we define the variable of liberalization of capitals by an indicatory variable (columns (2 and (4)), we find back the result got by Eichengreen and Arteta (2000). Indeed, like in our estimate the authors find that this variable is not significant and so becomes once we introduce the combined index of liberalization of interest rates and of capitals. Through this result, the authors support that the liberalization of capitals has effect only if it is combined with a liberalization of interest rates.

To prove the robustness of results all explicative variables (except liberalization indexes) were postponed by one year to eliminate the impact of the crisis on economic variables. The some variables can be changed after the starting of crisis, and as a result they represent no longer fundamental reasons for crises but their consequence.

Column (5) sums up all the results got with a delay of 1 year. Results show that the inflation rate, direct foreign investments, M2's relation in comparison with exchange rate reserves and the real credits are not significant any more.

The international rate of interest is now significant in 1 %, while in other specifications it was significant in 5 % or 10 %. So, it is possible to confirm the robustness of results for external commitments, claims on private sector, claims on central government and variables of liberalization. The other interesting result is the positive effect of the variation of the rates of international interests on the banking crisis which is confirmed with a risk of error in 1 %, this result was hidden by the effects of causality of crisis on economic variables.

Conclusion

The studies on financial stability help to go deeply into the debate on the consequences of deregulation. Since any economic growth is durable only with a stability of markets, the study on the stability of financial markets is necessary to determine the conditions necessary for the smooth running of deregulation and risk exposures.

The first studies on the causes of crises highlighted weaknesses in the economic fundamentals of the countries affected by crisis. The mainly concerns excessive short-term foreign loans contracted by the government and the private sector and the volatility of the short-term capital flows. The recent studies are more and more emphasizing the important role of the weakness of the national financial systems in the starting or strengthening of crises. Our empirical results confirm results got in previous studies where liberalization accentuates banking crises. This effect is amplified by the instability of the macroeconomic and financial environment which could be measured thanks to different variables. Therefore the significativity of these variables with the variables of liberalization highlights reasons of banking crises. Indeed, financial liberalization is translated by the cancellation of the ceilings of the real interest rates and a reduction of barriers at the entry. These phenomena lead to the fall of the frankness of banks, which encourages them into more risky behaviours. Caprio and Klingebiel (1997) showed among 86 episodes of insolvency of banks over

the period 1980-1994 that at least 30 introduce high levels standards of bank loans. These authors also show that macroeconomic and microeconomic factors result in systematic crises. Premature liberalization could be mentioned in practically all cases. But a successful liberalization, as in the case of Chile, can also cause crises if there is no good control of the financial system.

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Appendices

Table 3: Financial Liberalization and Banking Crises

	Systemic Crisis	Non Systemic Crisis	Liberalization of Interest Rates	Liberalization of Capital
Africa				

South Africa		1977 / 1985/1989	1980	1985
East Asia				
Indonesia	1997-2002	1994	1983	1971
Malaysia	1997- 2002	1985-88	1978-82/1991	1973-93/1996
Philippines	1981-87 / 1997-2002		1981	1992
Singapore		1982	1973	1978
South Korea	1997- 2002		1984-88/ 1991	1985
Thailand	1983-87 / 1997- 2002		1989	1997
Latin America				
Argentina	1980-82 / 1989-90 /1995-1997 / 2001-2002		1977-81/1987	1976-81/ 1991
Brazil	1990/ 1994-99		1976-78/1989	1990-94/1998
Chile	1976 / 1981-86		1974-81/1984	1979-82/1985
Colombia	1982-87		1980	1991-92/1998
Mexico	1981-91 / 1994-97		1989	1989
Peru	1983-90		1980-84 /1990	1991
Uruguay	1981-84 / 2002		1980[b]	1991
Venezuela	1994-97	1978-86	1981-83/89 /91-93/1996	1989-93/1996
Middle East				
Egypt	1980-85	1991-95	1991	1991
Morocco	Early years 1980		1996	1993
Israel	1977-83		1990	1977-78/1987
Jordan		1989-90	1988	2002
Tunisia		1991-95	1996	1993
Turkey	1982-85 /2000- 2002	1991/1994-95	1980-82 / 1988	1989
South Asia				

India		1993- 2002	1992	1994
Pakistan			1995	1994
Sri Lanka	1989-93		1980	1978

Sources : A.Demirguç-Kunt and E.Detragiache (1998), R.Glick and M. Hutchison (1999) and G. Caprio and D. Klingebiel (2003).

