International Journal of Economics and Financial Research
ISSN(e): 2411-9407, ISSN(p): 2413-8533
Vol. 9, Issue. 1, pp: 1-8, 2023
URL: https://arpgweb.com/journal/journal/5
DOI: https://doi.org/10.32861/ijefr.91.1.8

Academic Research Publishing Group

Original Research **Open Access**

Financial Stability and Economic Growth in the Cemac Zone: A Panel Cointegration Approach

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Article History
Received: 15 January, 2023
Revised: 21 March, 2023
Accepted: 20 April, 2023
Published: 25 April, 2023

Abstract

The objective of this study is to analyze the impact of financial stability on economic growth in the CEMAC zone. Using annual data over the period 2003-2016, the empirical results from the estimation of a cointegrated panel model using FMOLS and DOLS methods indicate that financial stability has a positive effect on economic growth. Moreover, these results reveal that financial depth does not significantly influence economic growth in the area.

Keywords: Financial stability; economic growth; cointegrated panel model; CEMAC.

1. Introduction

The global economic and financial crisis of 2008 highlighted the need for financial stability in today's economies, as monetary policies, in their traditional role of price stabilization, were unable to provide effective solutions for macroeconomic stabilization. Thus, in the aftermath of the crisis, most Central Banks around the world, including the Bank of Central African States (BEAC), has continued to attach importance to financial stability. Since then, the role of financial stability in economic development has become an important issue in recent academic debates in financial macroeconomics, as well as in debates among policymakers. This has materialized in recent years, on the one hand, through the development of several international forums devoted to financial stability, such as the Basel Committee on Banking Supervision (BCBS), the Committee on the Global Financial System (CGFS), or the Committee on Payment and Settlement Systems (CPSS), and, on the other hand, through the publication of numerous studies aimed at analyzing the effects of financial stability on economic activity. However, most of these studies have been limited to developed countries, thus neglecting developing countries, particularly those in sub-Saharan Africa, including the countries of the Central African Economic and Monetary Community (CEMAC).

Specifically, the CEMAC countries have undergone a very turbulent economic development process, marked by a major economic crisis in the mid-1980s. The average real growth rate in these countries fell from 5.6 percent between 1980 and 1985 to -1.3 percent between 1986 and 1989, and then -0.9 percent between 1986 and 1993 (BEAC, 2002) (op. cit.). As a corollary, the public finance situation of the various states deteriorated sharply, leading to a banking crisis as a result of unpaid bills in the banks' portfolios and the drying up of the deposits of the states that were their main clients (Avom and Eyeffa, 2007). In 1990, this resulted in the insolvency of 18 banks, 11 of which went into liquidation, out of the 24 banks in the CEMAC zone (BEAC, 2002)(op. cit.).

To date, the CEMAC financial system, which consists mainly of the banking sector (about 90% of financial assets), has improved significantly. As of December 31, 2017, the zone's banking system comprised 62 credit institutions, including 52 banks and 9 financial institutions (Commission Bancaire de l'Afrique Centrale (COBAC), 2017). However, in recent years, many upheavals have occurred in the region through "a deep economic and financial crisis, caused in large part by a deterioration in the terms of trade due to the prolonged and substantial weakness in the prices of key commodities, particularly oil" (CEMAC, 2017). This crisis has not been without consequences for the financial sector in CEMAC, as there has been a deterioration in bank assets and a reduction in bank liquidity. Concerning bank assets, for example, the rate of bad loans rose from 9% in 2014 to 12.3% in 2017 (Commission Bancaire de l'Afrique Centrale (COBAC), 2017). At the same time, credit growth to the private sector declined by 0.8 percent in 2015, the first time this has happened in the zone in 10 years (CEMAC, 2017). This context was also marked by a slowdown in economic growth in the zone, causing non-oil GDP growth to fall from 5.3 percent in 2014 to 1.3 percent in 2016 (CEMAC, 2017).

