International Business Research; Vol. 11, No. 4; 2018
ISSN 1913-9004 E-ISSN 1913-9012
Published by Canadian Center of Science and Education

Determinants of Bank Credit Risk in Developing Economies: Evidence from Benin

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Received: February 9, 2018 Accepted: March 13, 2018 Online Published: March 19, 2018

doi:10.5539/ibr.v11n4p154 URL: https://doi.org/10.5539/ibr.v11n4p154

Abstract

Our study mainly focuses on the determinants of credit risk of Beninese banks. Theoretical and empirical literature teach us that both external and internal factors are the determinants of credit risk. From a sample of seven (07) commercial banks (only one of which is listed on the BRVM), we tested the simultaneous effect of external and internal factors on credit risk over the period 2004-2013. After an econometric analysis on panel data (fixed effect model estimated by the PCSE method), it appears that the "growth of GDP", "credit by signature", "interest margin" and the "proportion of institutional administrator "are the determinants of credit risk. Therefore, political authorities and bank officials could improve credit risk management by issuing policies on these factors.

Keywords: balanced panel, bank governance, benin, credit risk, determinant

1. Introduction

The main function of commercial banks is to finance the economy by granting credit to the different actors of economic life. Thus, banks provide the function of intermediation between agents with surplus funds and those with funding deficits. However, despite innovations in the sector, the supply of this service exposes banks to many risks (Greuning & Bratanovic, 2004). One of these risks is the credit risk. Credit risk simply means the likelihood that the borrower will fail to honor the terms of the loan agreement. This risk is emphasized by the phenomenon of information asymmetry which creates adverse selection and moral hazard. Some important researches (Vazquez, F., Tabak, B. M., & Souto, M. 2012; Fofack, 2005) reveal that this risk is the source of banking crisis. As an illustration, the banking crisis that affected a large number of countries in sub-Saharan Africa in the 1980s was accompanied by a rapid accumulation of non-performing loans (Fofack, 2005). In Benin Republic 80% of the bank loan portfolios were reported unproductive.16% for Burkina-Faso, 50% for Ivory-Coast, 75% for Mali, 50% for Niger and 50% for Senegal of loans from banks were also reported unproductive (Powo 2000).This crisis cost the Central Bank of West African States 400 to 500 billion CFA francs, about one quarter of the money supply in circulation.

More than two decades after the liberalization of the banking sector in UEMOA[1], Benin Republic still remains one of the most affected countries by the credit risk problem. In fact, numerous reports from UEMOA (2012), FMI[2](2015) from BM[3] (data base, 2015) and Economist Abdoulaye Bio TCHANE (RFI, July 2015) underline that banks in Benin Republic are characterized by a large amount level of unhealthy portfolio. In Benin Republic, bad debts saw their stock increase by 67% that is 16 billion CFA francs in 2002, whereas they had decreased by 30% a one year earlier. Outstanding loans frozen by banks stood at 54.6 billion as of June 30, 2012 (Information Note Q4 2012). At the end of 2011, two (02) banks were closely monitored by the monetary authorities and another insolvent for several years, was closed in March 2012. In addition, banks' loan portfolios have been deteriorated. They reached 14.4% in 2010; 15.16% in 2011 and 18.6% in July 2012, representing an average rate of 16.05% over the period 2010-2012. However, for the same period the average rate of unproductive loan portfolios was 9.87%

[1]West African Economic and Monetary Union

[2]Central Bank of West African States

[3]International Monetary Fund

in Nigeria, 5.1% in Kenya, 5.9% in Gabon, 4.83% in South Africa, 4.13% in France, 3.83% in the United States and 1.97% in Australia.

Given these statistics, one deduce that the rate of non-performing loans in Benin is above international standards. Therefore, the study of credit risk in the Beninese context is of particular interest. Thus, our work will try to answer to the following question: what explains a considerable volume of non-performing credits in the Beninese banking sector?