Table 4: Results of the classification (b, c) of the index of liberalization of capitals

		Allocation class for analysis 1	Allocation class foreseen envisaged (s)		Total
			0,00	1,00	
Original	Enrolment	0,00	700	0	700
		1,00	58	67	125
	%	0,00	100,0	0,0	100,0
		1,00	46,4	53,6	100,0
Crossed Validated (a)	Enrolment	0,00	700	0	700
		1,00	65	60	125
	%	0,00	100,0	0,0	100,0
		1,00	52,0	48,0	100,0

The crossed validation is performed only for the observations of the analysis. In crossed validation, each observation is classified by functions derived from all other observations.

b 93,0 % original observations classified correctly.

c 92,1 % crossed validated observations classified correctly.

The table above gives us enrolments and frequencies of the original groups (raw data) and calculated groups (result of AFD). This table is made up of two parts. The first part of classifications is the one called "original" and which gives rather optimistic results of the good classification. The estimate software provides us with crossed validated estimates which are not biased.

The differential function of the index of liberalization of capitals seems to have good classification results, with 93 % of original observations well classified and 92,1 % validated observations - junctions classified correctly. However, if the crossed-validated classification table is closed examined, we realise that these high rates are due to the good classification of cases of not liberalization (class 0) where 100 % cases are classified well. On the contrary for cases of liberalization (class 1) they find 52 % cases which are badly classified and attributed to the case of non liberalization.

Table 5: Results of the classification (b, c) of combined liberalization indication

		Allocation class for analysis 1	Allocation class envisaged (s)		Total
			0,00	1,00	
Original	Enrolment	0,00	320	0	320
		1,00	0	505	505
	%	0,00	100,0	0,0	100,0
		1,00	0,0	100,0	100,0
Crossed Validated (a)	Enrolment	0,00	309	11	320
		1,00	59	446	505
	%	0,00	96,6	3,4	100,0
		1,00	11,7	88,3	100,0

The crossed validation is performed only for the observations of the analysis. In crossed validation, each observation is classified by functions derived from all other observations.

b 100,0 % original observations classified correctly.

c 91,5 % crossed validated observations classified correctly.

The classification results seem to be very good with 100 % of original observations classified correctly and 91,5 % crossed validated observations well classified. The first part of the table shows us that 100 % of cases of non liberalization of capitals and of interest rates are classified well. Also 100 % of cases of liberalization are correctly classified. But these results are rather optimistic and it is the second part of the table that is going to give us enrolments as well as unbiased percentages. By looking closely at the classifications of crossed validated observations we found cases 11 (3,4 %) of non liberalization classified as cases of liberalization, which is negligible. On the contrary, 59 cases of liberalization are classified as cases of non liberalization, which corresponds to a 11,7 % rate, which remains after all a weak classification error ratio.

Table 6: Tests of equality of the group averages for combined liberalization index

	Lambda from Wilks	FR	ddl1	ddl2	Signification
TE	0,947	1,112	1	20	0,304
TMM	0,967	0,677	1	20	0,420
TCRE	0,822	4,330	1	20	0,051
TDEP	0,920	1,739	1	20	0,202
FDI_KS_E	0,950	1,060	1	20	0,316
FDI_TR_E	0,957	0,900	1	20	0,354

IP_E	0,989	0,227	1	20	0,639
MON_A	1,000	0,000	1	20	0,988
PRAP_LT_E	0,980	0,412	1	20	0,528
PRBQ_CT_E	0,997	0,051	1	20	0,824
PR_LT_E	0,998	0,040	1	20	0,844
PR_CT_E	0,973	0,549	1	20	0,467
MON_E	0,992	0,164	1	20	0,690
ENG_CT	0,997	0,054	1	20	0,818
RSV_DTS	0,990	0,206	1	20	0,655
RSV_DEV	0,974	0,529	1	20	0,475

Table 7: Coefficients of canonical differential functions standardised for combined liberalization index

	Function
	1
TE	2,780
TMM	-3,731
TCRE	17,612
TDEP	-19,166

FDI_KS_E	6,960
FDI_TR_E	-3,985
IP_E	-0,894
MON_A	3,007
PRAP_LT_E	-1,789
PRBQ_CT_E	0,732
PR_LT_E	-0,763
PR_CT_E	-2,579
MON_E	-1,964
ENG_CT	2,818
RSV_DTS	0,347
RSV_DEV	1,747