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Effects of Banking Provisions on the Quality of Assets of Commercial Banks in the Central African Economic and Monetary Community (CEMAC): An Application by the Generalized Moments Method (GMM)

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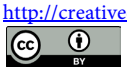

Abstract

The main objective of this article is to analyze the impact of bank provisions on the asset quality of CEMAC commercial banks over the period 2004-2018 using panel data analysis and the generalized method of moments. The results of this study showed a strong positive relationship between bank provisions (PCS) and nonperforming loans (NPLs). Return on assets (ROA) and inflation showed a significant negative impact. However, the rate of gross domestic product (TxGDP), return on equity (ROE) and the ratio of deposits to loans (RCD) did not have a significant impact on NPLs. CEMAC commercial banks should anticipate high levels of capital losses when creating higher provisions, reducing the volatility of results and strengthening their solvency in the medium term.

Keywords

Banking, Provisions, Quality of Assets

1. Introduction

The sharp increase in nonperforming loans (NPLs) over the past decade has attracted the attention of many researchers around the world in an attempt to explain this phenomenon. Moreover, the banking sector plays a decisive role in the functioning of the economy. Indeed, through its intermediary role, the banking sector makes it possible to collect funds from savers and to grant loans to eco-

nomic agents in need of consumption or investment (Diamond, 1984). One of the challenges of lending is accurately predicting whether a loan will be repaid in full. This implies that loans involve credit risk, specifically default risk. As credit risk is relatively high and increasing since the fall in commodity prices and the ensuing African economic downturn in 2014, an analysis of the determinants of credit risk seems both relevant and timely (Brei et al., 2020). CEMAC banks are marked by their exposure to nonperforming loans, as their banks reveal an increase in their nonperforming loans between 2016 and 2018 from 14.9 to 21.2% (RSF, 2018)[1].

This problem has given rise to theoretical analyses and empirical work; on the theoretical level, two approaches have been identified. The first approach is based on the theory of banking financial intermediation developed by Gurley and Shaw (1960). This theory stipulates that banks act as intermediaries between depositors and borrowers. In contrast, the second approach, that of information asymmetry (Akerlof, 1970), argues that asymmetric information occurs when one party in a transactional relationship is more knowledgeable about the transaction than the other party.

Empirically, the results obtained by different authors are conflicting. Indeed, Chen et al. (2018), by studying the effect of liquidity risk and bank capital on the profitability of banks, obtained results showing that the liquidity risk has inverse effects on the performance of banks in a system market-based finance. Otherwise, Nugroho et al. (2021) determine the partial and simultaneous influences of loan loss allowances, nonperforming loans and third-party funds on the bank's capital adequacy ratio. The results showed that a partial provision for loan losses had no significant effect on the bank's capital adequacy ratio, while nonperforming loans and third-party funds partially influenced the capital adequacy ratio of the bank. In their study, Ahmed, Takeda & Shawn (1998) revealed that loan loss provisions have a significant positive influence on nonperforming loans. According to Ozili and Adamu (2021), provisions for bank loan losses are lower in countries that have high levels of financial inclusion only when financial inclusion is achieved through the combined use of formal account ownership. In addition, nonperforming loans are lower in countries that experience economic booms and high levels of financial inclusion.

Thus, most research on the link between asset quality and provisions is limited to the impact of nonperforming loans (NPLs) on these determinants. The effect of asset quality on bank provisions has not been sufficiently analyzed for CEMAC banks. The research that has mentioned these bank provisions includes that of Nugroho et al. (2021) in Indonesia and Ozili and Adamu (2021) in Sub-Saharan Africa, who used this variable for its influence on the funds adequacy ratio on the one hand and on financial inclusion on the other hand. However, these empirical analyses do not distinguish between asset quality and

[1]RSF stands for Financial Stability Report
https://www.beac.int/wp-content/uploads/2019/02/RSF-AC_VF_27_03_20_1.pdf

bank provisions.

Thus, the objective of this study is to analyze the impact of bank provisions on the quality of assets of commercial banks in CEMAC. Asset quality is related to the quality of loans provided by the bank, and loan quality can be measured by nonperforming loans constituting delinquent loans. Using empirical evidence, we test the hypothesis that bank provisions have a positive influence on asset quality.