In light of the above, it seems imperative to examine the relationship between financial stability and economic growth in the CEMAC, not only because financial stability is one of the BEAC's statutory missions, but also and above all because a better understanding of this relationship seems necessary for the better conduct of

macroprudential policies. This study thus aims to analyze the impact of financial stability on economic growth in the CEMAC zone. In pursuit of this objective, the remainder of this paper is organized as follows: the second section reviews some theoretical and empirical studies on the relationship between financial stability and economic growth; the third section is devoted to the presentation of the methodology and data; the fourth section is devoted to the presentation and discussion of the results; the fifth section looks at some robustness tests; and the sixth section concludes.

2. Literature Review

In recent years, many studies have focused on the relationship between economic growth and financial stability, the latter being defined by Mishkin (1992) as the ability of the financial system to ensure an efficient allocation of financial resources on a permanent and undisrupted basis. Theoretically, this relationship is part of the literature on the links between financial development and economic growth. This literature dates to the pioneering work of Schumpeter (1912), Goldsmith (1969), and McKinnon (1973). These authors show that the development of the financial sector helps to mobilize the savings needed for the production process and the investment activities of firms, thus representing an indispensable means of financing economic growth. Based on this, important empirical literature will emerge on the relationship between financial development and economic growth in general (Arcand *et al.*, 2012; Batuo *et al.*, 2018; Beck and Levine, 2004; Ibrahim and Alagidede, 2018; King and Levine, 1993; Madsen *et al.*, 2018; Ono, 2017; Shen and Lee, 2006; Yang and Yi, 2008), and between financial stability and economic growth in particular (Alsamara *et al.*, 2018; Creel *et al.*, 2015; Manu *et al.*, 2011; Sotiropoulou *et al.*, 2019; Torabi *et al.*, 2017).

Specifically, on the relationship between financial stability and economic growth, Manu et al (2011) consider a sample of 29 African countries (including Cameroon and Gabon) over the period 1996-2006. By estimating a panel error correction model, their results reveal that financial stability captured by, among other things, the ratio of non-performing loans to total gross loans, and the ratio of liquid assets to total assets, has a positive effect on economic growth in both the short and long run. Based on their results, they suggest that African governments should pursue policies to improve the stability of their financial systems to boost economic growth.

In the same vein, Creel *et al.* (2015) examine the effects of financial stability on economic performance in European Union countries. To do so, they use the generalized method of moments (GMM) applied to a dynamic panel model inspired by the work of Beck and Levine (2004), and annual data over the period 1998-2011. Their results indicate that financial instability, captured by different indicators[1] , negatively affects economic growth. On the other hand, they find that financial depth, as measured by domestic credit provided to the private sector, does not positively influence economic growth. In the same vein, Torabi *et al.* (2017) analyze the effects of financial stability on economic growth in the Organization of the Petroleum Exporting Countries (OPEC) countries during the period 2000-2013. Also adopting the GMM method, their results reveal that financial stability, as measured by the percentage change in bank liquidity to GDP, has a positive effect on economic growth. Furthermore, their results show that financial liberalization, as measured by net capital inflows, has a positive effect on economic growth.

Similarly, Alsamara *et al.* (2018) use quarterly data over the period 1980-2013 to analyze the relationship between financial stability and economic growth in Qatar. Based on a Vector Error Correction Model (VECM) with structural breaks, their results indicate that economic growth has a negative effect in the long run, and a moderate positive effect in the short run on financial stability, measured in their study by real loan forecasts. Sotiropoulou *et al.* (2019), on the other hand, focus on the relationship between financial development, financial stability, and economic growth in the 28 countries of the European Union. Using a dynamic panel model and annual data over the period from 2004 to 2014, their results indicate that the development of the banking system as measured by credit to the private sector hurts economic growth. Furthermore, they find that financial instability captured by the ratio of non-performing loans to total gross loans negatively influences economic growth. Their empirical results thus suggest that financial development is not always conducive to economic growth, which is why policymakers should focus on improving the functioning of the financial system rather than on its expansion.

In a similar vein, Ijaz *et al.* (2020) analyze the effect of bank competition and financial stability on economic growth in a sample of 38 European countries over the period 2001-2017. Using the generalized method of moments in system (GMM-SYS) to solve potential econometric problems (controlling for unobserved heterogeneity, endogeneity, the dynamic effect of economic growth, and reverse causality), their results show that financial stability contributes significantly to economic growth in Europe. Following them, Mande *et al.* (2020) examine the effect of financial stability on economic growth in 26 emerging countries over the period 1996-2018. Using different dynamic panel estimation techniques, and exploring both the stock market and banking dimensions of the financial system, they find on the one hand that financial instability resulting from both stock market volatility and non-performing loans has a negative impact on economic growth in the sample of countries studied, and on the other hand that the magnitude of this negative impact on economic growth seems to be relatively more pronounced via the stock market volatility channel.

