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Financial Liberalization and Banking Crisis in CEMAC Countries

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Abstract: *Since the outbreak of the subprime crisis in the United States in 2007, the reconsideration of the financial instability hypothesis (Gertler and Karadi, 2011) has reoriented the debates on the link between financial liberalization and the banking crisis in both advanced and developing economies (Ben Gamra and Plihon, 2008 and Levieuge, 2009).*

The purpose of this article is to verify whether financial liberalization is indeed at the origin of the banking crisis that has hit the member countries of the Economic and Monetary Community of Central Africa (CEMAC). It also suggests that financial stability could be addressed through the implementation of a macroprudential framework, on the one hand, and the reduction of credit procyclicality and risk-taking by banks, on the other.

Keywords*: Financial Liberalization, Banking Crising, macro-prudential, Financial Stability, Procyclicality.*

Résumé
Depuis le déclenchement de la crise des subprimes aux Etats-Unis en 2007, la reconsidération de l'hypothèse d'instabilité financière (Gertler et Karadi, 2011) a réorienté les débats relatifs au lien entre libéralisation financière et crise bancaire aussi bien dans les économies avancées que dans celles en développement (Ben Gamra et Plihon, 2008 et Levieuge, 2009).

L'objet du présent article est alors de vérifier si la libéralisation financière est effectivement à l'origine de la crise bancaire qui frappe les pays membres de la Communauté Economique et Monétaire de l'Afrique Centrale (CEMAC). Aussi, la stabilité financière pourrait-elle la résorber grâce à la mise en place d'un dispositif macroprudentiel, d'une part, et à la réduction de la procyclicité du crédit et de la prise de risque des banques, d'autre part.

Mots clés :
Libéralisation financière, politique macroprudentielle, stabilité financière, procyclicité.

Code Jel : F32, F37, F41

I. Introduction

Since the outbreak of the subprime crisis in the United States in 2007, the reconsideration of the financial instability hypothesis (Galbraith,1993 and Gertler and Karadi, 2011; Schularick and Taylor, 2012 and Sapir, 2014) has reoriented the debates on the link between financial liberalization and banking crises in both advanced and developing economies (Ben Gamra and Plihon, 2008 and Levieuge, 2009).

Thus, on the theoretical level, the literature on the link between financial liberalization and banking crises generally revolves around two approaches:
1°) the macroeconomic (or even institutional) approach, for which banking crises are the consequence of inappropriate institutional preconditions of financial liberalization (Demirguç-Kunt and Detragiache, 1998 and Chebbi, 2005);
2°) the microeconomic approach, according to which banking crises are the result of the increasing vulnerability of banks in a context of financial liberalization (Plihon and Miotti, 2001).

The first approach comprises two groups of works. The first considers information asymmetries and transaction costs as the basis of the banking crisis. It identifies the systemic banking crisis resulting from financial market failures, and is in line with the analyses of Minsky (1986). The second deals with the inefficiency of banking governance in an environment of intense international competition and ineffective macroprudential policy. Banking competition is much more about rate spreads, especially between lending and deposit rates, and not

about bank fees, to the point where bank profits are now linked to financial intermediation activity (Horiuchi, 2000; Daniel and Jones, 2006; Shehzad and De Haan, 2009).

The second approach starts from the observation that banks, by practicing credit rationing (Stiglitz and Weiss, 1981) to guarantee their profit margin, tend to take excessive risk. In such a case, banking crises are the result of a vulnerable banking sector in a newly liberalized environment with foreign competition (Demirguç-Kunt and Detragiache, 1998; Hellmann et al., 2000).

Empirically, the results of the main studies (Eichengreen and Rose, 1998; Demirgüç-Kunt et al., 2008; Rancière and Tornell, 2011) show that financial liberalization is indeed the cause of banking crises. Two types of approaches testify to this:
1°) the one that proceeds from the determination of a warning indicator of banking crises (Kaminsky and Reinhart, 1999; Hardy, Pazarbasioglu, 1998);
2°) that which analyses the determinants of banking crises (Eichengreen and Rose, 1998; Kaufmann and Mehrez, 2000) and which we favour in the present work.

In fact, the results of both theoretical and empirical work are based on the degree of financial liberalization, the prioritization of financial reforms and the pace of their implementation (Jonston et al., 1997; Angkinand et al., 2007 and Fowowe, 2010). The question of the link between financial liberalization and the banking crisis thus seems more topical than ever.

In this respect, the purpose of this paper is to verify whether financial liberalization is indeed at the origin of the banking crisis that is affecting the member countries of the Central African Economic and Monetary Community (CEMAC), our field of investigation. There are at least three reasons for this concern:
1°) CEMAC countries have adopted policies to liberalize their financial systems since the late 1980s;
2°) the CEMAC zone is essentially composed of debt economies, which explains the preponderance of the sector;
3°) the prudential regulations drawn up by the Banking Commission of Central Africa (COBAC) combine the quantitative and qualitative dimensions of internal control of credit institutions as stipulated in COBAC Regulation R-2016/04 on internal control of credit institutions (1).

The quantitative dimension encompasses solvency and liquidity standards. The solvency standards consist of five ratios and are based on the Basel Committee's concept of capital: core capital and supplementary capital, which are integrated only up to the amount of the core capital. The liquidity standards are limited to two ratios: the liquidity ratio and the long-term transformation ratio.

As for the qualitative dimension, it essentially relates to the governance of credit institutions through three main roles:
- guaranteeing the confidence of operators, investors and savers
- improving the performance of the various institutions;
- ensuring the stability of the banking system (COBAC, 2016).

Although the provisions of the prudential regulations developed by COBAC are in line with the new recommendations of the Basel Committee (Basel III Accords), their application is ineffective due to the persistence of gaps in the internal control of credit institutions.