The article is organized as follows. In addition to this introduction, the study includes four other sections. The second section presents the data and variables. The third section presents the methodology. The fourth section presents our main results. Finally, the fifth section addresses the conclusion and the implications of economic policies.

2. Data and Choice of Variables

The data used to study the hypothesis of this work were accumulated from reports published by the Bank of Central African States (BEAC) and the Banking Commission of Central Africa (COBAC). These data are established over a period from 2004 to 2018, taking into account their availability. The variables are grouped in terms of dependent variables and independent variables.

With regard to the dependent variable, the objective of this work is to analyze the effects of the provisions constituted by the banks on the quality of the assets. Thus, the chosen dependent variables are nonperforming loans. Indeed, these loans represent the losses that banks incur when the borrower fails to honor their obligations on the due date or at maturity of the loan, which can lead to bankruptcy if not managed appropriately (Campbell, 2007). For the independent variables, the (LDR) serves as a liquidity indicator and gives indications of the banking system's ability to mobilize deposits to meet the demand for credit (Vogiazas & Nikolaidou, 2011). The bank's performance is measured by two variables: return on equity (ROE), which is the ratio of net income to equity, and return on loan-to-deposit ratio assets (ROA), which is the ratio of net income to total assets. These variables are widely used by others, such as Naceur and Omran (2011), Kosmidou (2008) and Siddiqui (2008), and are considered two of the best measures of bank profitability in the related literature (Sinkey, 2002). We include the ratio of deposits to total assets (RDA), similar to Menicucci and Paolucci (2016). The ratio of deposits to total assets measures the level of funding of the bank's assets by its deposits, which reflect the degree of stability of a bank's funding, in turn influencing the performance of the bank. We also include the ratio of provisions to bad debts (PCS). This ratio reflects the quality of a bank's assets (Trad et al., 2017). In addition, we studied the influence of two macroeconomic variables. Indeed, according to Espinoza and Prasad (2010), the subprime crisis reveals the importance of linking macroeconomic variables to the stability of banking systems. In this context, we have added variables, growth rate of GDP per capita (TxPIB) and inflation rate represented by the consumer price index (CPI).

3. Study Methodology

3.1. Presentation of the Correlations between the Explanatory Variables

Table 1 presents the correlation between the different explanatory variables. Most of the correlation values of the variables, apart from "PROVC", "NPLs", "ROA" and "RDB" are relatively weak, which suggests that there is no significant problem of multicollinearity if two of the cited variables with different correlation values are removed. We therefore remove the "PROVC" and "RDA" variables in the estimation of the model.

3.2. Descriptive Analysis

Table 2 presents the descriptive statistics of the variables used in this research. The average values of the growth rate of GDP per capita, the rate of provision of bad debts, the return on assets, equity, and the consumer price index are acceptable throughout the CEMAC zone. However, the average credit risk value is 14.27. This value remains very high, indicating that CEMAC banks face high levels of credit risk.

3.3. Choice of Model

Most previous studies have focused on the effect of credit risk on bank profitability, bank liquidity risk and performance (Chen et al., 2018) and the impact of the management of credit risk on the profitability of commercial banks (Kidane, 2020). Most of the authors of these previous studies have used regression models based on the method of generalized moments and that of generalized least squares on panel data To be able to measure the effect of bank provisions on nonperforming loans, we will use the generalized method of moments (GMM), as is the case in most empirical work on credit risk.

Table 1. Correlation matrix between explanatory variables.

	NPLs (−1)	PROVC	LDR	RDA	ROA	ROE	CPI	TPCS	TXGDP
NPLs (−1)	1.00								
PROVC	0.91	1.00							
LDR	0.61	0.68	1.00						
RDB	−0.24	−0.25	−0.32	1.00					
ROA	−0.15	−0.19	−0.18	0.81	1.00				
ROE	−0.36	−0.41	−0.36	0.22	0.56	1.00			
CPI	0.13	0.08	0.07	0.10	0.02	−0.12	1.00		
PCS	−0.01	0.18	−0.02	0.18	0.19	0.08	0.13	1.00	
TXGDP	−0.12	−0.11	−0.22	0.13	0.18	0.25	−0.09	0.40	1.00

Source: Author's calculation.