Bayar *et al.* (2021), on the other hand, analyze the dynamic effects of banking sector stability in post-transition European countries over the period 1998-2016. Using different banking sector indicators (the bank Z-score, country-

[1]At the microeconomic level, they use as indicators the ratio of non-performing loans to total gross loans, the Z-score, and stock market volatility. At the macroeconomic level, it is the CISS (Composite Indicator of Systemic Stress) which is an indicator developed by the European Central Bank for the countries of the Eurozone.

level bank nonperforming loans, bank regulatory capital to risk-weighted assets) and panel causality and cointegration tests, they find on the one hand that there is a long-run relationship between banking sector stability and economic growth, and on the other that banking sector stability has a positive effect on economic growth. Furthermore, the causality analysis conducted by these authors reveals opposite directions of causality between the different indicators of banking sector stability and economic growth, suggesting that banking sector stability is a complex and hierarchically structured multidimensional construct (Bayar *et al.*, 2021).

In a similar vein, Barra and Zotti (2022) analyze the effect of financial stability on local economic development in Italian economic areas. Using a sample of Italian banks over the period 2001-2012 and using the two-stage generalized method of moments, they find that financial stability has a positive effect on local economic development in Italy. Recently, Amali *et al.* (2022) focus on analyzing the impact of financial stability on economic growth in Nigeria. Using the Autoregressive Distributed Lag (ADRL) approach and quarterly data over the period 2006(Q4) to -2020(Q1), they find that there is a negative relationship between financial stability and economic growth in Nigeria.

All things considered, the empirical studies thus presented show that the debate is still far from over regarding the relationship between financial stability.

3. Methodology and Data

3.1. The model

Empirically, the study of the relationship between financial stability (and/or financial development) and economic growth has led to various formulations of equations to be estimated. In this study, the model estimated is mainly inspired by the work of Manu *et al.* (2011), which is based on the growth model of Ndebbio (2004) (op. cit). The choice of this model is justified by the fact that it is based on the endogenous growth model, recognized in the theoretical literature as the best model for explaining economic growth. Indeed, it is an endogenous growth model modified to include financial stability and therefore assumes that both financial stability and other macroeconomic variables determine economic growth. It is given by the following equation (1):

$$PIB_{it} = \alpha_0 + \alpha_1 SF_{i,t} + \alpha_2 PF_{i,t} + \alpha_3 INFL_{i,t} + \alpha_4 OUV_{i,t} + \alpha_5 CONSPUB_{i,t} + \alpha_6 POP + \varepsilon_{i,t} \quad (1)$$

GDP represents the growth rate of real GDP; *SF* is an indicator of financial stability; *PF* represents the depth of the financial system, captured by domestic credit to the private sector as a percentage of GDP; *INFL* refers to inflation, measured by the percentage change in the consumer price index with 2010 as the reference year; *OUV* is the openness of the economy, measured by the average sum of imports and exports, expressed as a percentage of GDP; *CONSPUB* is government consumption expenditure as a percentage of GDP. *POP* is the population growth rate and refers to the error term. ε refers to the error term.

In the literature, the financial stability (FS) indicator varies from one study to another because of measurement difficulties, especially since there is no consensus on its definition. However, a careful review of this literature allows us to identify two broad groups of financial stability indicators: non-systemic risk indicators (indicators of banking stability), and systemic risk indicators (indicators of the stability of the financial system as a whole). Among the former, the most commonly used are: The Z-score (Hannan and Hanweck, 1988), the distance to default[2] (Black and Scholes, 1973), and the ratio of non-performing loans to total gross loans. The latter include the aggregate Z-score (Strobel, 2011), SRISK (Systemic Risk) (Acharya *et al.*, 2012; Brownlees and Engle, 2016), and CoVaR (Conditional-Value-at-Risk)[3] (Tobias and Brunnermeier, 2016), among others.

