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IMPACT OF DEFAULT RATE ON THE NET OPERATING PROFIT OF BANKS IN THE DEMOCRATIC REPUBLIC OF CONGO

IMPACT DE TAUX DE DEFAUT SUR LE RESULTAT NET D'EXPLOITATION DES BANQUES EN REPUBLIQUE DEMOCRATIQUE DU CONGO

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Abstract

The objective of this article is to determine the default rate of banks and to assess the impact of the latter on the net operating income. Theoretically, the authors MODIGLIANI and MILLER on the one hand and CALEM and ROB on the other hand, maintain that there is an indisputable nature of the need for an adequacy between capital and risk of bankruptcy.

The granting of credits is the main function of banks on the one hand and the non-repayment of these credits is the most important risk incurred on the other hand. The banking business is strongly characterized by the risk of default, because the loans granted to borrowers are not all recovered. This risk can be measured by the default rate determined by the ratio between the bad credit and the gross credit granted by the banking institution. The maximum acceptable threshold being 5%, only RAWBANK and SOFIBANK met this criterion.

Our results revealed that more than half of the banks under analysis run enormous default risks that could lead them to default. In addition, the default rate (TD) would have a direct influence on the bank's net operating income (RNE).

Keywords: Credit risk; Bankruptcy; Default rate; Net operating income; Bank.

Résumé

L'objectif de cet article est de déterminer le taux de défaut des banques et d'apprécier l'impact de ce dernier sur le résultat net d'exploitation. Théoriquement, les auteurs MODIGLIANI et MILLER d'une part et CALEM et ROB d'autre part, soutiennent qu'il existe un caractère incontestable de la nécessité d'une adéquation entre fonds propres et risque de faillite.

L'octroi des crédits est la principale fonction des banques d'une part et le non remboursement de ces crédits est le plus important risque encouru d'autre part. Le métier de la banque est fortement caractérisé par le risque de défaut, car les crédits accordés aux emprunteurs ne sont pas tous recouvrés. Ce risque peut être mesuré par le taux de défaut déterminé par le rapport entre le crédit douteux et le crédit brut octroyé par l'institution bancaire. Le seuil maximal acceptable étant de 5%, seules la RAWBANK et la SOFIBANK ont rempli ce critère.

Nos résultats ont révélé que plus de la moitié des banques sous analyse courent des risques de défaut énormes qui pourront les conduire à la défaillance. En outre, le taux de défaut (TD) aurait une influence directe sur le résultat net d'exploitation (RN) de la banque.

Mots clés : Risque de crédit ; Faillite ; Taux de défaut ; Résultat net d'exploitation ; Banque.

Introduction

In 2001, banking prudential regulations underwent a major change with the proposal of the Basel II committee aimed at using the probabilities of default (Pd) to determine the weightings attached to banking assets (PAGET-BLANC, E., July-August 2003 :1). This institution, considered to be a source of banking regulations, establishes that the greatest losses result from poor monitoring of internal control or a lack of respect for existing procedures. (Basel II Committee, 1998)

According to some approaches, default can be considered as the maximum deterioration in credit quality. It is possible to make assumptions about a possible failure of a financial institution. The more the bank grants loans and observes default rates, the more it will refine its ability to study a financial file and therefore reduce its default rate. In this case, the credit study will then go through the scoring or statistical analysis of the file based on the credits granted to other customers. This is why statistically it is safer for a bank to lend to a public servant than to a self-employed person.

The default, meanwhile, is above all an economic and accounting dimension. It designates any incident that deteriorates the quality of the loan and affects the relationship between the debtor and the creditor, knowing that it is likely to increase the potential losses of the latter. When it occurs, a default has the immediate impact of encouraging the creditor to increase its provisions for bad debts. In Congolese taxation, provisions made by credit institutions are only deductible from taxable income if they have been made in accordance with their purpose, if they are justified by the situation of the debtor and if the loss is clearly specified (Tax Code, July 15, 2017:85-89).

To fully understand the risk of default, it is desirable to return to the source of this risk, namely the institution that contracted a debt, either through a traditional bank loan or by issuing bonds on the market. Default occurs when the institution can no longer meet its obligations to its creditors. On this, two possibilities are possible in such an event: either the institution has the possibility of renegotiating the terms of its commitments with its creditors (rescheduling of payments, reduction of interest rates, etc.), or it cannot and in this case, the latter is declared bankrupt. (CHARBONNEAU, A., 2013-2014: 35)

Once the institution is declared bankrupt, two situations are again possible: receivership and judicial liquidation. The bankruptcy or default of a debtor can significantly affect the

profitability of creditors, but on the other hand, the default can undermine their solvency. As debtors of their depositors, the banks in turn risk finding themselves in a situation of default.

