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Empirical study of the relationship between financial development and economic growth in the WAEMU

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ABSTRACT
This article analyses the effectiveness of the financial system in economic development using data from 8 WAEMU countries over the period 1990-2021. It draws on the dynamic panel work of Arellano-Bond to specify the nonlinear model of growth, which is estimated by the Generalized Moments method in system results. The effect of financial development on economic growth is U-shaped. The research results show that the negative impact of financial growth on economic growth reaches a critical value, and after exceeding this critical value, financial growth ultimately promotes economic growth. The West African Economic and Monetary Union (WAEMU) zone should establish a Financial Stability Authority whose main mandate is to ensure the stability of the financial system of WAEMU member countries. Too high a level of financial development could damage GDP growth. Financial development therefore appears to be a necessary but not sufficient condition for economic growth.

KEYWORDS
Financial development; Economic development; WAEMU

1 Introduction

The African financial system is weak and may not stand the test of time. A sound financial system tends to lead to financial crises, which hinder negative consequences for growth. For example, the economic crisis in the United States has affected not only on the American economy, but also other Asian and European economies.

Indeed, to build a strong financial system, African countries have implemented several financial reforms to strengthen their past and present financial systems. Financial sector reform is considered an important element of economic policy and is stronger and more effective in consolidating domestic savings (Kang, Kaiyum, Sheikh and Sidik, 2005). African countries have made a lot of effort, yet it remains insufficient and, as many countries on the continent have pointed out, the financial system remains fragile.

These challenges in the financial sector have a major impact on the economy of the continent. The financial sector has made great progress in the region, but not so much in the countries of the West African Economic and Monetary Union (WAEMU) such as Togo and Benin. Africa's underdeveloped financial system can be attributed to weak foundations (Ghura, Kpodar and Singh, 2009), informality, weak institutional regulations, instability, and insecurity (Honohan and Beck, 2007) and cramped individuals per unit of geographic area (Allen et al., 2014).

Therefore, why should the government and policymakers strive to foster financial development and economic growth in the WAEMU zone? To ensure sustainable economic growth in the region will allow consumers to secure their savings. Additionally, investors will be able to identify profitable

investments and increase productivity in WAEMU only if financial improvement is present. Development of the sector can augment the financial system, which has been the main focus that African countries have undertaken to exert on financial reforms in the past and present.

However, until 1980, the African financial sector was perceived as repressive, concentrated in urban areas, risk averse and offering limited financial services (Andrianaivo and Yartey, 2010).

So, to reverse this situation, a series of reforms have been introduced that take into account the positive role of the financial sector, particularly the banking sector, in the development of economic activity. These reforms include restructuring banks, strengthening the institutional framework, banking supervision, promoting monetary policy autonomy, and enhancing the credibility of the central bank (Ndikumana, 2003). The objective of these reforms was to strengthen the performance of the financial sector and ensure that it plays its full role in allocating resources for more productive investments. In the WAEMU, these reforms have transformed the financial sector over time. Indeed, the financial system has evolved such that there are more banks, insurance companies and various other financial intermediaries whose role in collecting savings has increased. In addition to these organizations, microfinance institutions have also grown rapidly, despite their differences (Ekomo and Avom, 2007). Unfortunately, these reforms have not had the desired effect, as the structure of the financial system has remained largely unchanged. The financial systems of African countries in the WAEMU are much more dependent on financial intermediaries than the financial markets of developed countries. The latter seem to be virtually non-existent in the region. This means that the financing of economic activity in these countries depends to a large extent on the resources of banks and less on those of financial markets. It is questionable whether financial sector development will be a catalyst for growth in the WAEMU bloc, assuming that all WAEMU countries follow the same decisions and strategies of the Central Bank of West African States (BCEAO). However, it is important to examine the causal relationship between financial sector development and economic growth in the WAEMU bloc to determine whether financial system development affects economic development positively or not.

The study of this article is "financial development", and the general objective is to identify the theoretical, practical, and socio-economic contributions of financing to economic development in the WAEMU zone. Given the economic situation of the WAEMU zone, it is also important to examine how financial development can improve the economy within that area and adapt to new realities and challenges. To provides an overview of the literature on the subject, with a focus on traditional and modern theories of financing and economic development; the critical analysis of this literature led to the adoption of a methodology necessary to carry out an econometric analysis; the interpretation and results made it possible to make economic policy recommendations.

2 Literature Review

2.1 Relationship between the financial system and economic diversification

Economics itself teaches us that the pursuit of well-being is at the heart of science and guides any thinking about endless social needs in a way that explains how to achieve well-being with limited resources.

Jean-Paul Paullin and Anne Gaël Vaubourg (1998) argue that production levels are proportional to capital accumulation, which may explain economic growth. They tie up their savings and invest. Therefore, it is possible to understand how the efficiency of the financial system (i.e., the ability to respond to savings preferences and investment choices) affects not only the level of economic activity but also the rate of growth of economic activity.