Several studies have been conducted on the determinants of bank credit risk, especially in emerging countries (Ariff & Marisetty, 2001; Simpson & Gleason, 1999; Powo, 2000; Pathan, 2009 etc.). However, the banking sector of UEMOA and particularly of Benin remains unexplored, despite the upsurge of the problematic of credit risk in recent five years. To our knowledge, the determinants of credit risk in Benin's banking sector is one of the few gray areas that aspire to intellectual exploration. Therefore, the present study aims to contribute to the literature on the Beninese banking sector by exploring the determinants of the credit risk of these banks: with particular emphasis on the typology of credit granted (this approach makes it possible to understand indirectly the borrower behavior) and the structure of the board in managing credit risk. The main motivation behind this study is to improve the understanding of credit risk modeling at the micro level.

The rest of the document is organized as follows. The next section discusses the literature review, followed by the methodology. The penultimate section presents the results, and finally the conclusion.

2. Review of Literature on Credit Risk and Its Determinants

2.1 Theoretical Anchoring of the Research

Credit risk management depends on external and internal factors to banks. Thus, the risk of non-repayment of credits is based on factors inherent to the intrinsic qualities of the projects to be financed and / or solvency of the borrower himself. Among these factors, we cite banking governance and the banking relationship. Indeed, excessive credit risk taking is the result of inefficient governance mechanisms or poor control of the credit decision process as well as poor processing of information on the quality of the borrower (Boussaada, 2012). Thus, in our research, we apprehend credit risk through: the theory of corporate governance. Indeed, bank credit results from a process linking different agents whose interests differ. For instance, the interests of executives may differ from other stakeholders: mainly shareholders and depositors. Then, the control and management of bank credit risk is mainly the responsibility of the shareholders, the board of directors and the banking regulators. In addition, the ultimate responsibility for risk management within UEMOA banks is conferred on the social bodies (board of directors...) through the loan committee. The role of this committee is to follow the standards, to guarantee the quality of loans and to ensure the respect of loan procedures and policies. However, the committee reviews loans before or after funding, while ensuring that the approval threshold corresponds to the borrower's loan amount or debt capacity. It is also responsible for maintaining adequate reserves for loan losses. In addition, the Board adopts a set of guidelines that defines the types, size and expiry date of the loans to be granted, including loan application review procedures and the review of the bank's loan portfolio. So, the board of directors through its attributions is supposed to control the risk taking of bank credit. In addition, the ultimate responsibility for risk management within UEMOA banks is conferred on the social bodies (board of directors...) through the loan committee. Its role is to follow the standards, to guarantee the quality of loans and to enforce loan procedures and policies.

However, the Committee considered the loans before or after the funding, while ensuring that the threshold for approval is equivalent with the creditworthiness of the borrower. It is also responsible for the maintenance of adequate reserves for the loan losses. In addition, the Council adopts a set of directives, which define the types, the size and the expiry date of the loans to be granted. Also, the Council adopts the procedures for revision of loan applications and review of the loan portfolio of the Bank. Thus, the Board of Directors through its powers is supposed to control bank credit risk taking.

2.2 Review of the Empirical Literature and Research Hypotheses

From the academic literature there are two schools of thought that explain the determinants of the credit risk of the Bank: external variables theory and internal variables theory (Corsetti et al, 1998).

Literature provides evidence that suggest a strong association between credit risk and several external factors (Salas & Saurina, 2002; Khemraj & Pasha, 2009; Ali & Daly, 2010). Examining the Spanish banking sector from 1984 to 2003, Jiménez and Saurina (2006) find that the credit risk is determined by the growth of the GDP. Basing on the same model, Khemraj and Pasha (2009) studied the determinants of credit risk in the Guyanese banking sector. They found out that the GDP growth is inversely related to credit risk. This suggests that the

improvement in GDP translates into the real economy by a decline in bad debts, by ricochet bank credit risk. In a study of OECD and Asian countries, Ariff and Marisetty (2001) found that the gross domestic product (GDP) is negatively related to the risk of the Bank. Recently, Ali and Daly (2010) in their comparative study between the United States of America (USA) and Australian economy on the macroeconomic determinants of the credit risk of the Bank found that GDP has a statistically significant negative relationship. Therefore, the following hypothesis is to be tested: H1: the GDP growth has a negative impact on the risk of bank credit.