Failure is an objective event of a legal nature. On the other hand, the defect is an event which can take several forms and whose appreciation involves an element of subjectivity. For banks, the probability of bankruptcy is significantly affected by their level of indebtedness with the central bank. A low bankarization rate, ie the amount held by cash and demand account holders in relation to assets, also tends to increase the probability of bankruptcy. (POWO FOSSO, B., 2000: 32)

Thus, the main internal factors of bank default are respectively: excess credit risk and poor governance. Excess risk is the major cause of bank failure. Poor credit risk management and control generate excess risk at the bank level. This is the result of a credit decision that generates the bank's significant default risk in relation to the objectives of its stakeholders. (GOGLEWSKI, C.J., 2003: 2)

In many African countries, banking sectors are still among the least developed in the world, such as in the Democratic Republic of Congo (DRC), Guinea-Bissau, Malawi, Sierra Leone and Sudan, while in some other, their level of development remains lower than that of countries in the same income category. Cameroon and Nigeria, both lower-middle-income countries, and Gabon, an upper-middle-income country, still have financial depth below the average for low-income countries overall, although the capacity of their financial system has developed over the past ten years. (European Investment Bank, 2018:8)

At the beginning of the 2000s, a good number of banking institutions in the DRC having gone bankrupt, none of the funds deposited were reimbursed or compensated to savers, in particular the cases of the Banque Congolaise (BC) liquidated in 2011, the Banque de commerce et de développement (BCD), the Banque à la confiance d'or (BANCOR), the Union Zaïroise des Banques (UZB), the Banque Zaïroise de commerce Extérieur (BZCE). In the same batch were also grouped many PONZI deposit remuneration initiatives such as those of Bindo, Masamuna, Madova. (MUADIMANGA, I. E., 2016:17) These cases are close to fraud.

The concern for security led at one time to the flight of capital with the recurring problem of banks managing risks by identifying, evaluating and controlling them. Today, we have observed that the Congolese banking sector remains fragile following the phenomena that characterize it, namely the profound dysfunctions of financial institutions, the repeated monetary reforms, the persistent shortage of banknotes, the permanent loss of value of the national currency, the

parity gap between the street exchange rate and those of the banks' indicative rates, the promises of remunerating deposits at unrealistic rates, the discount of scriptural money in relation to fiduciary money.

Also, there is a downward trend in the digital workforce of banks in the DRC. In the annual report of the Central Bank of Congo (BCC) 2010, it is indicated that in this year the DRC had 21 commercial banks, in June 2014 the number was reduced to 18 and for the moment (2020) to 15. For say that in DR Congo the risks of default are not supported with a reassuring prudential system.

The aforementioned phenomena lead us to believe that Congolese banking institutions would be exposed to a significant level of credit risk. Credit or default risk arises when an annuity is not repaid on the due date. This situation leads the banks to a default likely to impact their net results. Hence the need to conduct an in-depth study on the relationship between the default rate and the net operating income of Congolese banks. From this observation a fundamental question arises: the default rate has an impact on the net operating income of banks in the Democratic Republic of Congo? Specifically, the question is: how high will the default rates of banks in the Democratic Republic of Congo be?

To answer this problem, we retain two hypotheses according to which: the Congolese banking activity would be subject to the fragility of the country's financial system, more than half of the banks under analysis would be in an uncontrollable threshold, i.e. that their default rates would be higher than 5%; there would be a negative relationship between the TD and the RN, this means that if the TD increases the RNE should decrease.

In this article, three points will be addressed: the literature review, banks in the DRC, data analysis and interpretation of results.

1. Literature review

For Tahiri and Yerrou (2018), risk is a dominant variable in banking activity, its management and control is a source of value and continuity for the banking system, which is constantly adapting its practices. BARI I. & TANI W. (2019)

Each individual has their own vision of risk. Many definitions of risk are found in the literature. Risk is frequently defined as an unforeseen event or a set of conditions that significantly reduce the ability of managers to carry out the planned business strategy (DARSA, J.-D. and DUFOUR, N., 2014: 14).

The notion of default by a company does not only concern the non-payment of its coupons or its principal. The Basel Committee provides a definition of default by a debtor when one of the two events below occurs, if not both (BENOIT GARNIER, M., 2013: 29-30):

- the bank considers it unlikely that the debtor will fully repay its credit to the banking group without it needing to take appropriate measures such as the realization of a guarantee (if one exists);

- the debtor's arrears on a large loan due to the banking group exceeds 90 days. Overdrafts are considered overdue receivables as soon as the customer has exceeded an authorized limit or has been notified that he has a lower limit than the current outstanding amount.

Credit risk, called solvency risk (generally controlled by the credit committee), is the risk of loss on a debt or more generally that of a third party who does not pay its debt on time. It measures the probability of default or default by the borrower. It is naturally a function of three parameters: the amount of the claim, the probability of default and the proportion of the claim that will be recovered in the event of default. (VERNIMMEN, P., 2002: 1056) It concerns: default risk; inflation risk (this is the risk of being reimbursed in a depreciated currency, of obtaining a rate of return lower than the rate of inflation); and the risk of deterioration in the value of the receivable (downgrading risk).

Note that the risk of default is expressed according to three parameters: the probability of default, the exposure to default and the loss in the event of default (FATAKI NTULA, D., 2015: 115-142). Our research is based on the last parameter because the loss given default corresponds to the amount of debt that could not be recovered.

Credit risk relates to receivables from subsidiaries. This risk is also limited by the systematic use of standard contracts which authorize compensation and make it possible to obtain additional collateral in the event of an unfavorable change in the quality of the risk. Credit risk is related to investment activities. The investment of cash surpluses and all the financial instruments used to manage the interest rate and exchange rate risk are contracted with counterparties having a long-term rating assigned by the rating agencies, a limit being assigned to each institution. financial institution, according to its own funds and its rating. (RABIH EL-CHEIKH, A., 2014: 14)

The failure or receivership of its co-contractors may cause them to fail to sign. The cessation of payment, the disappearance and disagreement with its co-contractors, the depreciation of the value of assets held by foreign borrowers are all reasons for losing control of its debt, which is

materialized by the risk of insolvency of the debtors. or the refusal of the latter to respect their commitments.