We would therefore like to show, in the following developments, that financial liberalization is a source of banking crisis in the CEMAC countries (I), and that financial stability remains the main means of resolving it (II).

I- Financial liberalization as a source of banking crisis in CEMAC countries

We use a model that we would like to present first, before proceeding to its estimation.

1.1- The model's structure

The preferred theoretical framework is the New Keynesian economy augmented by the credit market, which allows for a better integration of financial frictions induced by the behavior of secondary banks (Curdia and Woodford, 2010, 2016; Gertler and Kiyotaki, 2010, 2015 and Carré et al., 2015) (2).

We take the model of Daniel and Jones (2007) as a reference in order to test whether financial liberalization is the cause of the emergence of banking crises, due to the tendency for excessive risk-taking by secondary banks imposed by the current financial globalization.

The Daniel and Jones (2007) model is based on the leverage mechanism, which is written as follows:

$$\frac{\partial V_t}{\partial Q_t} = \sum_{j=0}^{\infty} \left(\frac{1}{\bar{\omega}}\right)^j \mathrm{E}\left[\left(\frac{\Psi_{t+j}}{Q_{t+j}-d_{t+j}}\right)\frac{\partial V_{t+j}}{\partial \Psi_{t+j}} \middle| a_{t+j} > a_{t+j}^{min}, \mathrm{I}_t\right], \qquad [1]$$

with : $\frac{\partial V_t}{\partial Q_t}$, the net worth of the domestic bank ; $\bar{\omega}$, the discount premium consistent with a net worth of the bank that does not accumulate indefinitely ; a_{t+j}^{min} , the minimum value of the firm's productivity consistent with the bank's solvency ; a_{t+j} , the value of the firm's productivity on which the bank's net worth depends ; $\frac{\partial V_t}{\partial \Psi_t}$, the bank's marginal return on leverage ; Ψ_{t+j} , the bank's leverage ratio ; $\left(Q_{t+j} - d_{t+j}\right)$, the value of domestic and foreign household deposits after dividends.

The leverage mechanism, which reflects the trade-off between the bank's equity and leverage ratio, leads to two conditions:
1°) if $\frac{\partial V_t}{\partial \Psi_t} = 0$, the bank's profit is zero, which explains its indifference to risk ;
2°) if $\frac{\partial V_t}{\partial \Psi_t} \neq 0$, two sub-conditions can be highlighted:
- if the level of equity is low, the bank can only distribute dividends;
- if the level of equity is high, the bank can reduce its debt ratio by limiting the distribution of dividends.

In this benchmark model, we include a vector of determinants other than financial liberalization, which allows us to consider that the banking crisis in the CEMAC is a systemic crisis.

The explained variable is then the banking crisis indicator (icb) (3), which we approximate by the banking sector fragility index (4) (IMF, 2008). Such an indicator is an aggregation of several components (bank deposits, bank credits to the private sector and the external exposure of domestic banks) (Kibritcioglu, 2002) whose fluctuations are at the origin of banking crises.

The explanatory variables are:
- Financial liberalization (lb) which we assess from an indicator of two types of indicators:
1°) the degree of restriction on the capital account (Chinn and Ito, 2005), which has the advantage of taking into account the intensity of such restrictions and not their existence (5);
2) the degree of stock market liberalization, i.e. the degree of restrictions imposed on the stock market (Komulainen and Lukkarila, 2003; Neumann and Penl, 2008).

The vector of other determinants of the banking crisis includes mainly: inflation $(infl)$, which we retain as a proxy to capture the stability of the economy ; economic growth (y), which we take into account in order to incorporate concerns about macroeconomic stability ; internal credit in the banking sector $(cisb)$; reserves (rs) ; government spending$(dpub)$.

All these variables are likely to cause a banking crisis in the CEMAC zone.
The model we choose has the following functional form:

$$icb = f(lb, x), \qquad [2]$$

with : icb, the banking crisis index; lb, the financial liberalization index; $x(infl, y, cisb, rs, dpub)$ the vector of other determinants of the banking crisis.

The model for estimation purposes is as follows:

$$icb_t = \beta_0 + \beta_{lb} lb_t + \beta_x x_t + \varepsilon_t, \qquad [3]$$

with : icb_t, the index of banking crises in the period t ; lb_t, financial liberalization in the period t; x_t, the vector of other determinants in the period t; β_{lb}, the parameter associated with financial liberalization; β_x, the vector of coefficients associated with the other determinants (β_{infl}, the coefficient associated with inflation; β_y, the coefficient associated with economic growth; β_{rs} , the coefficient associated with reserves and β_{dpub}, the coefficient associated with government spending); β_0, the constant; ε_t , the error term in the period t .

The sign of the coefficient on financial liberalization can be positive ($\beta_{lb} > 0$) or negative ($\beta_{lb} < 0$). A positive and significant coefficient indicates that financial liberalization is a determinant of the banking crisis. On the other hand, a negative coefficient means that financial liberalization is not a source of banking crisis. The signs of the other determinants of the banking crisis(β_x) can also be positive or negative.

We can now proceed to estimate the model.

1.2- Model estimation

The model is estimated on the basis of a working hypothesis: financial liberalization amplifies the tendency for banks to take excessive risk, which is the cause of the banking crisis in the CEMAC zone.

The data used for the estimation are annual. They come from financial statistics published by the International Monetary Fund (IMF). The analysis period extends from 1980 to 2013, for at least two reasons:
- the period chosen makes it possible to assess the effects of the financial liberalization that began in the early 1990s in the CEMAC zone ;
- it shows the limited effectiveness of microprudential regulation as a basis for macroprudential regulation in the CEMAC zone (Kamgna et al. 2009).

In order to analyze the dynamics (individual and collective) of the variables in the model, we first performed the unit root test to determine the order of integration of the different variables. The results obtained (Appendix 1), using the Augmented Dickey-Fuller (ADF) test, indicate that all the variables in the model are integrated of order one (I(1)), in other words stationary in first difference.