Nkusu (2011) and Klein (2013) studied the effect of inflation rate on the quality of loans. According to Klein (2013), the impact of inflation is ambiguous: (i) inflation can make loan repayment easy by reducing the real value of outstanding loans and (ii) it can reduce the real income of borrowers when wages are rigid. In countries where the loan rate is variable, higher inflation may lead to higher rates resulting from monetary policies intended to combat inflation (Nkusu, 2011). Thus, despite this mixed finding, the following hypothesis will be tested:

H2: the inflation rate positively influences the risk of bank credit.

Today, competition forces banks to concede a few rules of good management. Indeed, a high competition could encourage banks to have excessively risky behavior (Salas and Saurina, 2003, among others) and especially in the presence of the prudential constraint that actually modifies the effects of the market power of banks on their risk-taking behavior. The empirical results show, on one hand, that crisis are less likely in countries with strong banking concentration (Lapteacru, I.2012) and on the other hand, a strong concentration of the banking sector could lead to monopoly profits according to Molyneux and Thornton (1992).

According to Short (1979), banks operating in a highly concentrated banking sector are susceptible to collusion practices. In general, a concentrated banking sector is positively correlated with profit and negatively correlated with risk. This is in line with the assumption of market power which asserts: a large market power leads to monopolistic profits. This leads to the following hypothesis:

H3: The higher the bank concentration, the lower the bank credit risk.

Other academic literatures argue that internal variables are the determinants of credit risk (Angbazo, 1997). Among these internal variables one can distinguish bank-specific factors and variables related to the structure of the organization. It is clear that the best approach to reporting on borrowers' credit repayment behavior would have been direct data on their situation. Nevertheless, the diversity of clients, the absence of average behavior and the asymmetry of information do not allow the use of this approach. Thus, we adopt an indirect approach that apprehends the behavior of borrowers through the credit activity of banks. The credit activity of banks includes signed commitments (usually reserved for businesses), campaign credits and ordinary credits. In addition, campaign and signed commitments are relatively compromised (Abdou, 2002).

This correspondence is predictable for campaign credits where disbursements are staggered throughout part of the year for the purchase: (i) seeds, fertilizer, personal consumption or they retain products and sold them at times well determined, (ii) school items, the bulk sale of which is mainly in the fall (in September and October), (iii) toys that are requested at holiday periods and (iv) farmers who buy lean beasts in the logic of fattening them and reselling them later. These activities are seasonal for both production and marketing. Given the risks of this activity (slump, lower prices of products, perishable products, diseases, drought, food costs) the bank runs the risk of unpaid. Thus, the following hypothesis is to text:

H4: The higher the campaign credit, the higher the credit risk.

Ordinary loans are credit agreements where an amount of money is made available to an individual over a certain period of time (a few months or even a few years, but not more than 5 years). This type of loan is not intended to finance a purchase of specific property, it is often used to meet certain expenses. As a result, there are various ways to meet the needs of borrowers according to their repayment capacity which must not exceed one third of their income. In order to benefit from such credit within the banking institutions, the beneficiary's salary should be deposit at the lending bank, and the borrower provide evidence that certifies that he has a permanent employment contract and a 'insurance contract. For such credit, the problems of moral hazard and adverse selection are likely to be removed. Thus, the following hypothesis is to be tested:

H5: The larger the ordinary credit, the lower the risk of bank credit.