The succession of financial crises in recent years has called into question the functioning of prudential policies. Indeed, the successive Agreements of the Basel Committee on Banking Supervision (BCBS) have attempted to regulate and stabilize the international financial system. The BCBS, in order to improve the stability of the banking system and remove distortions of competition between countries, formulated in 1988 a set of prudential rules known as the first Basel Accords. The most important element in this agreement is the amount of capital that the banks must hold. In fact, the risk of bankruptcy of a bank would decrease as the volume of its equity increases.

According to MODIGLIANI & MILLER, there is an indisputable nature of the need for an adequacy between capital and risk of bankruptcy. The health of a bank depends on the evolution of its capital. The latter thus enable the bank to increase its volume of risk and its commitments. However, it should be noted that imposing capital requirements has consequences that make the relationship between the capital held by banks and the risk of bankruptcy remains ambiguous. Indeed, a negative relationship between equity and the risk of bankruptcy would result from the loss realized by the bank in the event of insolvency of the borrowers. In other words, when there is insolvency, equity tends to fall while the risk of bankruptcy would increase. However, the bank will be led to take on less risk as the volume of its funds increases.

According to CALEM and ROB (1999) show, from a theoretical point of view, that the risk taking of banks is a function of the level of the bank's capital contribution. Undercapitalized banks could take excessive risks since they have very little to lose in the event of failure, and this without losing the depositors protected by deposit insurance.

On the other hand, a positive relationship can be the subject of two explanations. On the one hand, capital being expensive, banks are tempted to take more risk when its level is high to compensate for the cost of holding the additional capital, thus increasing the probability of bank failure. On the other hand, an increase in equity can increase bank risk by encouraging banks to be less rigorous in the selection and monitoring of the projects in which they invest (NDIAYE, M. P., June 2019: 20).

The net result or net accounting result designates the difference between the income and the expenses of a company over a given accounting period. It is one of the most important financial indicators for a company because it measures the wealth created by a company. Net income is

also used to calculate a company's cash flow capacity. It appears both in the income statement and in the company's balance sheet. This is also the last indicator that appears in these documents. (Google)

2. Banks in the DRC

According to statistics from the Central Bank of Congo (BCC), the DRC currently has 15 commercial banks, 126 savings and credit cooperatives and 23 approved microfinance institutions. In addition, there are a large number of informal systems such as tontines, self-help groups or informal suppliers of inputs on credit. In order to optimize the generalization of microfinance services in the country, emphasis must be placed on increased professionalization of the sector and providers.

Based on the detailed result of the survey conducted by the audit firm "Deloitte", it ranks the 10 best banks established in the DRC in relation to the six (6) main indicators below: total assets, receivables customers, customer deposits, equity, net banking income, net income, as shown in table 2.

Table 1. The 10 best banks in the DRC in billions of Congolese Francs

BANK	TOTAL ASSETS	CUSTOMER RECEIVABLES	CUSTOMER DEPOSITS	EQUITY	NET BANKING INCOME	NET PROFIT
RAWBANK	2 183	680	1 486	170	162	9.39
BCDC	1 124	449	772	144	113	13.21
TMB	1 019	332	851	120	85	12.19
EQUITY BANK	651	331	503	80	68	4.41
ECOBANK	603	205	488	48	55	12.42
FBN	560	157	434	23	55	8.37
BGFI	455	178	290	39	36	11.12
STANDARD BANK	453	78	295	67	34	13.84
BOA	328	194	187	32	28	6.10
SOFIBANQUE	227	124	135	74	41	9.50

Source: DELOITTE, *Etude sur le secteur bancaire en République Démocratique du Congo 2015-2016*, 2017, http://magazinekivuzik.com/les-10-meilleures-banques-en-rdc/, Accessed on December 08, 2019

The term commercial banks includes establishments with different statuses: mutual banks, banks in the cooperative sector. These are so-called "network" or "network" banks, which have traditionally developed through the establishment of several branches. These establishments belong to the retail banking sector: the loans granted, the savings products taken out, the assets managed are very varied. (ALEXANDRE, H., 2013: 11)

A commercial bank is a financial institution whose basic activities are mainly oriented towards individuals (deposits, investments, credit), companies and public authorities. These can be physical establishments (agencies, distributors) or virtual (online or remote presence only). Their capital is held by shareholders who are not necessarily customers. Its primary role is the creation of money through the credit multiplier mechanism. The main source of monetary creation is loans granted by banks. The latter encounter exogenous limits to their power to create money, such as: the network bank cannot issue banknotes; the commercial bank only creates money from the central bank (banknotes and deposits at the Central Bank). The currency

created by commercial banks in their granting of credit is called book money or bank money. It is represented by the sum of sight deposits and current accounts recorded in the registers of deposit banks, postal check accounts and financial intermediaries receiving sight deposits called secondarily monetary financial intermediaries.

Scriptural money is not created in an unlimited way. Indeed, those who have made bank sight deposits can, by means of a check or transfer (which are deposit mobilization instruments), withdraw their assets at any time. The bank must then cope with the withdrawal of deposits payable on sight by keeping a cash position in banknotes, the proportion of which depends on the payment habits of the public.

- **Characteristics of banks in the Democratic Republic of Congo** (MUADIMANGA, I. E., 2016: 56-62)

To the extroverted nature of the economy, which is highly dependent on the outside for basic products, oriented mainly towards crops or mining products for export and dominated by the weakness of the local processing manufacturing industry, is added the non-existence financial markets.