The one-step method of Johansen (1988) can therefore be used to conduct the cointegration test and then resort to the error correction model (ECM). The Johansen (1988) cointegration test confirms the existence of a long period relationship between the variables in the model (Appendix 2), allowing the use of the error correction model for its estimation.

The estimation results indicate that the recall force for each country is negative and significant at the 5 per cent level, which shows that the representation of the error-correction model is satisfactory. They also show that, in the short run (Table 1 in Appendix 4), the banking crisis is not caused by financial liberalization, as the financial liberalization variable does not have a statistically significant effect on the banking crisis index in all member countries.

On the other hand, they reveal a contrasting situation for the other determinants of the banking crisis. Two cases can be distinguished in this respect:
1) in the first case, the banking crisis is caused mainly by inflation in two member countries (Cameroon and Congo). Inflation has a statistically significant negative impact for Cameroon (-0.045), on the one hand, and a positive impact for Congo (0.0056), on the other hand, on the explained variable, namely the banking crisis index;
2) in the second case, the banking crisis is not explained by any of the other determinants (economic growth, government spending, domestic credit to the banking sector and reserves). All variables show coefficients that are not statistically significant considering their respective values of the individual significance test (t-Student).

In the long run (Table 2 in Annex 4), financial liberalization is at the root of the banking crisis in some CEMAC countries, notably Cameroon and Equatorial Guinea. In Cameroon, financial liberalization has a positive and significant impact on the banking crisis index. Considering that the absolute value of the recall force for this country is the lowest, it is possible to deduce that the transmission time for financial liberalization to lead to a banking crisis in Cameroon is the shortest, even if it is still more than one year. As for Equatorial Guinea, the negative sign of the coefficient on financial liberalization reveals the existence of rigidities in the financial

liberalization process, which translates into a longer transmission time given the absolute value of the force of recall.
Other determinants are also a source of banking crises in the CEMAC zone. Macroeconomic determinants are at the root of the banking crisis in three countries:
1°) in Cameroon, where government spending and the rate of economic growth act with a negative and significant effect, while inflation acts positively on the banking crisis index;
2) in Congo, where public spending and the economic growth rate have a positive effect on the banking crisis index, while inflation has a negative effect
3) in the Central African Republic, where economic growth has a positive and significant effect on the banking crisis.

Institutional determinants are at the origin of the banking crisis in two countries:
1°) in Equatorial Guinea where the ratio of liquid reserves to bank assets has a positive effect on the banking crisis index;
2°) in Congo and the Central African Republic with domestic credit provided by the banking sector.

We can now turn to the interpretation of the results.

II. Financial stability as a means of resolving the banking crisis in the CEMAC countries

The results of the model estimation suggest that financial stability could resolve the banking crisis in CEMAC countries, thanks to the implementation of a macroprudential system, on the one hand, and the reduction of credit procyclicality and risk-taking by banks, on the other.

2.1- The need for a macroprudential system

The prudential system includes a set of prudential rules, as well as methods for supervising credit institutions, the development and implementation of which are consistent with the international harmonization movement driven by the work of the Basel Committee (6) (Hanson, Kashyap and Stein, 2011).
Prior to the onset of the 2008 financial crisis and the subsequent international transmission of financial instability, prudential regulation focused primarily on individual institutions with the goal of limiting the damage caused by the failure of a single troubled institution (7) (Goodhart, 2008, 2014; Danielsson, 2013; Borio, 2014 and Barth and Wihlborg, 2016).

The need for a macroprudential framework within CEMAC can be assessed from two angles:
1°) that relating to the number of breaches observed in banks ;
2°) that which focuses on the risks incurred by the banking sector.

With regard to the violations observed, we are particularly interested in the way in which the banks comply with the standards of the prudential regulations in force. The graph in Annex 5 illustrates this from 2008 to 2012. It shows that the liquidity ratio is the prudential standard consistently met by the largest number of banks operating in the CEMAC with an average compliance rate of 91.4 percent, followed by minimum capital and risk coverage (89.9 percent).

On the other hand, the standard relating to the limitation of risks incurred on the same beneficiary reveals a large number of banks in violation, with an average compliance rate of 64.6%, followed by commitments on related parties with an average rate of 79.7 %. It appears that the number of credit institutions in difficulty has increased steadily from 2008 to 2014 (8), due to excessive risk-taking that is straining the capital of these institutions and contributing to the fragility of the banking system as a whole.

However, the internal control system is often deficient in most credit institutions (9) in the CEMAC countries, whose commitments are essentially unproductive due to the absence of rigorous analysis prior to risk-taking (10). Banks' non-compliance with current prudential regulations, particularly those relating to their commitments, can be considered a source of destabilization of the CEMAC financial system, since it exposes them to various risks, the most representative of which are compliance risk and operational risks (credit, liquidity and reputation risk and systemic risk) (COBAC, 2017).

As for the risks incurred by the banking sector, a macroprudential mechanism is made necessary by the analysis of their weight in terms of the importance of banks with respect to prudential standards, on the one hand, and the

risk of destabilization of the banking sector as a whole, on the other. The importance of offending banks in the CEMAC has been increasing since the 2010s. The table in Annex 6 shows the evolution of the balance sheet of credit institutions from 2008 to 2012.

However, the overall trend masks disparities between member countries, as three countries (Cameroon, Gabon and Equatorial Guinea) have the highest rates. In Cameroon, five banks are in violation of this standard, with a balance sheet total of CFAF 849.3 billion, representing 25.94 percent of the cumulative situation of the Cameroonian banking system and 7.95 percent of the aggregate balance sheet of CEMAC banks. In Gabon, the balance sheet total of the four banks that do not comply with the standard relating to their commitments is CFAF 908.2 billion, representing 34.87 percent of the total assets of Gabonese banks and 8.50 percent of the aggregate balance sheet of the CEMAC.