In the case of signed commitments, banks help companies in the form of commitments. These commitments correspond to two distinct categories: financing commitments and guarantee commitments. In terms of risk for the bank, both are very similar to credits. Because the bank is committed to grant a contest with conditions of duration and preset rate. However, the fact that credits by signature, do not require immediate disbursement and

very often no disbursement, the bank may be tempted to accumulate its commitments in order to make the most profit. This can cost him a lot if its clients fail (The risk is difficult to assess, the monitoring of commitments is cumbersome to manage, there is often a shift in commitments over time). In the financial statements, the considerable amounts attributable to off-balance sheet transactions show that it is now impossible to analyze an institution without thoroughly studying the level and components of its off-balance sheet, even if relating to financial futures transactions should be interpreted with caution. This leads to the following hypothesis :

H6: A high level of credit by signature generates an increase in the risk of bank credit.

The policy of increasing interest rates leads to a change in the configuration of the qualitative structure of the debtor groups. Thus, the players in the credit market are therefore sensitive to interest rates. As a result, an increase in lending rates is likely to lead to a deterioration in the situation of all credit market players. The margin appears as an important determinant of credit risk for Poland, the Czech Republic, Hungary, Slovakia and Latvia. Thus, faced with an increased probability of non-repayment of loan funds, banks would react by imposing more prohibitive pricing on potential borrowers (Goyeau, Daniel; Sauviat, Alain & Tarazi, Amine, 1999). H7: The higher the interest margin, the greater the risk of bank credit.

Board structure studies have often shaped three specific elements: the size of the board of directors, the number of independent directors and the number of institutional directors (Pathan & Skully, 2010).

According to the agency theory, the effectiveness of the board, as a control mechanism, depends on its size. Because, the disciplinary function is better ensured by a board of directors of reduced size, composed of 7 to 8 administrators (Jensen, 1993). In contrast, Baysinger and Zardkoohi (1986) argue that in highly regulated sectors, such as the banking sector, an expanded board of directors allows for more effective control, then leads to a better control the credit risk of banks. However, Andres and Vallelado (2008) specify that beyond a certain limit (19 directors) the problems caused by the large size of the board of directors outweigh the benefits that are associated with it (Andres & Vallelado, 2008), while Simpson and Gleason (1999) find no significant effect of the number of directors on the financial distress risk of 300 listed US banks. Nonetheless, Sumner and Webb (2005) rely on a sample of 316 US commercial banks during 1997 to find that the structure of the board has an impact on credit policies. This leads to the following hypothesis:

H8: The larger the size of the Bank's board, the lower the risk of bank credit.

Based on the agency theory, Fama (1980) and Fama & Jensen (1983) argue that independent directors are more motivated to control leaders and to ensure that they pursue policies that are compatible with shareholders. They are encouraged to protect their own interests, namely the development and preservation of a good reputation as an independent expert in the competitive market for directors. As an example, Boussaada (2012) studying the impact of banking governance on the credit risk of listed Tunisian banks, he provides proof that independent directors can reduce credit risk. In contrast, Greuning and Bratanovic (2004) argue that, in practice, outside directors are appointed by manager with the approval of shareholders. For this purpose, rare are external directors who exert a real influence on the risky activities of the bank. So, the results related to the role played by the independent directors on the board of directors of banks remain mixed. Thus, this hypothesis is to be tested :

H9: The greater the number of independent directors, the lower the risk of bank credit.

Institutional investors are banks, insurance companies, collective investment schemes and pension funds. Jensen (1993) argues that institutional shareholders are experts who can exercise more effective control over executives because they hold significant capital shares. They are independent of management (Brickley, J., Lease, R., & Smith, C. 1988), bear high control costs and are therefore motivated to exercise their power of control over managers to secure their wealth. In contrast, Pozen (1994) argues that most institutional investors are not active because they do not want to incur significant control costs. Coffee (1991) argues that in case of poor performance some institutional investors are motivated by the sale of their blocks of shares rather than the exercise of their supervisory and disciplinary power of directors. They favor liquidity over control. This leads to the following hypothesis:

H10: The proportion of institutional administration has a negative impact on bank credit risk.