Despite the increase in the number of active bank accounts in Congolese financial institutions, from 1,547,120 accounts in 2011 to 6,663,259 in 2019 in the space of eight years, the sector remains underbanked. for nearly 70,000,000 inhabitants of the active population (MUTOMBO, D). We find the insufficiency and marginalization of credit institutions, the poverty of financial services, excessive pricing, the limited number of specialized institutions for training in banking techniques and management, the absence of local private institutions for rating banks , the exaggeration of the informal sector, the crisis of confidence, the high volatility of prices and the omnipresent dollarization of services, inappropriate pricing, the stigmatization of foreign banknotes unfit for circulation, credit management, risk phobia , the heaviness in reacting to complaints, the decline in activities in the export products sector, the self-sufficiency of personnel masking knowledge or approximate training in the trade and the general lack of procedure manuals or descriptive sheets of use. All these deserve attention because of their impact on operational risks.

At the internal and functional levels, several banks have happily made significant reductions in the conditions for opening and managing accounts. Among these reductions, there is the reduction of the initial payment to more or less 100 dollars in default of nil, the relaxation of

formalities for access to the credit obtained and the waiver of account maintenance fees for certain categories.

Several services that were unknown or reserved for certain institutions and a few customers have been extended to a larger fraction of credit institutions for a large customer base. These include: e-banking allowing online management of accounts, the use of automatic cash dispensers, text message alerts for monitoring accounts, the use of bank cards.

Many banks now grant preferential conditions for opening accounts. They compete in innovative commercial products for their customers, get closer to them through their locations and service schedules, skilfully manipulate the exchange rate and regularly use information technology applications or new management techniques. Some banks have lowered their commissions charged on certain transactions (withdrawal of funds, credit card purchase, etc.).

Regarding the currency of settlement, the largest share of loans granted by banking institutions is in foreign currencies (DELOITTE, 2017). With the dollarization of the Congolese economy, the size of the loans granted (i.e. 82.6% and 89% of the loans granted in 2009 and 2010 being in foreign currency) reached exorbitant proportions. Similarly, deposits in US dollars occupy more than 90% of all banks (i.e. 99% and 85% in 2009 and 2010) (Banque Centrale du Congo, 2015: 203).

The conditions for granting lines of credit whose categories, remuneration and durations are as diverse as the financial objects, they remain subject to the guarantees presented by the applicants, to their repayment capacities. The requirements for collateral of 100% or more, of assets in foreign currency which constituted the preferred securities for banks in the 1980s and 1990s have been relaxed with mixed guarantees combining mortgage deeds, sureties, assignment of receivables, etc

The debit interest rates practiced border on usury and are generally fixed and frozen during the life of the credit. As soon as they are released, the credits often suffer from the lack of support from the donors who are only waiting for the repayment deadlines. Very often, in some banks, the rates applied to transactions are subject to professional secrecy to the point that they give rise to operational monitoring by stakeholders. It is therefore common to spy on the competition for a competitive offer of conditions.

In addition, the principle of value dates, that is to say, that of the date to be taken into account for the accounting of a transaction, raises many concerns for the client. Indeed, the value date system is configured so that account debits are recorded the day before the day of execution of

the transaction while account credits are recorded the day after the transaction day. The magic formula is: day plus one for credits and day minus one for account debits. The negative impact of value dates on the generation and recognition of debit interest remains real and increases the cost of account movements, especially in the event of large transactions.

In these practices, the sad self-sufficiency of certain operational staff is peremptorily displayed, imbued with their esoteric acquired skills and strong in the advantages linked to the character of adhesion of contracts between banks and customers. This type of agreement only offers customers a limited margin for negotiation on the essential clauses of the relationship between the parties. The standard clauses are already drawn up, often in the interest of the banker and the client is invited to subscribe to them.

The banker manifests an ease in mastering the artifices of the banking profession and considers that the client must learn everything from him. Some banks are rigid in certain administrative formalities aimed at satisfying the demand of their customers. Sometimes, the customer who is called upon to respond to a call for tenders has difficulty receiving an account confirmation certificate from his banker.

Such behaviors dishonor the bank and contribute to increasing its rate of distrust and the attrition of its customers. This banking business, which is like a game of risk and whose first challenge remains harmonization and synchronization, has little need for arrogance hiding stubborn ignorance. This dirty the profession.

3. Data analysis and interpretation of results

The assessment of the risk of business default began in the 1960s, through the analysis of their financial situation. The techniques used are varied, but the general principle of these various studies is the same: to exploit knowledge and ex-post information on the future of companies (Nokairi, W. 2019: 16).

Thus, this point is devoted to the empirical analysis of data on the default rate and net operating income. It includes the following four points: the methodological framework, the presentation of the model, the calculation of the default rate, the estimation of the model and finally the interpretation of the results obtained.

3.1. Methodological framework

Methodologically, we relied on the documentary technique for data collection. The annual reports of the banks including their financial statements enabled us to collect the net results as

well as the useful accounting indicators in order to calculate the default rates with which we estimated the model.

The sample taken consists only of commercial banks established in the DR Congo. The data used are the financial statements, i.e. the balance sheets and the income statements. This accounting information is collected over a period of 7 years from 2011 to 2017. Initially, we selected for this study the banks according to the ranking of the ten best banks established in the DRC according to the report provided by the audit firm "Deloitte".