Finally, in Equatorial Guinea, two banks do not meet this standard. Their balance sheet total amounts to 675.4 billion CFA francs, representing 33.7 percent and 6.32 percent of the total balance sheet of Equatorial Guinean and CEMAC banks respectively.

In addition, the 13 offending banks in 2012 granted about CFAF 1,167.5 billion, or 21.52 percent of the total volume of credit granted by the CEMAC banking system. The significant weight of the banks involved from 2008 to 2012 suggests risks to customer deposits in a context of systemic financial fragility, i.e., in the event of a deterioration in their financial situation and a drying up of bank liquidity in the event of non-repayment of loans granted.

Overall, the limitations of prudential governance suggest that they stem from different sources, the combination of which could increase the systemic nature of the banking crisis in the CEMAC countries.

A prudential system that is essentially oriented toward the internal control of credit institutions, as is currently the case in CEMAC countries, does not seem relevant in an environment where systemic risk is prevalent. It therefore appears necessary to complement it with a macroprudential dimension, which can be explained for at least two reasons:
1°) following the Basel III Committee, the renewal of prudential regulation could make it possible to limit the systemic importance of certain credit institutions by capping their size or restricting the range of their operations (Tucker, 2014; Couppey-Soubeyran and Dehmej, 2017). The overall growing trend of locally-owned banks in the CEMAC banking system could thus be better controlled ;
2°) the need to mitigate the sources of financial instability, as it could thus address both the imperfections of the financial system and, above all, the transmission channels of liquidity or solvency shocks. This is all the more true given that the tendency of banks to take excessive risks in CEMAC countries is based, as we have shown above, on a considerable volume of nonperforming loans.

2.2- The need to reduce credit procyclicality and bank risk-taking

The need to reduce the procyclicality (11) of credit and risk-taking by banks amounts to a search for greater independence of the financial systems of CEMAC countries. More specifically, it is a question of optimal management of the interactions necessary in a context of renewed prudential governance in line with the regulatory requirements of the Basel III Committee (Pollin, 2009). It thus appears that prudential standards carry within them the seeds of procyclicality. In other words, the correlation between phases of the financial cycle and those of the economic cycle resulting from the adoption of the prudential standards in force.
Such a need could be assessed through the procyclicality of prudential standards, on the one hand, and the conformity of national prudential regulations with the international standards enacted by the Basel Committee (the Basel III Accords), on the other. The procyclicality of prudential standards results from the use of the solvency ratio in the phases of the economic cycle and the role of the rating agencies.
Such procyclicality is evident in the different phases of the economic cycle. During a recession, prudential standards are pro-cyclical because the weights applied to liabilities, based on the risks incurred by credit institutions, increase and contribute to the increase in capital requirements. In order to comply with the prudential standards in force, banks are forced to reduce the volume of loans distributed.
In times of expansion, on the other hand, the reduction in risk encourages banks to lend more, which can have the effect of fuelling speculative bubbles. Prudential standards then accentuate the economic cycle, both in periods of recession and growth. In the CEMAC, compliance with the solvency ratio (prudential standard), approximated by the risk coverage ratio, is presented at both the aggregate and specific levels.
At the aggregate level, 39 banks had a risk coverage ratio greater than or equal to the minimum of 8 percent in 2014 (compared to 41 banks in 2013). By country, the risk coverage ratio is greater than or equal to the

minimum of 8 percent in Cameroon (8 banks), Central African Republic (4 banks), Congo (9 banks), Gabon (8 banks), Equatorial Guinea (3 banks) and Chad (7 banks).
In total, the majority of banks in CEMAC countries complied with the prudential standard in force, particularly that relating to solvency during the period 2008-2013 (Annex 7), which reveals the extent of their risk aversion, which compels them to take out credit.
As for the procyclicality of prudential standards, it stems from the central role of rating models (12), which lead investors to consider derivatives as homogeneous. This increases the procyclicality of the financial system, which overreacts to changes in the economy (13). Given that rating agencies are criticized because of conflicts of interest due to the coexistence of rating and advisory activities (de Grauwe, 2008), only the guarantee of greater independence of the banking system in CEMAC countries can reduce the procyclicality of credit and risk-taking by banks through: the introduction of macroeconomic dynamics to assess credit risk ; the introduction of regulatory capital requirements in response to the cyclical nature of the economy ; the determination of risk provisions with reference to the entire cycle and the imposition of safety margins on the value of collateral, etc.

All of these orientations would certainly make it possible to significantly reduce the procyclicality of the financial system, in particular that due to prudential standards in times of depression, on the one hand, and that due to rating agencies, on the other.

III. Conclusion

The above discussion has revealed a mixed picture overall. The short-term results show that financial liberalization does not cause banking crises in CEMAC countries. In the long run, however, financial liberalization does cause banking crises in Cameroon and Equatorial Guinea. However, the transmission for financial liberalization to lead to banking crisis is asymmetric between these two countries.

It appears that other determinants are at the origin of the banking crisis, thus confirming its systemic nature. Therefore, in order to resolve the crisis, it seems appropriate to improve financial stability through the implementation of a macroprudential framework, on the one hand, and the reduction of credit procyclicality and risk-taking by banks, on the other.

The adoption of a macroprudential framework would complement the current prudential governance, which is essentially oriented towards the internal control of banks. Reducing credit procyclicality and risk-taking by banks would better ensure the independence of the financial system even in such an environment of high uncertainty.