3. Methodology of Research

This section describes how the study was conducted. It describes the econometric model used, the sample and the source of the data.

3.1 Data

Today, the Beninese banking sector is made up of 13 banks: 12 commercial banks (whith only one of which is

listed on the Regional Stock Exchange (BRVM)) and one national representation of the BCEAO. The sample of our study is made up of 7 out of 12 commercial banks in Benin (ie about 59% of the study population) over a period of 10 years (from 2004 to 2013) wich represent a panel of seventy (70) observations. Subsequently, it was necessary to focus on the nature of the panel, cylinder or non-cylinder. We chosed to use a cylinder sample. So, it is about to retaining the banks having all the data over the whole period considered. The choice of a balanced panel results from the need to test the model over several years by addressing the largest number of econometric tools. For this purpose, the selection of the sample was made according to the following criteria : (i) balance sheets and income statements of banks are available and published over 10 consecutive years, over 12 months of activity and (ii) the data financial information is updated. The choice of the year 2004 as the date of the beginning of the study is not arbitrary. Indeed, we found that in Benin Republic, it was from 2004 that it had stability in the balance sheet data of the banks. Regarding the date of the end of the study, we chose the year 2013 based on the data we have.

The data used were taken from (i) the annual report and financial statements of each bank, (ii) the BCEAO (Central Bank of West African States) database which provides balance sheets, accounts detailed results and (iii) directories of banks and financial institutions of UEMOA (West African Economic and Monetary Union).

3.2. Variable construction and empirical model

We present all the variables of the model as well as the data sources that we used to determine the coefficients of the model. The choice of indicators comes from both the theoretical and empirical literature and the availability of data. To estimate the credit risk, we take into account the ratio of the share reserved for the credit risk (provision required) on total credits. By total credits, we mean the outstanding loans of the bank. This ratio focuses exclusively on the credit risk of banks. Banks with risky assets will offer a substantial portion of these assets at a loss, which will reduce net profits and capital. Thus a high value of this ratio would contribute positively to the likelihood of going bankrupt. So, we use this ratio to measure credit risk as in Goyeau Daniel, Sauviat Alain, Tarazi Amine, (1999). In our empirical trial, we use, as in the majority of studies in the literature (Boussaada, 2012), a standard model that uses the following panel model specification :

$$Y_{i,t} = \alpha_i + bx_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where Y is the dependent variable, X is the independent variables, εi, t the disturbance and (i, t) indicating respectively the bank and the time. Therefore, the following equation of credit risk to will be estimated :

$$\mathbf{Risk_{i,t}} = C_i + \beta_1 CrE_{i,t} + \beta_2 INF_{i,t} + \beta_3 CoB_{i,t} + \beta_4 CrC_{i,t} + \beta_5 CrS_{i,t} + \beta_6 MaI_{i,t} + B_7 CrO_{i,t} + \beta_8 TCA_{i,t} + \beta_9 AInd_{i,t} + \beta_{10} AIns_{i,t} + \varepsilon_{i,t} \quad (1 \leq i \leq n ; 1 \leq t \leq T ; n = 7 \text{ banks} ; T = 10 \text{ years})$$

To determine the appropriate estimation method, we will perform certain tests, including the individual effects presence test, heteroskedasticity test, the autocorrelation error test and the stationarity test of the series observed.