Secondly, the criterion for choosing our sample is based on the reasoned choice method or the empirical sample. For this method of reasoned choice, when one wishes to constitute a representative sample of the population that one wishes to study, it is advisable to have a minimum sample equivalent to 30% of the population. And, we have taken the option of going beyond 30%. On the basis of the financial statements made available to us, we have constituted a sample of 70%, i.e. 7 banks among the 10 of the best in the country.

3.2. Presentation of the model

The model used is the simple linear regression model. Thus, we start from the following function:

$$\mathbf{Y= f(X)}$$

X is an explanatory variable of the model representing the default rate (TD);

Y is a variable to be explained, it represents the net operating income (RNE).

The mathematical specification takes the following form:

$$\mathbf{Y= b_0 + b_1X}$$

$\mathbf{b_0}$ represents the constant and $\mathbf{b_1}$ the parameter to be estimated

The choice of a simple linear relationship between these variables is justified by the fact that our work is concerned with analyzing two quantitative variables.

Economic or social phenomena being essentially stochastic, the introduction into the model of the random variable representing the residuals leads to my following statistical specification :

$$\mathbf{Y= b_0 + b_1X_t+U_t}$$

$\mathbf{U_t}$ represents the random variable. It captures the part of the behavior of the endogenous variable that is not explained by the exogenous variable of our model.

3.3. Calculation of default rate (TD)

The relationship between capital and the risk of bankruptcy is not absolutely standardized, but it depends on the attitude to be adopted by the bank and the evolution of its solvency ratio.

The default rate being one of the ratios of the financial diagnosis, it is obtained by making the ratio of overdue loans to the total of outstanding loans. Also called the risk control ratio, it measures the risk of non-reimbursement of receivables granted to customers. For this ratio, the ideal situation is that it should be less than 5% (De COUSSERGUE S., 2005: 116-117).

As a reminder, the default rate is determined by the ratio between doubtful loans and gross loans. The figures given in Table 2 were calculated on the basis of the data given in Appendices 1 and 2.

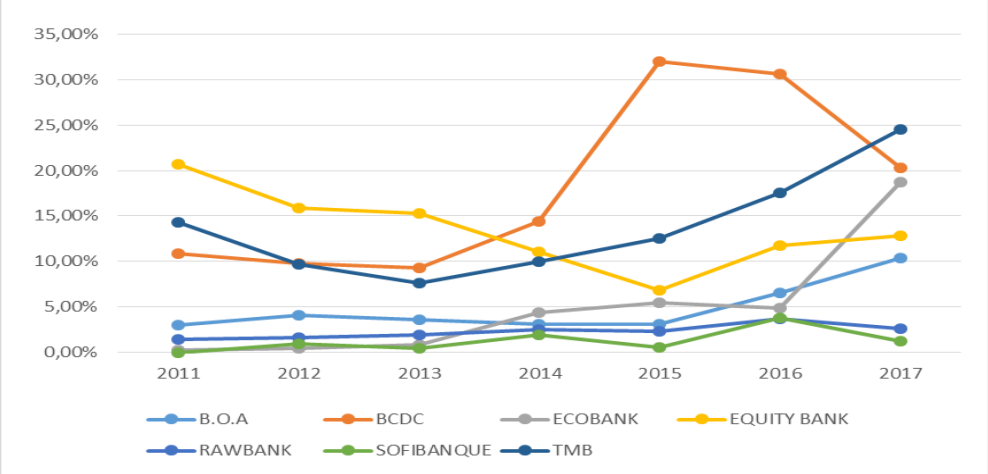
Table 2. Default rate from 2011 to 2017

BANKS / YEARS	B.O.A	BCDC	ECOBANK	EQUITY BANK	RAWBANK	SOFIBANQUE	TMB
2011	3,03%	10,83%	0,22%	20,72%	1,41%	-	14,26%
2012	4,07%	9,82%	0,41%	15,85%	1,61%	0,90%	9,67%
2013	3,56%	9,32%	0,82%	15,27%	1,96%	0,46%	7,63%
2014	3,05%	14,44%	4,38%	11,03%	2,54%	1,90%	9,94%
2015	3,07%	32,02%	5,47%	6,83%	2,27%	0,56%	12,50%
2016	6,56%	30,60%	4,88%	11,78%	3,66%	3,83%	17,56%
2017	10,35%	20,28%	18,72%	12,87%	2,60%	1,26%	24,53%
Average	5%	18%	5%	13%	2%	1%	14%

Source: Author based on data from banks' annual reports.

Reading the table above implies that the average default rates are 5%, 18%, 5%, 13%, 2%, 1% and 14% respectively for BOA, BCDC, ECOBANK , EQUITY BANK, RAWBANK, SOFIBANQUE and TMB. We note that overall, only RAWBANK and SOFIBANQUE are within the controllable threshold, i.e. the averages of their default rates are below 5%, which is in line with the theory mentioned by De COUSSERGUE S., (2005). And for the five (5) other banks, controlling the risk associated with the loans granted poses a problem, because their average default rates are above 5%. In this way, Figure 1 shows the evolution of default rates throughout the study period.

Figure 1. Evolution of default rates from 2011 to 2017



Source: Author, from Excel 2016 on database in possession.

In this figure, we note that for RAWBANK and SOFIBANQUE, their curves evolved below the 5% threshold, which means that their default rates remained within the controllable threshold throughout the period considered. This is not the case for other banking institutions. In addition, Table 3 allowed us to find interesting results by determining the percentage of loans granted by all the banks under examination compared to the overall envelope of credit granted during the period under consideration. This exercise proved to be useful insofar as theoretically a bank which grants large amounts of credit takes a greater risk than the others.