Notes
(1) In particular articles 1, 2, 3, 4, 5 and 8 of the said regulation.
(2) However, the fact that the New Keynesian Economics uses DSGE models has been widely criticized. The main one is that these models incorporate a closed-economy banking sector, which does not allow for a better consideration of the effects of full financial liberalization. However, such criticisms do not call into question the advantages of a DSGE model (especially with financial frictions), which is still the most relevant framework for analyzing the effectiveness of economic policy.
(3) The banking crisis index (Kibritcioglu, 2002), is obtained from the following formula:

$$ICB_t = \frac{\left(\frac{DB_t - \mu_{db}}{\sigma_{db}}\right) + \left(\frac{CBSP_t - \mu_{cbsp}}{\sigma_{cbsp}}\right) + \left(\frac{EEB_t - \mu_{eeb}}{\sigma_{eeb}}\right)}{3},$$

with:
icb, the bank crisis index in t;
DB_t, the annual change in bank deposits in t ;
$CBSP_t$, the annual change in bank credit to the private sector in t :
EEB_t, the annual change in external liabilities of domestic banks in t;
μ_{db}, μ_{cbsp} and μ_{eeb}, the respective average of bank deposits; bank credits to the private sector and external liabilities of domestic banks;
σ_{db},σ_{cbsp} and σ_{eeb}, the standard deviation of bank deposits; bank credits to the private sector and external liabilities of domestic banks, respectively.
(4) Most of the analysis (Eichengreen and Rose, 1998; Kaminsky and Reinhart, 1999; Kaufmann and Mehrez, 2000; Kibritcioglu, 2002; Ben Gamra and Plihon, 2008) of banking crises focuses on identifying and describing

crises after their occurrence. They use the following binary indicators: ICB= 0 reflecting the absence of a banking crisis; ICB=1 corresponding to the appearance of a banking crisis.
(5) Constructed essentially by the principal component analysis method, this indicator ranges from -1.7 to 2.6. The higher its value, the more liberalized the capital account of the country concerned is.
(6) The Bale regulation aims to prevent bank failures by imposing a minimum level of capital to cover risks.
(7) Two major developments then occurred in the conduct of microprudential policy, namely the first generation microprudential framework and the second generation microprudential framework.
The first-generation microprudential system corresponds to the first Basel agreement (1988), which defines a solvency ratio, known as the "Cooke ratio". However, this agreement was quickly judged to be insufficient, due to:
1°) its too narrow conception of banking risks, since it is limited to credit risk alone;
2°) the limits of its risk measurement;
3°) the failure to take into account risk reduction techniques, making the weighting grid rigid.
The second-generation microprudential system corresponds to the second Bale agreement (2004), which integrates the previous shortcomings. This new system led to the introduction of a ratio, known as the "McDonough ratio", reflecting the risk actually incurred by banks, while encouraging them to strengthen their risk management procedures.
(8) According to COBAC's rating system (SYSCO), about 15.2 percent of the total balance sheets of CEMAC banks were in unsatisfactory situations as of December 31, 2014, compared to the situation as of December 31, 2013 (7 banks in a fragile financial situation and 5 banks in a critical financial situation) (COBAC, 2013, 2014).
(9) Indeed, the weight of the main promoters in locally-owned banks and their interference in bank governance contribute to directing the commitments of these institutions in their favor as well as to persons and entities related to them without the signing of an agreement or without the agreement of the authorized bodies of the credit institution and the identity of the true final beneficiaries of such commitments is often concealed, as they participate in the decision-making.
(10) These loans are generally granted on non-market terms, without any analysis of the beneficiary's financial situation and without any real guarantees being taken. In most cases, they are not subject to the internal procedures for granting credit, where they exist.
(11) Two types of procyclicality can then be distinguished:
1°) endogenous procyclicality, which corresponds to the link between the supply of credit and the solvency of financial agents induced by the requirement of guarantees by banks;
2°) exogenous procyclicality, which characterizes the mechanism of amplification of fluctuations in financial and economic cycles generated by banking and prudential regulations.
Procyclicality can thus be understood as a causality or correlation between financial and economic cycles. It can be observed in particular in the phase of economic slowdown (recession) as well as in the phase of strong growth (expansion).
(12) The role of rating agencies is central, regardless of the approach used to measure risk:
- in the "standard approach" of Pillar 1 of Basel II, the ratings established by the agencies determine the weighting coefficients applied to assets;
- In the internal model approaches of banks, the rating agencies also play an important role, since the ratings they produce are inevitably taken into account.
(13) "While the rating indicates the average risk level of a security, it does not incorporate the dispersion of risk around its average". (Senat, 2009).
(14) Rather than gradually adjusting their ratings, the agencies tended to lower their ratings very quickly in response to the subprime crisis, which was an additional destabilizing phenomenon, with an immediate impact on both the liquidity and solvency of participants.

Appendices :

Appendix 1: Unit root tests (ADF)

	icb	*lb*	*y*	inf *l*	*dpub*	*cisb*	*rs*
Cameroun	I(1)	I(1)	I(1)	I(1)	I(1)	-	-
Centrafrique	I(1)	I(1)	I(1)	-	-	I(1)	-
Congo	I(1)	I(1)	I(1)	I(1)	I(1)	I(1)	-
Guinée Equatoriale	I(1)	I(1)	-	-	-	I(1)	I(1)

Appendix 2: Cointegration tests

a) Cameroun

Date: 08/18/14 Time: 17:55					
Sample: 1980 2013					
Included observations: 32					
Series: ICB LB DPUB INFL Y					
Lags interval: 1 to 1					
Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	1	1	2	1	2
Max-Eig	1	1	1	1	1

b) Centrafrique

Date: 08/18/14 Time: 18:50					
Sample: 1980 2013					
Included observations: 32					
Series: ICB LB CISB Y					
Lags interval: 1 to 1					
Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	0	1	1	0	1
Max-Eig	0	1	1	1	1

c) Congo

Date: 08/18/14 Time: 18:36					
Sample: 1980 2013					
Included observations: 32					
Series: ICB LB DPUB INFL Y CISB					
Lags interval: 1 to 1					
Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	1	1	1	1	1
Max-Eig	1	2	2	1	1

d) Guinée Equatoriale

Date: 08/19/14 Time: 10:53					
Sample: 1980 2013					
Included observations: 32					
Series: ICB LB RS CISB					
Lags interval: 1 to 1					
Selected (0.05 level*) Number of Cointegrating Relations by Model					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	1	0	1	1	2
Max-Eig	1	0	0	0	0