Does financial development, through the mobilization of savings, the efficient allocation of

resources, managerial control, risk management and the provision of services facilitating exchange, really stimulate economic growth?

Economists differ on the role of the financial system in promoting economic growth. Hicks (1969) pointed out that the development of the financial sector played an important role in industrialization in England. Studies on the relationship between financial development and economic growth date back to Schumpeter (1911) who critically examined the primary role of financial services in innovation and development. The role played by financial institutions is very important because they promote the growth and development of the economy by identifying and making money available for productive investments. According to Ahmed (2006), the financial sector plays an important role in the transfer of funds from savers to investors. Thus, the sector plays an important role in capital accumulation, trade, and capital formation.

There are four views on the relationship between financial development and economic growth. The first view, known as the supply hypothesis, holds that an increase in incomes leads to the growth of an economy. Thus, the development of the financial sector will play an important role in the growth of an economy (Schumpeter,1911; Robert G King, Levine, and intermediation, 1993; and Calderon and Liu, 2003). Therefore, the causal effect goes from financial development to economic growth and not in the opposite direction. This is due to high savings rates and an increase in productive investment. The second view is the demand hypothesis. This view suggests that economic growth leads to financial development. Thus, the financial sector will be developed as the economy improves (Jung and change, 1986; and Ireland, 1994). As a result, causality ranges from economic growth to financial development and not in the other direction.

According to Apergis, Filippidis and Economidou (2007), between the first and second point of view, there is a third and fourth point of view. The third view, the two-way causality hypothesis, suggests that the relationship between financial development and economic growth is bidirectional. These include both the first and second hypotheses (Jovanovic and Greenwood, 1990; Demetriades and Hussein, 1996; Greenwood, Smith and Control, 1997; Blackburn and Hung, 1998; and Harrison, Sussman and Zeira,1999). According to the independent hypothesis, there is a neutral relationship between financial development and economic growth, meaning that financial development and economic growth are causally independent.

2.2 Empirical literature on Economic Growth-Financial Development

Various scholars have researched the relationship between the development of financial sectors and economic growth. For example, Musau (2002) studied the impact of financial liberalization on some indicators of financial sector development in Kenya where he found that it increased the level of penetration of financial services in Kenya. He found that among the selected financial sector developments, microfinance institutions played a major role in promoting financial sector development. Kioi (2003) examines the relationship between FDI and economic growth in Kenya, Uganda, and Tanzania. He concluded that FDI contributes significantly to a country's economic growth in several ways, including monetary stability and inflation. Levine (2005) examined the effects of banking system and stock market development on economic growth in a sample of 11 Arab countries. A study found that countries with weak financial institutions have a negative impact on national economic growth. He stressed the importance of an economically sound financial system. Odhiambo (2008) conducted a study on economic stability, savings, and economic growth in Kenya. It is important to establish a dynamic causal relationship. Sindani (2013), in his article "Effect of Financial Sector Depth on Economic Growth in Kenya", found that financial sector depth has a positive effect on economic growth. Caporale, Raul, Sova and Sova (2009) examine the relationship between financial and economic growth in 10 new Member States of the European

Union (EU),. This study examines the main characteristics of the financial and banking sectors of these new members the relationship between financial growth and economic growth. A quantitative study was conducted from 1994 to 2007 using a tuned dynamic panel model. The study found that credit and equity markets continued to underperform in all countries tested. Contribution to economic growth is negligible due to insufficient funding depth. Conversely, banking efficiency measures the rate of economic growth. According to Granger causality analysis, causality is not the effect of fiscal progress on economic growth, but rather the opposite, indicating that there is a positive relationship between the two.

Bwire and Musiime (2006) examine the link between financial development and economic growth in Uganda over the period 1970-2005 using modern multivariate techniques and Granger causality tests. They find strong evidence that the financial sector reforms implemented in the early 1990s generally contributed positively to Uganda's real GDP, adding that financial development is a necessary but not sufficient condition for stimulating economic growth. With respect to causality findings, the dominant supply hypothesis applies to Uganda. The policy implication of the findings is that policies aimed at promoting financial intermediation should be complemented by other policies aimed at addressing some of the structural bottlenecks inherent in developing countries such as Uganda.

In another study, Chimobi (2010) examines the relationship between financial development, trade openness and economic growth in Nigeria using Johansen's multivariate cointegration method and vector autoregression (VAR) method for the test of Granger causality for the period 1970-2005. The causality results show that Nigeria is different and contrary to Greening's view, there is no cointegration between the three measures of growth, trade openness and financial development (i.e. say direct credit, private credit and money supply) (DATE). The causality results show a one-way causality between economic growth and trade openness. This implies that support for growth-oriented trade and economic growth leads to financial development, thus supporting the demand sequence hypothesis for the Nigerian economy.