Table 1. Summary of variables with expected sign

Variables	Measures	References	Sign expected
	Dependent variable		
Credit risk (Risk)	Risk = $\frac{\text{necéssary Provision}}{\text{Total credit}}$	Goyeau Daniel, Sauviat Alain, Tarazi Amine (1999)	
	Independent variables		
GDP growth (CrE)	CrE = Rate of growth	Ariff et Marisetty (2001) ; Ali et Daly (2010)	-
Inflation (INF)	INF = Inflation rate	Shu (2002) ; Nkusu (2011) et Klein(2013)	+
Banking concentration (CoB)	Hirschman Index $HHI_t = \sum_{i=1}^{n} X_{it}^2$	Lapteacru, I. 2012	-
Campaign credit (CrC)	CrC = $\frac{\text{Compaign credit amount}}{\text{Total credit}}$	ABDOU, 2002	+
Credit by signature (CrS)	CrS = $\frac{\text{signed commitment amount}}{\text{Total Assets}}$	-	+
Ordinary Credit (CrO)	CrO = $\frac{\text{Ordinary credit amount}}{\text{Total credit}}$	-	-
Margin of interest (MaI)	MaI= log Interest (perceived-paid)	Angbazo, 1997	+
Size of the board (TCA)	TCA = log (Nbr director of the board of directors)	Sumner et Webb (2005) ; Pathan (2009)	-
Proportion of independent director (AInd)	AInd = $\frac{\text{Nbr of Independent director}}{\text{size of the board}}$	Andres et Vallelado (2008) ; Pathan (2009).	-
Proportion of institutional administrator (AIns)	Ains = $\frac{\text{Nbr of Institutional director}}{\text{size of the board}}$	Andres et Vallelado (2008) ; Pathan (2009).	-

4. Results

A priori, the different variables of the model are stationary in level, with the exception of three variables "campaign credit (CrC), size of the board of directors (TCA) and the size of the independent directors (Aind)", which are stationary in first difference. As a result, we conclude that there is no co-integration relationship.

4.1 Examination of Correlations

Table 2. Variables Correlation Matrix

	Risk	CrE	CoB	INF	CrC	CrS	MaI	CrO	TCA	AInd	AIns
Risk	1.0000										
CrE	0.1404	1.0000									
CoB	0.2687*	-0.3444*	1.0000								
INF	-0.0709	0.3658*	0.1812	1.0000							
CrC	0.0226	0.1275	0.0469	-0.0385	1.0000						
CrS	0.3845*	0.1164	0.0889	0.0581	-0.1288	1.0000					
MaI	-0.6715*	0.1084	-0.2443*	-0.0037	-0.1301	-0.2500*	1.0000				
CrO	-0.1555	0.1460	-0.4888*	-0.0171	-0.4230*	-0.2041*	0.4018*	1.0000			
TCA	-0.4576*	-0.0035	-0.0639	-0.0114	-0.0438	-0.3976*	0.5735*	0.1731	1.0000		
AInd	-0.4155*	0.0494	-0.0776	0.0708	0.2248*	-0.1767	0.0439	-0.0685	0.2197*	1.0000	
AIns	0.2440*	-0.0135	-0.1389	-0.0501	0.1346	0.3333*	-0.5167*	-0.3478*	-0.3584*	-0.0526	1.0000

Before starting the multivariate analysis, we want to check the possible multi-colinearity between the independent variables of our model. Multi-collinearity can distort the precision of estimating regression coefficients and make the estimated values of the coefficients sensitive to small data fluctuations (Bourbonnais, 2009). To do this, we

studied the correlation matrix above. The study of the correlation matrix (Table 2) reveals a weak correlation between the variables, with the exception of the pair (MaI, Risk), (TCA, MaI) and (AIns, MaI) which are moderately correlated respectively to 67.15%; 57.35%; 51.67%. Since the correlation coefficient between these variables is less than the limit value (ie 0.8), then no serious problem of multi-collinearity (Kennedy, 2003). So, we confirm that we are not confronted with a problem of correlation of variables in our sample.