Table 2. Descriptive statistics of the variables used.

Variables	Obs	Mean	Std. Dev.	Min	Max
PNL	90	14.27	8.82	1.38	37.61
PNL (−1)	84	13.60	8.47	1.38	34.56
RCD	90	71.19	28.21	25.93	177.31
ROE	90	20.59	12.52	−9.92	65.76
TPCS	90	68.93	18.75	9.23	119.95
ROA	90	1.59	1.70	−1.84	14.66
TxPIB	90	3.44	7.55	−36.39	33.73
RDB	90	86.39	48.96	50.59	526.33
TI	90	2.98	3.21	−7.4	17.83
DPCS	84	−0.69	20.42	−80.29	81.85
DPNL	84	0.45	4.27	−9.06	20.40

Source: author's calculation.

3.3.1. Model Specification

To take into account the tendency to persist over time of credit risk, the use of a dynamic model that ensures robustness by taking into account heteroscedasticity, endogeneity and serial correlation proves to be very useful. For this purpose, researchers use the generalized methods of moments (GMM) estimator proposed by Arellano and Bond (1991). This estimator provides more robust results because it guarantees efficiency and consistency.

The model specification takes the following form:

$$Y_{it} = \beta_0 + \beta_1 Y_{it-1} + \beta_2 X_{it} + \beta_3 Z_{it} + \cdots + \beta_n U_{it} + \varepsilon_{it}$$

where X_{it}, Z_{it}, …, U_{it} represent the exogenous variables of the model; Y_{it-1} is the endogenous variable lagged by one period; les β_i are the model coefficients; and ε_{it} is the error term.

3.3.2. Estimation Method

The "generalized moments" method in dynamic panels was introduced by Holtz-Eakin et al. (1988), Arellano and Bond (1991) and Arellano and Bover (1995).

There are two variants of dynamic panel GMM estimators: the GMM estimator in first differences and the GMM estimator in system. Within the framework of this research, the second estimator will be used; indeed, this estimator combines the equations in first difference with the equations in level in which the variables are instrumented by their first differences (Blundell & Bond, 1998), which appears more efficient than that put forward by Arellano and Bond (1991). The validity of the additional instruments is tested using Sargan's or Hansen's instrument validity tests. These tests make it possible to determine whether the instruments are exogenous or not.

4. Results

4.1. Panel Structure Specification Test

Within the framework of a panel model, it is essential to determine upstream the structure of the panel or even the homogeneous or heterogeneous specification of the process generating the data. This means testing the equality of the coefficients of the model studied in their individual dimension. The purpose of these tests is to determine whether we are entitled to assume that the theoretical model studied is perfectly identical for all individuals (*total homogeneity*) or, on the contrary, if there are specificities specific to each individual (*total heterogeneity*). In this case, the results of the Hsiao test (1986) display a partially homogeneous panel because the first two critical probabilities of the Fisher test concerning the first two hypotheses are less than 5% and the third probability is greater than 5%. This is a *heterogeneity of the coefficients of the explanatory variables and homogeneity of the constant terms.*

We estimate a system GMM model, which eliminates individual fixed effects; therefore, it is no longer necessary to distinguish between a model with individual fixed effects and a model with random effects (Table 3).

4.2. Model Validity Tests

Sargan/Hansen overidentification test

For the various models produced, the *p* values of the Sargan and Hansen statistics are greater than 5%. These confirm that the instruments used are valid (Table 4).

Arrelano and Bonde autocorrelation test

The results of the Arrelano and Bonde autocorrelation tests indicate probabilities greater than 5% for AR (1) and AR (2). Thus, there is no autocorrelation of orders 1 and 2 (Table 5).

Table 3. Result of the Hsiao (1986) homogeneity test.

HSIAO test					
F1		F2		F3	
Statistics	*p* value	Statistics	*p* value	Statistics	*p* value
2.888535	0.00045594	3.0072229	0.00038581	1.0760026	0.38033322

Source: author, calculated from Stata 16.