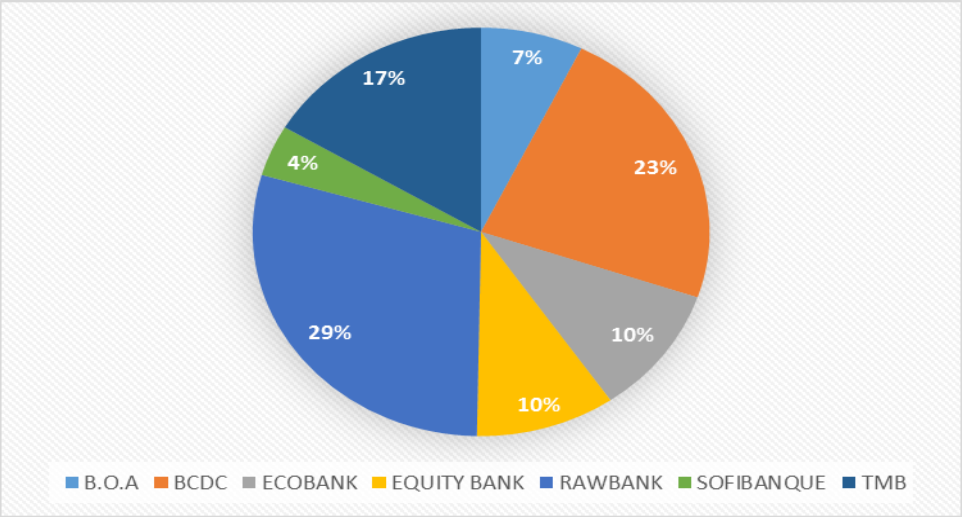
Table 3. Percentage of loans granted by bank from 2011 to 2017

Banks	**Total credit granted**	**Percentage**
B.O.A	570 098 079 134,80	7%
BCDC	1 808 664 766 663,60	23%
ECOBANK	804 883 188 916,60	10%
EQUITY BANK	778 331 084 913,40	10%
RAWBANK	2 300 325 839 900,10	29%
SOFIBANQUE	318 759 493 176,10	4%
TMB	1 295 575 560 851,70	16%
TOTALS	7 876 638 013 556,30	100%

Source: Author based on the data given in appendix 2.

Reading Table 3, we see that RAWBANK is the banking institution that granted significant credit, i.e. 29%, while SOFIBANK is the one that granted less credit, i.e. 4%. These data are graphically represented in Figure 2 below.

Figure 2. Percentage of loans granted by bank from 2011 to 2017



Source: Author, from Excel 2016 on database in possession.

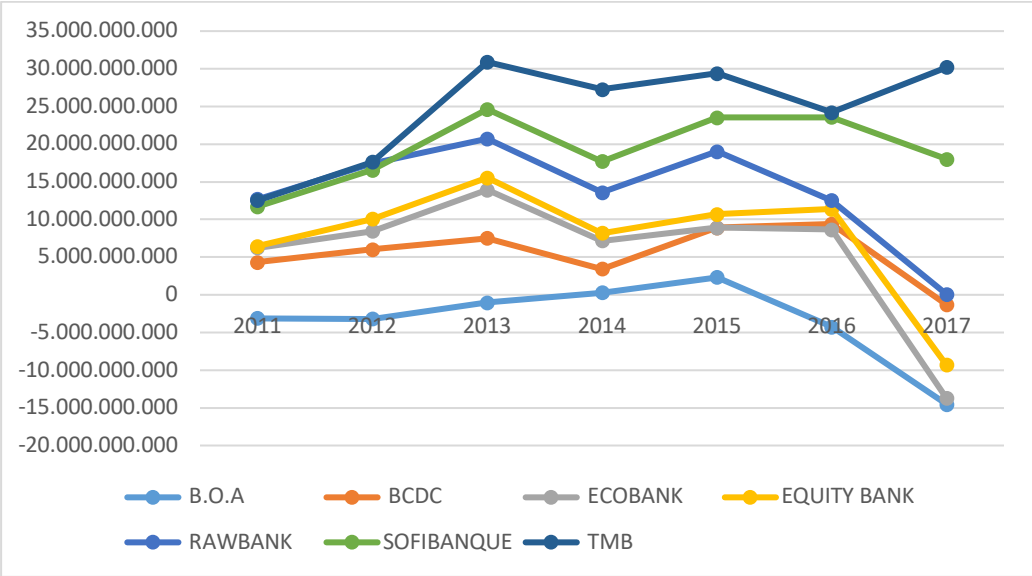
This pie chart gives the percentages of loans granted by each bank during the entire period considered. We note that RAWBANK comes first with 29%, followed by BCDC, TMB, ECOBANK, EQUITY BANK, BOA and SOFIBANK with respectively 23%, 17%, 10%, 10 %, 7% and 4%.

Although RAWBANK and SOFIBANK have respectively a higher and a lower percentage of credit granted as presented in Table 4, the two institutions have lower average default rates of 2% and 1% respectively in Table 3 and located at the controllable threshold. For RAWBANK, we found that despite the scale of the risk taken by granting large loans, it was able to recover them better. This situation would probably be justified by a good internal managerial strategy for granting and recovering loans, which could be the subject of further research. SOFIBANK, for its part, would have a restrictive credit granting policy, which is why it grants smaller credits. This policy has also enabled it to have a controllable average default rate.