Appendix 3: Results of the error correction model

a) Cameroun

Vector Error Correction Estimates					
Date: 08/18/14 Time: 17:57					
Sample (adjusted): 1982 2013					
Included observations: 32 after adjustments					
Standard errors in ( ) & t-statistics in [ ]					
Cointegrating Eq:	CointEq1				
ICB(-1)	1.000000				

LB(-1)	-1.208025				
	(0.32907)				
	[-3.67104]				
DPUB(-1)	0.559094				
	(0.19411)				
	[2.88030]				
INFL(-1)	-0.263149				
	(0.05395)				
	[-4.87799]				
Y(-1)	0.424765				
	(0.06458)				
	[6.57694]				
C	-5.682365				
Error Correction:	D(ICB)	D(LB)	D(DPUB)	D(INFL)	D(Y)
CointEq1	-0.117561	0.032381	-0.182224	0.924098	-1.291403
	(0.04993)	(0.03879)	(0.21504)	(0.68723)	(0.34107)
	[-2.35441]	[0.83484]	[-0.84739]	[1.34468]	[-3.78635]
D(ICB(-1))	-0.040872	0.004806	-0.318532	-4.931980	-1.035110
	(0.17157)	(0.13327)	(0.73891)	(2.36140)	(1.17195)
	[-0.23822]	[0.03606]	[-0.43109]	[-2.0885]	[-0.88324]

	]	]	]	8]	
D(LB(-1))	-0.038813	-0.049303	0.159914	1.975513	-0.178645
	(0.25032)	(0.19444)	(1.07804)	(3.44521)	(1.70984)
	[-0.15505]	[-0.25356]	[0.14834]	[0.57341]	[-0.10448]
D(DPUB(-1))	0.043290	0.009246	0.250377	-0.403367	0.222985
	(0.05498)	(0.04270)	(0.23676)	(0.75665)	(0.37552)
	[0.78743]	[0.21651]	[1.05749]	[-0.53310]	[0.59380]
D(INFL(-1))	-0.045918	0.010696	-0.115225	-0.116218	-0.070115
	(0.01584)	(0.01230)	(0.06820)	(0.21794)	(0.10816)
	[-2.89973]	[0.86959]	[-1.68959]	[-0.53325]	[-0.64823]
D(Y(-1))	-0.000164	-0.002225	0.020584	-0.157777	-0.098290
	(0.01490)	(0.01157)	(0.06416)	(0.20503)	(0.10176)
	[-0.01100]	[-0.19225]	[0.32085]	[-0.76954]	[-0.96595]
C	-0.015148	0.070152	-0.078418	-0.358482	-0.437403
	(0.06265)	(0.04867)	(0.26981)	(0.86227)	(0.42794)
	[-0.24178]	[1.44152]	[-0.29064]	[-0.41574]	[-1.02211]
R-squared	0.272896	0.064056	0.133362	0.268759	0.559079
Adj. R-squared	0.098391	-0.160571	-0.074631	0.093261	0.453258
Sum sq. resids	2.908415	1.754895	53.94303	550.9255	135.6985
S.E. equation	0.341082	0.264945	1.468918	4.694361	2.329794
F-statistic	1.563831	0.285167	0.641183	1.531406	5.283243

Log likelihood	-7.035992	1.047197	-53.76112	-90.93985	-68.52122
Akaike AIC	0.877249	0.372050	3.797570	6.121241	4.720076
Schwarz SC	1.197879	0.692680	4.118199	6.441871	5.040706
Mean dependent	0.000000	0.062500	-0.020000	-0.223125	-0.442187
S.D. dependent	0.359211	0.245935	1.416994	4.929867	3.150838
Determinant resid covariance (dof adj.)		1.369918			
Determinant resid covariance		0.398699			
Log likelihood		-212.3174			
Akaike information criterion		15.76984			
Schwarz criterion		17.60201			

b) Centrafrique

Vector Error Correction Estimates				
Date: 08/18/14 Time: 18:51				
Sample (adjusted): 1982 2013				
Included observations: 32 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
ICB(-1)	1.000000			
LB(-1)	-0.012838			
	(0.06347)			
	[-0.20227]			
CISB(-1)	0.034882			
	(0.01039)			
	[3.35821]			
Y(-1)	-0.060411			
	(0.01522)			
	[-3.96922]			
C	-0.538772			

Error Correction:	D(ICB)	D(LB)	D(CISB)	D(Y)
CointEq1	-0.525980	-0.137600	-2.755444	10.31816
	(0.16603)	(0.19032)	(1.88564)	(3.31978)
	[-3.16803]	[-0.72299]	[-1.46128]	[3.10808]
D(ICB(-1))	0.252772	0.102155	0.479846	-10.48206
	(0.17213)	(0.19732)	(1.95499)	(3.44188)
	[1.46846]	[0.51771]	[0.24545]	[-3.04544]
D(LB(-1))	-0.040103	-0.077568	1.227473	1.869328
	(0.16522)	(0.18939)	(1.87643)	(3.30357)
	[-0.24273]	[-0.40956]	[0.65415]	[0.56585]
D(CISB(-1))	0.026202	0.036410	0.056069	0.501955
	(0.02265)	(0.02597)	(0.25726)	(0.45292)
	[1.15676]	[1.40225]	[0.21795]	[1.10826]
D(Y(-1))	-0.003677	0.002158	-0.136671	-0.240303
	(0.00828)	(0.00949)	(0.09407)	(0.16562)
	[-0.44397]	[0.22730]	[-1.45281]	[-1.45092]
C	0.000986	0.063288	-0.272039	0.022649
	(0.04089)	(0.04687)	(0.46437)	(0.81755)
	[0.02411]	[1.35031]	[-0.58583]	[0.02770]
R-squared	0.355266	0.0963	0.1193	0.6038