Given that the financial sector in CEMAC is essentially based on the banking sector, we use the Z-score as an indicator of financial stability in our baseline model. It measures the solvency risk of banks by combining information on the profitability of each bank, its capital, and the volatility of returns. It is defined as follows:

$$Z - Score = \frac{(K + \mu)}{\sigma} \quad (2)$$

Where K is equity as a percentage of assets. μ is the return on assets as a percentage of assets, and σ is the standard deviation of the return on assets, which is taken as an indicator of the volatility of return. The higher the value of the Z-score, the lower the risk of bank failure and thus financial instability.

3.2. Data

To estimate the model given by equation (1), we use annual data for the six CEMAC countries over the period 2003-2016. This study period is chosen due to the unavailability of financial data for all CEMAC countries over a long period. Indeed, the data available on financial stability indicators, notably the Z-Scrore, although known for some of the countries in our sample (Cameroon and Gabon) until 2020, is limited to 2016 for the other countries (Congo, Equatorial Guinea, Central African Republic, and Chad). These data were all obtained from the World Bank through its Global Financial Development (GFD) and World Development Indicators (WDI) databases. The descriptive analysis of the different variables used is summarized in Table 1 below:

[2]It is the difference between the market value of a bank's assets and its point of default, divided by the volatility of the asset value.
[3]See Bisias et al. (2012) for a comprehensive and detailed description of systemic risk indicators.

Table-1. Descriptive statistics of the different variables used

Variables	Mean	standard deviation	Minimum	Maximum	Observations
GDP	4.278	8.443	-36.699	37.998	84
SF (Z-score)	9.027	5.376	2.625	44.412	84
PF	8.653	4.702	2.097	25.016	84
INF	4.079	6.521	-8.974	37.142	84
OPEN	44.679	23.505	16.604	153.507	84
CONSPUB	10.919	4.281	2.736	27.304	84
POP	2.918	1.008	0.205	4.605	84

Table 1 above shows that the average real growth rate for the CEMAC zone over the period 2003-2016 was 4.27%, which indicates that the pace of economic activity is appreciable in the subregion. However, this economic growth appears to be somewhat scattered (standard deviation of 8.44), which can be explained by the considerable variation in the pace of economic activity in the various countries. Concerning financial stability, the average Z-score is 9.027, which indicates that the risk of bank failures in CEMAC is quite high, hence the need to further strengthen the financial system by improving bank capitalization and reducing non-systemic risks. Concerning financial depth, the average value of domestic credit provided to the private sector as a percentage of GDP over the study period was 8.65, implying that bank financing of the private sector remains low in the CEMAC region.

Moreover, the analysis of the correlation matrix in Appendix A indicates that there is a low degree of linkage between the different explanatory variables, which suggests that there are no problems of multicollinearity in our data, which can therefore easily be estimated empirically.

3.3. Estimation Procedure

To assess the impact of financial stability on economic growth in the CEMAC zone, our methodological approach is based on three steps: The first step is to check the statistical properties of the different variables used using the unit root test of Im *et al.* (1997); the second step is to analyze the long-run equilibrium relationship between the different variables used using the cointegration tests of Pedroni (1999) and Kao (1999); and finally, in the third step, we proceed to the actual empirical estimations. The estimation method is based on the use of Fully-Modified OLS (FMOLS) and Dynamic OLS (DOLS). These are estimation methods specific to cointegrated panel models (Kao *et al.*, 1999; Pedroni, 2001). These two estimators have the advantage of allowing the correction of endogeneity bias and multicollinearity problems that can arise when using Ordinary Least Squares (OLS).

4. Results and Discussion

This section summarizes the empirical results of the various econometric analyses, namely the stationarity and cointegration tests on the one hand, and the various estimates of our basic model on the other. As the results of the Im *et al.* (1997) unit root test reported in Appendix B indicate, not all variables used in our basic model are integrated into the same order. While some of them are stationary at level (I (0)), others are stationary at the first difference (I (1)). However, the stationarity test alone does not allow us to see whether the variables are in a long-run equilibrium relationship, which is why it is necessary to perform a cointegration test. From the results reported in Appendix C, we can conclude that there is a long-run equilibrium relationship between the different variables used in our basic model. Indeed, based on the Pedroni (1999) cointegration test, four out of seven statistics reject the null hypothesis of no cointegration. The results of the Kao (1999) cointegration test also reject the null hypothesis of no cointegration.