3.4. Estimate and interpretation

Before presenting the results obtained from the estimation by Microsoft Excel software, let us first analyze the evolution of the NREs as shown in Figure 3 from the data in Appendix 3 of this article.

Figure 3. Evolution of net results from 2011 to 2017



Source: Author, from Excel 2016 on database in possession.

The figure above gives us the annual evolution of net results from 2011 to 2017. Overall we observe that the BANK OF AFRICA (BOA) made losses in 2014. The other banks made profits in particular: the BANQUE COMMERCIALE DU CONGO (BCDC), RAWBANK, SOFIBANQUE, TRUST MERCHANT BANK (TMB), EQUITY BANK and ECOBANK.

After estimation using Microsoft Excel, the function equations of the RNE by banks with respect to X are as follows:

$$R_{BOA} = 5\ 489\ 403\ 305 - 183\ 974\ 395\ 234\ X$$

$$R_{BCDC} = 6\ 617\ 276\ 107 + 12\ 179\ 491\ 203\ X$$

$$R_{Ecobank} = 4\ 574\ 051\ 233 - 87\ 890\ 996\ 075\ X$$

$$R_{Equity} = 3\ 529\ 820\ 469 - 12\ 010\ 953\ 244\ X$$

$$R_{Rawbank} = -\ 487\ 629\ 171 + 105\ 045\ 564\ 465\ X$$

$$R_{Sofi} = 2\ 343\ 806\ 821 + 261\ 265\ 665\ 354\ X$$

$$R_{TMB} = 1\ 885\ 531\ 666 + 24\ 153\ 836\ 341\ X$$

The models thus obtained are justified as follows:

1. a positive relationship between the endogenous variable and the exogenous variable. For the BCDC, the TD explains the RNE at 10%, to say that an increase of one TD unit will lead to an increase of 12,179,421,203 dollars in the RNE; as for the RAWBANK, the TD explains 34% of the RNE, an increase of one unit of TD will cause an increase of 105,045,564,465 in the

RNE; concerning SOFIBANQUE, the TD explains the RNE at 24%, which means that an increase of one unit of TD has the effect of increasing the RNE by 261,265,665,354 and for the TMB, the TD explains at 9% the RNE, this shows that an increase of one unit of TD has the effect of increasing the RNE by 24,153,836,341.

2. a negative relationship between the endogenous variable and the explanatory variable for the rest of the banks, in particular the BOA, where an increase of 1 unit of TD will lead to a drop of 183,974,395,234 in RNE and TD explains 87% of the RNE; for ECOBANK, the TD explains 88% of the RNE, this situation is justified by the effect that an increase of 1 unit of TD results in a decrease of 87,890,996,075 of the RNE; and finally, for the Equity bank, the TD explains 15% of the RNE and this negative link is explained by the fact that an increase of 1 unit implies a reduction of 12,010,953,244 of the RNE.

Our results found are theoretically supported by the authors MODIGLIANI and MILLER on the one hand and CALEM, and ROB on the other hand mentioned in the review of the literature. According to these authors, there is an indisputable nature of the need for an adequacy between capital and the risk of bankruptcy.

Conclusion

The main objective of this study was to calculate bank default rates and assess their impact on net results. In order to achieve this objective, we relied on the documentary technique (books, articles, annual reports of banks including their financial statements, etc.). As a result, we have made the following assumptions: firstly, more than half of the banks under analysis would be within an uncontrollable threshold, i.e. their default rates would be above 5%. Secondly, because the Congolese banking activity is subject to the fragility of the country's financial system, there would be a negative relationship between the TD and the RN, this means that if the TD increases the RN should fall.

From our analyses, the following emerges: only RAWBANK and SOFIBANQUE are within a controllable threshold following their respective average DRs of 2% and 1% which are less than 5%, consequently more than half of the banks under analysis are in the uncontrollable zone. In addition, our results confirmed the existence of a negative relationship between TD and RN for BOA, ECOBANK, EQUITY BANK. For the latter, according to the coefficients of determination (R^2) of our estimates, the TD would explain the RNE respectively at 87%, 88% and 15%. On the other hand, there was a positive relationship between TD and RN for BCDC,

RAWBANK, SOFIBANQUE and TMB, but with respective coefficients of determination of 10%, 34%, 24% and 9%.

In summary, although the results of our study show that the institutions under study were greatly exposed to the risk of default, they did not close their doors. These institutions are maintained until then since they are not unable to honor their financial commitments to depositors.

By observing the various studies carried out on the credit risk of banks, we have identified certain limitations: the sample size is small and the study period is less extensive; the simple linear regression model used to assess the relationship between the RNE and the DR did not take into account qualitative variables, in particular the behavior of borrowers, market trends, the economic situation.

Given that few studies have been conducted in this area of default risk in my country the DRC, our research fills this gap in the financial literature concerning the impact of default risk on the RNE of banks. The managerial implication of this work is due to the fact that, based on the recommendation formulated below, this article constitutes a tool to help with decision-making regarding the granting of credits.

In order to reduce the risk of default, we recommend that bankers develop a model based on the analysis of the repayment capacity of borrowers, rather than on the assets financed, the nature and value of which may be more volatile. The prospects for future research can be focused on analyzing the feasibility of introducing a new information system (quantitative and qualitative) allowing bankers to estimate the repayment capacity of borrowers, which could be summarized by the following question: why so many difficulties for customers to repay the loans granted to them?