		03	41	86
Adj. R-squared	0.231278	-0.077485	-0.050017	0.527710
Sum sq. resids	1.289468	1.694431	166.3295	515.5503
S.E. equation	0.222699	0.255285	2.529286	4.452961
F-statistic	2.865339	0.554143	0.704668	7.927528
Log likelihood	5.978060	-1.608185	-71.77779	-89.87802
Akaike AIC	0.001371	0.274488	4.861112	5.992376
Schwarz SC	0.276197	0.549314	5.135937	6.267202
Mean dependent	0.000000	-0.062500	-0.226563	0.123125
S.D. dependent	0.254000	0.245935	2.468311	6.479545
Determinant resid covariance (dof adj.)		0.300225		
Determinant resid covariance		0.130840		
Log likelihood		-149.0837		
Akaike information criterion		11.06773		
Schwarz criterion		12.35025		

c) Congo

Vector Error Correction Estimates						
Date: 08/18/14 Time: 18:37						
Sample (adjusted): 1982 2013						
Included observations: 32 after adjustments						
Standard errors in ( ) & t-statistics in [ ]						
Cointegrating Eq:	CointEq1					
ICB(-1)	1.000000					
LB(-1)	0.4209					

	95					
	(0.22291)					
	[1.88865]					
DPUB(-1)	-0.092747					
	(0.02301)					
	[-4.03027]					
INFL(-1)	0.046252					
	(0.00843)					
	[5.48883]					
Y(-1)	-0.024243					
	(0.01209)					
	[-2.00468]					
CISB(-1)	0.036876					
	(0.01360)					
	[2.71111]					
C	0.518880					
Error Correction:	D(ICB)	D(LB)	D(DPUB)	D(INFL)	D(Y)	D(CISB)
CointEq1	-0.246724	-0.005689	1.068046	-25.49295	0.010033	3.446926
	(0.09238)	(0.09773)	(1.47150)	(6.42719)	(2.23846)	(2.00069)
	[-2.67081]	[-0.05821]	[0.72582]	[-3.96642]	[0.00448]	[1.72287]
D(ICB(	-	-	-	21.777	0.3632	-

-1))	0.136510	0.128560	8.601813	46	51	2.773036
	(0.18325)	(0.19387)	(2.91895)	(12.7493)	(4.44033)	(3.96869)
	[-0.74495]	[-0.66314]	[-2.94689]	[1.70813]	[0.08181]	[-0.69873]
D(LB(-1))	-0.083630	-0.141795	-0.754826	6.315656	-4.721005	0.524813
	(0.19000)	(0.20101)	(3.02649)	(13.2191)	(4.60393)	(4.11491)
	[-0.44016]	[-0.70542]	[-0.24941]	[0.47777]	[-1.02543]	[0.12754]
D(DPUB(-1))	-0.008345	-0.001304	0.279643	-3.838242	-0.239956	0.634736
	(0.01767)	(0.01869)	(0.28140)	(1.22908)	(0.42806)	(0.38259)
	[-0.47237]	[-0.06978]	[0.99377]	[-3.12286]	[-0.56056]	[1.65903]
D(INFL(-1))	0.005631	-0.005343	-0.050045	-0.078141	0.032278	-0.054176
	(0.00237)	(0.00251)	(0.03777)	(0.16499)	(0.05746)	(0.05136)
	[2.37475]	[-2.12984]	[-1.32485]	[-0.47361]	[0.56173]	[-1.05486]
D(Y(-1))	-0.011496	-0.002536	-0.025806	-0.863883	-0.398039	0.072098
	(0.00834)	(0.00882)	(0.13283)	(0.58016)	(0.20206)	(0.18060)
	[-1.37862]	[-0.28743]	[-0.19429]	[-1.48904]	[-1.96992]	[0.39922]
D(CISB(-1))	-0.015162	-0.023052	-0.325027	0.886664	0.074404	-0.029772
	(0.01315)	(0.01391)	(0.20944)	(0.91480)	(0.31860)	(0.28476)
	[-1.15318]	[-1.65717]	[-1.55188]	[0.96925]	[0.23353]	[-0.10455]
C	-0.013604	0.043773	-0.465202	-2.018354	-0.338776	-0.700545
	(0.04567)	(0.04832)	(0.72749)	(3.17752)	(1.10667)	(0.98912)

	[-0.29788]	[0.90595]	[-0.63946]	[-0.63520]	[-0.30612]	[-0.70825]
R-squared	0.337804	0.209421	0.334809	0.662368	0.233033	0.182338
Adj. R-squared	0.144663	-0.021165	0.140795	0.563892	0.009335	-0.056146
Sum sq. resids	1.324393	1.482336	336.0465	6410.946	777.6388	621.2131
S.E. equation	0.234911	0.248524	3.741917	16.34389	5.692242	5.087620
F-statistic	1.749004	0.908212	1.725696	6.726186	1.041728	0.764570
Log likelihood	5.550477	3.747831	-83.03025	-130.2065	-96.45445	-92.86105
Akaike AIC	0.153095	0.265761	5.689391	8.637903	6.528403	6.303815
Schwarz SC	0.519529	0.632195	6.055825	9.004337	6.894837	6.670249
Mean dependent	0.000000	0.062500	-0.245000	-0.769375	-0.475000	-0.847812
S.D. dependent	0.254000	0.245935	4.036879	24.74904	5.718997	4.950540
Determinant resid covariance (dof adj.)		1139.831				
Determinant resid covariance		202.8654				
Log likelihood		-357.4369				
Akaike information criterion		25.71480				
Schwarz criterion		28.18823				