4.2 Diagnostic Tests and Data Estimation

The results of the diagnostic tests and the estimation are summarized below:

Table 3. Data Diagnostic Test

Test	Results
Individual effects presence test	test that all u_i = 0 F(6, 53) = 5.11 Prob > F = 0.0003
Hausman Test	Chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 40.31 Prob > chi2 = 0.0000
Breush-Pagan LM heteroscedasticity test	Prob > F = 0.0000 R-squared = 0.9542 Adj R-squared = 0.9464
Auto Correlation Test for Wooldridge's Errors	F(1, 6) = 9.965 Prob > F = 0.0196

Fisher's statistic (Table 3) reveals a near-zero probability, which leads us to reject the null hypothesis and conclude that our model includes individual effects. The individual effect model assumes that the model to be estimated differs individuals only by the value of the constant (Bourbonnais, 2009). When we detect the presence of individual effects, there is the problem of specification of its effects: are they fixed (the individual effect is constant over time) or random (the constant term is a random variable)? To discriminate between these two models, we performed the Hausman specification test. We found that the p-value of the Hausman test is below the 5% threshold, implying that the fixed effects model is preferable to the random effects models. To verify the absence of biases likely to alter the significance of our coefficients, we performed heteroscedasticity and autocorrelation tests. The negligence of these two problems affects the accuracy of the estimators, which can has a negative impact on statistical inference (Pirotte, 2011).

The result of the Breush-Pagan LM test (Table 3) leads us to reject the null hypothesis and indicate the presence of a heteroscedasticity problem between errors. This is explained by the fact that the p-value of the test is less than 1%. Regarding the presence or absence of an autocorrelation of errors, we found that the p-value of the test is less than 5%. Therefore, there is a problem of autocorrelation of errors of order 1.

We must take into account the problems detected by previous tests (Diagnostic Data Test) in the model estimates. The Generalized Least Squares method should be used to overcome these problems. However, Beck and Katz (1995) have shown that the Generalized Least Squares method tends to overestimate the significance of coefficients. Thus we opt for the PCSE method (Panel Corrected Standar Erros) proposed by Beck and Katz (1995). The latter allows to correct the problems of heteroscedasticity and autocorrelation of errors and producing more robust results. The results from the application of this estimation method are as follows:

Table 4. Results of the regression [Estimator: Panels Corrected Standard Errors (PCSEs)] (1)

Variables	Coefficients	Std- Error	Z- Statistic	P > |**z**|
CrE	-0.0004*	0.0002	-1.76	0,078
CoB	0.0031	0.0132	0.24	0.811
INF	0.0000	0.0001	0.46	0.647
D.CrC	0.0117	0.0096	1.21	0.225
CrS	0.0078**	0.0038	2.08	0.038
MaI	-0.0070***	0.0015	-4.68	0.000
CrO	0.0018	0.0060	0.31	0.758
D.TCA	0.0010	0.0031	0.31	0.753
D.AInd	-0.0056	0.0061	-0.91	0.364
AIns	-0.0031*	0.0028	-1.61	0.102
Cons	0.0324***	0.0086	3.75	0,000
R^2 = 0.5026		Wald chi2(10) = 51.88		Prob > chi2 = 0.0000

Note: ***, ** and * represent respectively the significance at 1% level, 5% level and 10% level.

Reading this result (Table 4), we found that the coefficient of determination (R2 = 0.5026) indicates a good specification of the model. We can conclude that our model has a good linear fit quality. At the 5% level, the regression is globally significant because the value of the probability associated with the chi2 test is 0.0000, a

value which is less than 0.05. Thus, the credit risk is explained to 50.26% by the explanatory variables of the model. The coefficients of the variables of the model, have for the majority the expected sign with the exception of four (4) variables namely the concentration of the banking sector (CoB), the interest margin (MaI), the ordinary credits (CrO) and the size of the board of directors (TCA). In addition, it should be noted that among the four (4) variables with the opposite sign, only the coefficient of the variable "MaI" is significant.

5. Discussion

The GDP growth (variable "CrE") was included in our analysis to see the effect of the real economy on credit risk. It therefore appears that there is a negative relationship between the GDP growth rate and the credit risk. That is, the improvement in the real economy is leading to a reduction in the non-performing loan portfolios of commercial banks.This result corroborates the work of Salas & Suarina, 2002; Fofack, 2005, Jimenez & Saurina, 2006.