Table-2. The effects of financial stability on economic growth in the CEMAC zone

	Estimation method					
	FMOLS			**DOLS**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Financial stability (SF: Z-score)	0.275** (0.139)	0.269* (0.156)	0.268* (0.157)	0.261** (0.146)	0.252 (0.164)	0.252 (0.166)
Financial depth (PF: Credit to the private sector as % of GDP)	0.112 (0.228)	-0.279 (0.215)		0.067 (0.225)	-0.263 (0.216)	
Inflation rate (INFL)	0.055 (0.109)	-0.016 (0.121)	-0.057 (0.120)	0.073 (0.114)	0.026 (0.127)	-0.003 (0.125)
Economy open rate (OUV)	0.280*** (0.089)	0.233** (0.099)	0.222** (0.099)	0.164*** (0.060)	0.141** (0.067)	0.135** (0.067)
Public consumption expenditure (CONSPUB)	-0.81*** (0.294)	-0.82*** (0.329)	-1.03*** (0.275)	-1.06*** (0.285)	-1.06*** (0.320)	-1.26*** (0.278)
Population growth rate (POP)	7.810*** (2.539)			6.990*** (2.467)		
R2	0.50	0.44	0.42	0.47	0.42	0.40
R2 -Adjusted	0.41	0.35	0.34	0.38	0.34	0.33
Number of countries	6	6	6	6	6	6

Note: Standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

Table 2 above presents the different results from the estimation of equation (1) using the FMOLS and DOLS methods. The table shows that financial stability has a positive influence on economic growth in the CEMAC zone since the coefficient associated with the Z-score is positive and significant at the 5% level. Thus, an improvement in financial stability (a reduction in the solvency risk of banks) of 1% leads to an increase in economic growth of 0.275% and 0.261% respectively according to the two estimation methods mentioned above. This result, which corroborates those of Torabi *et al.* (2017), Ijaz *et al.* (2020), Bayar *et al.* (2021), and Barra and Zotti (2022), among others, implies that the more solvent banks in the CEMAC zone are, the better the economy of the zone is. Indeed, when banks have high equity and their assets are profitable and not very volatile, their capacity to finance productive investments is high, which ultimately increases output.

However, the coefficient associated with financial depth as measured by domestic credit provided to the private sector although positive remained insignificant at conventional thresholds. This result, although surprising, corroborates Creel *et al.* (2015) in the case of European Union countries. In the CEMAC context, it could be explained by the embryonic state of the financial sector and the weakness and inefficiency of credit to private investors. This suggests that commercial banks in the CEMAC zone, which are otherwise over-liquid, should make efforts to finance private projects that are beneficial to economic growth.

Furthermore, concerning the control variables, we find that government consumption expenditure has a significant negative impact on economic growth in the CEMAC zone. Thus, an increase in government consumption expenditure of 1% leads to a decrease in economic growth of 0.81% and 1.06% respectively according to the FMOLS and DOLS methods. This result is consistent with theoretical predictions insofar as public consumption expenditure is described as "non-productive expenditure" by proponents of endogenous growth theory. In CEMAC, it could also be explained by excessive consumption of imported goods, which worsens the balance of payments and hence national income.

As for the other control variables, we find that the rate of openness of the economy and the rate of population growth has positive and significant effects at the 1% threshold on economic growth. Thus, for example, an increase in the volume of foreign trade of 1% translates into an increase in economic growth of 0.28% and 016% respectively according to the FMOLS and DOLS methods. Inflation does not seem to have a significant effect on economic growth in the CEMAC zone, which shows that the monetary policy conducted by the BEAC keeps inflation under control in the various member countries of the zone.