Table 4. Instrument over identification test results.

Sargan test		Hansen test	
Statistics	*p* value	Statistics	*p* value
8.80	0.117	0.00	1.000

Source: Author's calculation from Stata 16.

Table 5. Arrelano and Bonde autocorrelation test.

AR (1)		AR (2)	
Statistics	*p* value	Statistics	*p* value
−1.78	0.074	0.33	0.741

Source: Author's calculation from Stata 16.

4.3. Results of the Estimation of the GMM in the System and Discussion

The results of the estimation are recorded in Table 6. These results were obtained using Stata 16 software.

The regression shows that four variables are significant at the 1% level: PNL (−1), PCS, ROA and CPI. The probability associated with the Wald statistic (Prob > chi2 = 0.000) is below the critical threshold of 0.05, which indicates that the model is globally significant. In other words, at least one explanatory variable coefficient has a significant effect on nonperforming loans.

The results showed a positive and significant relationship of 1% between nonperforming loans delayed by one year and nonperforming loans in the current year. Nonperforming loans from CEMAC banks persist. Indeed, when a bank does not have the capacity to eliminate or manage the nonperforming loans of a given year, these loans accumulate over time. This sharp deterioration in the quality of the bank credit portfolio has increased the vulnerability of the CEMAC banking system.

In regard to the provisioning rate for bad debts (PCS), it also has a positive and significant effect of 1% on nonperforming loans. Indeed, the increase in the ratio of nonperforming loans generally implies an increase in the provisions to be constituted by the banks, which limits their ability to distribute credit. This result is similar to that of Fisher, Gueyie and Ortiz (2001). The regression analysis shows that the return on assets (ROA) negatively and significantly affects the risk of banks at a level of 1%. Thus, an increase in bank profitability leads to a reduction in bank credit risk. This is explained by the fact that a bank with high profitability is less encouraged to generate income and therefore less constrained to engage in lending activities. In addition, inefficient banks are forced to grant credit deemed risky and subsequently experience high levels of nonperforming loans. Asset profitability contributes to a decline in nonperforming loans. This is consistent with the work of Godlewski (2004) and Ali (2013). Furthermore, Inflation showed a significant negative relationship with NPLs, revealing that in times of low inflation, people can honour their loan obligations due to the reduced real burden of such repayments as general prices rise. This result is similar to that obtained by Mazreku et al. (2018).

The results obtained on the relationship between nonperforming loans and the provisions of CEMAC banks validated the hypothesis of this work.

Table 6. Results of the system GMM estimation.

Variables	Coefficient	*p*-value
NLP (−1)	0.785***	0.000
TxGDP	0.048	0.543
PCS	0.155***	0.000
ROE	−0.037	0.355
ROA	−1.628***	0.000
LDR	0.004	0.918
CPI	−0.346***	0.000
Cons	17,579	0.000

Rating: * (10%), ** (5%) and *** (1%). Source: Author's calculation from Stata 16.

5. Conclusion and Implications of Economic Policies

This research analyzes the effect of bank provisions on the nonperforming loans of CEMAC banks and sheds light on some key factors related to asset quality that impact banks' ability to manage their nonperforming loans. The results show a persistence in the level of nonperforming loans in CEMAC banks. Furthermore, these results show that the increase in the NPLs provisioning rate is associated with high risk in these banks. Indeed, the emergence of NPLs and the resulting increase in provisions (PCS) can cause a negative adjustment in the supply of credit. Moreover, the coefficient on inflation is significant and negative, which implies that higher levels of inflation are associated with lower levels of nonperforming loans. This can be explained by the resulting reduction in actual loan repayments.

Thus, this research proposes to shed additional light on this subject for monetary authorities and CEMAC banks. To this end, bank supervisors and regulators should consider the effect of the origin of the increase in nonperforming loans to strengthen the stability of the banking system. Therefore, by studying how the level of nonperforming loans influences bank profitability, this research contributes to the growing literature on factors influencing nonperforming loans (e.g., Abid et al., 2014). Future research could extend this study by making a comparison with the West African Economic and Monetary Union (UEMOA) zone.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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