d) Guinée Equatoriale

Vector Error Correction Estimates				
Date: 08/19/14 Time: 10:51				
Sample (adjusted): 1982 2013				
Included observations: 32 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
Cointegratin	CointEq1			

g Eq:				
ICB(-1)	1.000000			
LB(-1)	0.518720			
	(0.11567)			
	[4.48431]			
RS(-1)	-0.010391			
	(0.00257)			
	[-4.04603]			
CISB(-1)	0.001974			
	(0.00311)			
	[0.63578]			
C	-0.056130			
Error Correction:	D(ICB)	D(LB)	D(RS)	D(CISB)
CointEq1	-0.466641	-0.570350	32.16507	17.65732
	(0.21500)	(0.22873)	(24.448)	(7.67574)
	[-2.17037]	[-2.49356]	[1.31561]	[2.30041]
D(ICB(-1))	-0.269229	0.282382	-15.9122	-11.52660
	(0.18894)	(0.20100)	(21.484)	(6.74518)
	[-1.42495]	[1.40489]	[-0.74063]	[-1.70887]
D(LB(-1))	0.062785	-0.025502	7.356161	-6.569428
	(0.16862)	(0.17938)	(19.174)	(6.01970)
	[0.37235]	[-0.14217]	[0.38365]	[-1.09132]
D(RS(-1))	-0.003155	-0.004011	-0.428475	0.055632
	(0.00217)	(0.00231)	(0.2471)	(0.07758)
	[-1.45201]	[-1.73495]	[-1.73392]	[0.71708]

D(CISB(-1))	0.005054	0.000769	-0.615186	-0.044869
	(0.00556)	(0.00592)	(0.63235)	(0.19853)
	[0.90888]	[0.12992]	[-0.97285]	[-0.22601]
C	0.012449	0.082628	3.342133	-0.320574
	(0.04123)	(0.04386)	(4.68821)	(1.47187)
	[0.30196]	[1.88390]	[0.71288]	[-0.21780]
R-squared	0.365671	0.234244	0.362159	0.251670
Adj. R-squared	0.243684	0.086983	0.239497	0.107760
Sum sq. resids	1.268659	1.435793	16404.55	1616.920
S.E. equation	0.220895	0.234995	25.11860	7.886014
F-statistic	2.997633	1.590671	2.952503	1.748804
Log likelihood	6.238375	4.258261	-145.2393	-108.1667
Akaike AIC	-0.014898	0.108859	9.452455	7.135419
Schwarz SC	0.259927	0.383684	9.727281	7.410245
Mean dependent	0.000000	0.062500	2.102813	-0.460313
S.D. dependent	0.254000	0.245935	28.80349	8.348659
Determinant resid covariance (dof adj.)		85.41938		
Determinant resid covariance		37.22630		
Log likelihood		-239.4964		
Akaike information criterion		16.71852		
Schwarz criterion		18.00104		

Appendix 4: Values of the short and long term coefficients

Table 1: Values of the short-term coefficients

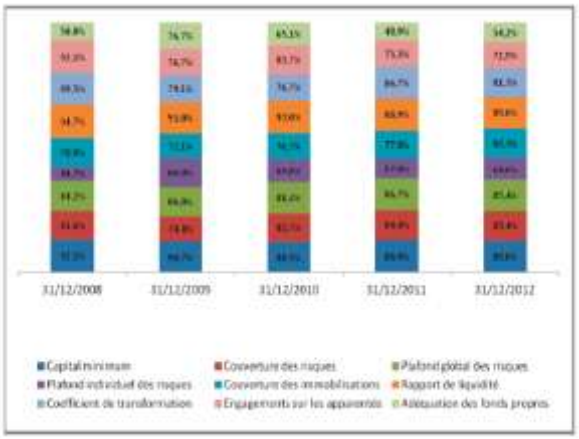
	Variable expliquée : *icb*						Force de rappel
	lb	*y*	inf *l*	*dpub*	*rs*	*cisb*	
Cameroun	– 0,0388 (–0,15)	– 0,00016 (–0,011)	– 0,045 (–2,899)	0,043 (0,787)			– 0,11 (–2,35)
Centrafrique	– 0,0401 (–0,242)	– 0,0036 (–0,44)				– 0,026 (1,156)	– 0,52 (–3,16)
Congo	– 0,083 (–0,44)	– 0,011 (1,37)	0,0056 (2,74)	– 0,0083 (–0,47)		– 0,015 (–1,15)	– 0,24 (–2,67)
Guinée Equatoriale	– 0,062 (0,372)				– 0,0031 (–1,452)	– 0,00505 (0,908)	– 0,46 (–2,17)

Source: The Author.

Table 2: Values of the long-term coefficients

	Variable expliquée : *icb*					
	lb	*y*	inf *l*	*dpub*	*rs*	*cisb*
Cameroun	0,141 (–3,67)	– 0,049 (6,57)	0,03 (–4,87)	– 0,065 (2,88)		
Centrafrique	0,0063 (0,203)	0,031 (–3,96)				– 0,017 (3,35)
Congo	– 0,103 (1,88)	0,005 (–2,004)	– 0,011 (5,488)	0,022 (–4,03)		– 0,0088 (2,711)
Guinée Equatoriale	– 0,241 (4,484)				0,0046 (–4,046)	0,00085 (0,635)

Appendix 5: CEMAC banks' compliance with current prudential regulations (2008-2012)



Source: Graph 1 taken from COBAC Bulletin No. 16 of June 2014.

Appendix 6: Percentages of member country and CEMAC banks in breach of their commitments (2008-2012)

	Par pays membre (%)	Pour la CEMAC (%)

Cameroun (%)	25,94	7,95
Gabon (%)	34,87	8,50
Guinée Equatoriale (%)	33,7	6,32

Source: Table drawn from COBAC Bulletin No. 16 of June 2014.

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