5. Robustness Check

In this section, we propose to verify the robustness of the various results previously discussed. To do so, we change the estimation methods on the one hand and replace the financial indicators previously used with other indicators on the other hand. The new estimation method consists of using the ordinary least squares (OLS) method with individual specific effects, and the generalized method of moments (GMM), although the latter is not appropriate for this study[4]. Table 3 below presents the results from OLS and GMM estimation of equation (1), and for comparison, we have included previous results from FMOLS and DOLS methods. These results indicate that the key message regarding the effects of financial stability on economic growth does not change. Indeed, apart from the degree of significance of the "financial stability" variable, which increased from 5% to 10%, the sign and magnitude of the coefficients are roughly equal across the different estimations, suggesting that the results previously discussed are sufficiently robust to the estimation methods used.

Table-3. Analysis of the robustness of the results according to the estimation method

	Estimation method			
	FMOLS	**DOLS**	**MCO**	**GMM**
One-period lagged real GDP growth rate (GDP (-1))				-0.011 (0.109)
Financial Stability (SF): Z-score	0.275** (0.139)	0.261** (0.146)	0.261* (0.161)	0.290* (0.156)
Financial depth (FP): Credit to the private sector as % of GDP	0.112 (0.228)	0.067 (0.225)	0.067 (0.247)	0.290* (0.156)
Inflation rate (INFL)	0.055 (0.109)	0.073 (0.114)	0.073 (0.125)	0.018 (0.271)
Open rate (OPEN)	0.280*** (0.089)	0.164*** (0.060)	0.165** (0.066)	0.377*** (0.098)
General government consumption expenditure (CONSPUB)	-0.813*** (0.294)	-1.06*** (0.285)	-1.065*** (0.312)	-0.842** (0.379)
Population Growth Rate (POP)	7.810*** (2.539)	6.990*** (2.467)	6.990** (2.702)	7.248** (2.909)
Constant			-15.082 (10.83)	-27.21** (11.93)

[4]The use of the generalized method of moments requires the presence of a large sample (large N) and a reduced number of periods (small T) (Roodman, 2009).

R2	0.50	0.47	0.47	
Adjusted- R2	0.41	0.38	0.39	
Number of countries	6	6	6	6
Hausman test (P-value)			0.000	
Sargan Statistic				62.52

Note: Standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

Table 4 summarizes the estimation results obtained by varying the different financial indicators. By replacing the financial stability indicator initially used (the Z-score) with the ratio of non-performing loans to total gross loans, these results show that financial instability negatively influences economic growth in the CEMAC zone, thus corroborating the results recently obtained by Sotiropoulou *et al.* (2019) for the European Union countries and Amali *et al.* (2022) for Nigeria. Indeed, the results from the estimation of equation (1) using the DOLS method indicate that an increase in the ratio of nonperforming loans to total gross loans of 1% leads to a decrease in the economic growth of 0.467% (see column 5). This result, which shows that non-performing loans are a "burden on the financial system" as stated by Amali *et al.* (2022), is understandable insofar as inefficiency in the loan allocation process reduces the profitability of banks and increases their financial costs, which leads to a decrease in the supply of credit to the private sector as a result of a deterioration in market confidence, and consequently slows economic growth.

Moreover, by replacing the different estimates of the credit provided to the private sector as a percentage of GDP with the money supply as a percentage of GDP, the key message regarding the effect of financial depth on economic growth also remains unchanged. In other words, the coefficient associated with the "financial depth" variable remains insignificant at the conventional thresholds, thus confirming the robustness of the results previously discussed, particularly concerning the neutral effect of financial depth on economic growth in the CEMAC zone.

Table-4. Analysis of the robustness of the results according to the financial indicators

	Estimation method					
	FMOLS			**DOLS**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Financial Stability (SF): Z-score	0.271** (0.137)			0.283* 0.151		
Financial Stability (SF): Non-Performing Loans Ratio		-0.333 (0.213)	-0.356* (0.209)		-0.467** (0.222)	-0.441** (0.229)
Financial depth (PF: Credit to the private sector as % of GDP)		0.142 (0.232)			0.150 (0.232)	
Financial depth (FP): Money supply (M2) as % of GDP	-0.027 (0.157)		0.045 (0.160)	-0.133 (0.154)		-0.001 (0.158)
Inflation rate (INFL)	0.074 (0.107)	0.1700 (0.124)	0.179 (0.120)	0.098 (0.118)	0.198 (0.131)	0.198 (0.133)
Open rate (OPEN)	0.280*** (0.087)	0.2472*** (0.090)	0.251*** (0.088)	0.167*** (0.061)	0.136** (0.061)	0.137** (0.062)
Public consumption expenditure (CONSPUB)	-0.79*** (0.267)	-0.408 (0.315)	-0.395 (0.289)	-0.96*** (0.270)	-0.753** (0.308)	-0.686** (0.296)
Population Growth Rate (POP)	6.693*** (2.393)	6.173** (2.707)	5.445** (2.53)	5.697** (2.387)	4.985* (2.662)	4.257* (2.561)
R2	0.50	0.49	0.49	0.47	0.47	0.47
R2 -Adjusted	0.416	0.41	0.41	0.39	0.49	0.39
Number of countries	6	6	6	6	6	6