With respect to the "CrS" and "MaI" variables, table 4 shows that the latter significantly explain the evolution of credit risk. The sign of the coefficient of the variable "CrS" is positive. So, there is a positive relationship between this variable and the evolution of unpaid bills. This means that, the higher the level of signed commitments, the more the banking institution runs the risk of seeing the loans granted not returned. Indeed, the result shows that a 10% increase in credit by signature increase unpaid bills of 0.078 units. This result could be justified by the fact that the implementation of "signature credit" does not result in immediate outward payment and very often not at all. For this purpose the bank is tempted to accumulate its commitments in order to make the largest savings possible. Thus, in an unfavorable economic environment, such credit is therefore compromised. Because, the risk is difficult to evaluate, the follow-up of the commitments is heavy to manage and there is often shift of the commitments over time (which can be very expensive for the banking institution in case of failure of its customers).

Regarding the interest margin, it is significant with a sign opposite to the expected one (Positive). An increase in the interest margin of 10% will reduce the credit risk by 0.07 points. This seemingly surprising result is explained by the notion of credit rationing developed by Stiglitz and Weiss (1981). Indeed, the bank as a funding intermediary faces many sources of information asymmetries. Thus, it is difficult to distinguish between honest and dishonest borrowers. However, in the absence of being able to set an interest rate that corresponds to the actual risk of the project, the bank applies a rate reflecting the average quality of the borrowers. There is a maximum interest rate threshold which corresponds to a better diversification of the banks' loan portfolio and to a maximum expected profitability. As a result, beyond this threshold, there is a decrease in the expectation of profitability due to the deterioration in the quality of borrowers. So, if in Benin Republic, the fixed interest rate is below this maximum threshold, it is normal that any increase in the interest margin increases the expected profit of the banks and, in turn, the decline of unpaid (income effect > risk effect).

The result of the estimation shows that the proportion of institutional administrator "AIn" negatively and significantly affects the credit risk. The variable "AIn" has the expected sign and its impact on the credit risk is significant at 10 level. In addition, its coefficient of -0.0030789 means that a 10% increase of the institutional administrator leads to a decrease of about 0.03 credit risk unit. This result is justified by the fact that institutional administrator are experts who can exercise more effective control of the executives, since they hold (i) significant capital shares, (ii) they are independent of management, (ii) support high control costs and (iv) are also motivated to exercise their power of control over managers in order to guarantee their wealth. Our results contradict the work of Coffee (1991), Pozen (1994).

6. Conclusion

This paper examines the predictive factors of credit risk in the Beninese banking landscape. Thus, from a sample of seven (07) commercial banks (of which only one listed on the BRVM) during the period 2004-2013, we tested the combined effect of external and internal factors on credit risk. Using a balanced panel econometric analysis method, the fixed effect model was estimated by the PCSE method. The study shows that annual GDP growth, credit by signature, interest margin, and the proportion of institutional administrator are the predictors of credit risk. So, political authorities and bank officials could improve credit risk management by formulating policies around these factors. For example, consider increasing the size of the board by focusing on the proportion of institutional administrator.

However, one of the limitations of the empirical analysis conducted in our research is that the sample size is relatively small. Similarly, regarding the measurement of credit risk, we could have used the cost of risk (the loan-to-credit ratio / net credit total).

A comparative study with some UEMOA countries, in particular Ivory Coast, would be interesting. Because, in recent years, Ivory Coast has been able to reduce its bad debts and align with international standards. The study of the factors that influenced the risk management of Ivorian banks will enable us to identify the shortcomings of the Beninese banking sector and to try to provide the appropriate solutions.

Acknowledgments

I would like to thank the DAAD for its doctoral research grant program In Région - CESAG Senegal, 2017.

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