APPENDICES

Annex 1. Doubtful loans deflated in Congolese francs

Banques / Années	B.O.A	BCDC	ECOBANK	EQUITY BANK	RAWBANK	SOFIBANQUE	TMB
2011	450 258 401,00	16 552 690 000,00	138 485 000,00	8 423 426 147,00	1 970 000 000,00	-	16 835 622 000,00
2012	1 054 428 832,40	19 717 712 070,50	363 938 132,80	8 308 929 146,40	3 399 001 913,50	91 504 972,40	11 821 605 691,40
2013	1 734 273 983,90	21 198 149 660,20	917 200 199,20	10 597 308 104,80	5 299 538 914,90	109 380 735,40	14 803 000 068,60
2014	2 471 090 764,00	37 388 600 260,50	4 605 347 697,90	9 668 346 097,70	8 037 601 383,90	636 870 599,30	18 154 075 531,40
2015	3 516 348 683,80	82 498 151 550,80	7 056 166 736,60	8 663 543 682,30	9 409 309 797,80	380 327 058,50	25 199 257 077,70
2016	10 184 378 863,90	112 371 143 204,40	8 482 189 221,50	22 293 563 706,20	18 715 757 976,30	4 106 581 157,20	44 760 944 301,80
2017	13 431 569 673,20	62 007 923 689,00	24 888 009 038,90	27 302 153 272,60	11 366 715 820,70	917 976 433,60	54 489 338 309,30
Total	32 842 349 202,20	351 734 370 435,50	46 451 336 027,00	95 257 270 157,00	58 197 925 807,20	6 242 640 956,50	186 063 842 980,30

Source : author, based on data from the annual reports of the banks concerned.

Annex 2. Gross loans deflated in Congolese francs

Banques / Années	B.O.A	BCDC	ECOBANK	EQUITY BANK	RAWBANK	SOFIBANQUE	TMB
2011	14 879 775 610,00	152 867 541 000,00	63 474 407 000,00	40 653 537 590,00	139 235 666 000,00	3 502 513 809,00	118 025 521 000,00
2012	25 923 214 308,40	200 758 288 001,00	88 533 129 039,90	52 436 555 140,40	211 371 550 638,00	10 219 115 275,40	122 264 042 259,50
2013	48 665 544 134,40	227 524 086 323,20	112 156 455 855,30	69 402 006 158,60	270 546 094 204,00	23 549 760 460,90	194 085 406 647,20
2014	80 909 248 888,90	260 576 455 001,00	105 138 509 288,00	87 682 406 476,30	315 944 022 687,00	33 535 223 649,60	182 584 072 313,20
2015	114 659 724 135,60	257 629 469 079,90	128 923 189 536,40	126 841 731 633,60	414 865 521 056,10	67 860 327 006,50	201 579 653 284,00
2016	155 296 041 633,10	403 522 086 000,90	173 715 529 697,20	189 189 610 088,20	511 395 426 310,10	107 147 806 800,40	254 914 336 434,70
2017	129 764 530 424,40	305 786 841 257,60	132 941 968 499,90	212 125 237 826,30	436 967 559 004,90	72 944 746 174,30	222 122 528 913,10
Total	570 098 079 134,80	1 808 664 766 663,60	804 883 188 916,60	778 331 084 913,40	2 300 325 839 900,10	318 759 493 176,10	1 295 575 560 851,70

Source : author, based on data from the annual reports of the banks concerned.

Annex 3. Net operating results of banks in Congolese francs

Banques / Années	B.O.A	BCDC	ECOBANK	EQUITY BANK	RAWBANK	SOFIBANQUE	TMB	Total
2 011	-3 126 751 316,00	7 443 516 000,00	1 926 598 000,00	192 551 177,00	6 253 394 000,00	-980 196 489,00	798 802 000,00	12 507 915 383,00
2 012	-3 203 934 387,00	9 228 678 000,00	2 435 657 000,00	1 580 435 048,00	7 391 700 000,00	-874 595 253,00	1 067 638 000,00	17 625 580 420,00
2 013	-1 041 702 671,00	8 534 819 000,00	6 441 344 000,00	1 612 876 403,00	5 164 384 000,00	3 922 571 559,00	6 260 945 000,00	30 895 239 304,00
2 014	280 999 900,00	3 152 838 000,00	3 723 597 000,00	1 033 733 870,00	5 381 916 000,00	4 123 671 150,00	9 587 155 000,00	27 283 912 934,00
2 015	2 306 240 631,00	6 606 514 000,00	3 652 000,00	1 791 954 819,00	8 325 964 000,00	4 502 102 227,00	5 851 189 000,00	29 387 618 692,00
2 016	-4 250 288 132,00	13 651 445 000,00	-764 166 000,00	2 757 612 220,00	1 120 109 000,00	11 040 051 129,00	656 939 000,00	24 211 704 233,00
2 017	-14 519 714 644,00	13 208 833 000,00	-12 422 281 000,00	4 407 245 361,00	9 393 154 000,00	17 951 814 209,00	12 185 475 000,00	30 204 527 943,00
Total	-23 555 150 619,00	61 826 643 000,00	1 344 401 000,00	13 376 408 898,00	43 030 621 000,00	39 685 418 532,00	36 408 143 000,00	172 116 484 811,00

Source : author, based on data taken from the income statement of the banks concerned..

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