Note: Standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

6. Conclusion and Policy Implications

The objective of this study was to analyze the impact of financial stability on economic growth in the CEMAC zone. Using the FMOLS and DOLS methods applied to a cointegrated panel model, the various results indicate that financial stability has positive effects on economic growth in the CEMAC zone. These results support theoretical predictions and corroborate most empirical studies linking financial development and economic activity in general and financial stability and economic growth.

These results also show that population growth and economic openness have positive effects on economic growth, while government consumption expenditures have negative effects instead. In addition, we find that economic growth is not significantly influenced by inflation, which reflects the BEAC's perfect control of inflation. Another important result is the absence of a significant relationship between financial depth and economic growth, which can be explained by the still-embryonic state of the CEMAC financial system.

Based on these different results, we suggest that the monetary authorities in the CEMAC zone set up better macroprudential regulations that should ensure the reinforcement of the stability of the financial system in the zone and avoid the materialization of systemic and non-systemic risks.

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Appendices

Appendix A: Intensity of correlation between the different variables of the model

	GDP	**SF**	**PF**	**INFL**	**OPEN**	**CONSPUB**	**POP**
GDP	1						
SF	0.042 (0.702)	1					
PF	-0.405*** (0.000)	0.109 (0.323)	1				
INFL	-0.013 (0.902)	-0.158 (0.151)	0.083 (0.449)	1			
OPEN	0.341*** (0.001)	-0.151 (0.169)	-0.270** (0.012)	-0.057 (0.603)	1		
CONSPUB	-0.411*** (0.0001)	0.161 (0.142)	0.513*** (0.000)	-0.183* (0.095)	0.103 (0.347)	1	
POP	0.356*** (0.000)	0.171 (0.119)	-0.40*** (0.000)	-0.301*** (0.005)	0.588*** (0.000)	0.092 (0.402)	1

Notes: Critical probabilities (p-value) in parentheses and ***p < 0.01, **p < 0.05, *p < 0.

Appendix B: Results of the unit root test of Im, Pesaran, and Shin (1997)

Variables	Statistical IPS at level	Probability	Statistical GPI in difference	Probability	Integration order
GDP	-2.809	0.002	/	/	I (0)
SF (Z-score)	-0.643	0.260	-3.522	0.000	I (1)
PF (credit/GDP)	1,253	0.895	-2.597	0.004	I (1)
FP (M2/GDP)	2.965	0.998	-4.973	0.000	I (1)
INFL	-3.716	0.000		/	I (0)
OPEN	-2.636	0.004	/	/	I (0)
CONSPUB	-0.304	0.380	-1.772	0.03	I (1)
POP	-4.453	0.000	/	/	I (0)

Notes: I (0) indicates that the series is stationary at level, while I (1) indicates that it is integrated of order 1, therefore stationary in the first difference.

Appendix C: Results of the cointegration tests of Pedroni (1999) and Kao (1999)

Pedroni's cointegration test (1995, 1997)			Kao's cointegration test (1999)	
Statistics	Value	Probability	Statistical	Probability
v-Statistic Panel	-2.033	0.979	-3.6287	0.000
Rho-Statistic Panel	1.687	0.954		
PP-Statistic Panel	-17.585	0.000		
ADF-Statistic Panel	-2.533	0.005		
Group rho-Statistic	2.602	0.995		
Group PP-Statistic	-21.604	0.000		
Group ADF-Statistic	-1.711	0.043		