Boulila and Trabelsi (2002) find that financial reforms in Tunisia shift the pattern of growth causality from finance before the reforms to two-way causality after the reforms. Ozturk (2008), using annual data from Turkey from 1975 to 2005, finds that there is no long-term relationship between financial development and economic growth, and the results show a one-way causal relationship between economic growth and financial development.

Chuah and Thai (2004) examine the causal relationship between financial development and economic growth in six Gulf Cooperation Council (GCC) countries. Testing causality using error correction modeling (ECM) and VAR models, they find evidence of bidirectional causality for five countries and growth in financial advance for the last. Results vary by country, depending on the chosen indicator of financial development or economic growth. These results suggest that GCC countries should continue to promote financial development while undertaking the necessary reforms to develop the real sector.

The discussion on the effect of financial development and economic growth is uncertain, given the contradictory empirical and theoretical results of previous studies. However, the non-linear relationship between the "more finance, more growth" hypothesis and the "financial curse" hypothesis is still under discussion. The legal structure and conditions of the economy determine the efficiency and proper functioning of the financial system. Therefore, the modest contribution of this study lies in the construction of a composite indicator and the evaluation of the development effect of the financial system on growth.

3 Methodologies

3.1 Model Specification

The endogenous growth model can be transformed into a reference econometric model based on the work of Beck & Levine (2004). The business model for this study can be derived as follows:

$$GDPG_{it} - GDPG_{it-1} = (1-a)\, GDPG_{it-1} + \beta_1 FDEVT_{it} + \delta' X_{it} + u_i + e_{it} \cdots\cdots\cdots\cdots. \quad (1)$$

Where PIBG is the growth rate of GDP per capita; X is a vector of control variables containing TOP, GEXP, INV and INF. The FDEV must have a positive impact on economic growth. To test the "over-funded" hypothesis, we used a quadratic polynomial model with squared FDEV. The specifications of this model are almost identical to the existing study by Cecchetti and Kharroubi (2012), Arkan et al. (2015), Law & Singh (2014) where they commonly used the financial development phalanx to demonstrate the non-linear effects of finance on economic growth and established a U-shaped or inverted U-shaped relationship. This study further modified equation (1) according to the "more funding" hypothesis, which can be expressed as follows:

$$GROWTH_{it} - GROWTH_{it-1} = (1-a)\, GROWTH_{it-1} + \beta_1 FDEVT_{it} + \beta_2 FDEVT_{it}^2 + \delta' X_{it} + u_i + e_{it} \cdots\cdots\cdots\cdots. \quad (2)$$

If the Kuznets hypothesis (1955) is correct, then financial development and economic growth are related in inverted U form, and the coefficients of parameters B1 and B2 have positive and negative signs respectively, and both are statistically significant. This will clearly prove the hypothesis supported by Arcand et al. (2015) and Law and Singh (2018) of "too much funding" or the "financial curse" respectively. However, if the coefficients B1 and B2 are negative and positive respectively and are statistically significant to indicate a U-shaped or anti-Kuznets relationship, the "financial curse" hypothesis is not supported, but it strongly supports the "more funding, more growth" hypothesis of Levine (2003). On the other hand, if the relationship between financial development and economic growth is non-monotonous, the non-monotonous model will lead to a downward bias in the estimated relationship between financial development and economic growth. The above variance equation (2) can be developed as follows:

$$GDPG_{it} = a_i + \beta_1 GDPG_{it-1} + \beta_2 FDEVT_{it} + \beta_3 FDEVT_{it}^2 + \beta_4 INV_{it} + \beta_5 TOP_{it} + \beta_6 GEXP_{it} + \beta_7 GEXP_{it}^2 + \beta_8 INF_{it} + \beta_9 LL_{it} + e_{it} \cdots\cdots\cdots\cdots. \quad (3)$$

Here, FDEVT stands for financial development and is measured by two variables: private credit (PRIV) and commercial bank assets (CCB). Two variables representing financial development, PRIV and CCB, are measured separately in different models. Add FDEVT squared to test the non-linear effects of monetary development on economic growth. The INV control variable represents investment, INF stands for inflation, TOP stands for trade openness, and GEXP stands for public expenditure. The GEXP edge was included because of Wagner's law. According to Wagner's law, the effect of public spending on economic growth is non-linear. In fact, we expect B6 to be above zero, or B7 to be below 0. All regressions, with the exception of GDP and delays, are expressed in natural logarithms. Equation (3) is estimated using econometric methods on panel data. The segments are represented by letters i (i=1,2,...,N) and the periods are represented by indices t (t=1,2,...,T). Equation (3) is the general model used for estimation. Depending on what is tested, the following variants of the complete model are used:

$$GDPG_{it} = a_i + \beta_1 GDPG_{it-1} + \beta_2 FDEVT_{it} + \beta_3 INV_{it} + \beta_4 TOP_{it} + \beta_5 GEXP_{it} + \beta_6 GEXP_{it}^2 + \beta_7 INF_{it} + + e_{it} \cdots\cdots\cdots\cdots. \quad (4)$$

This equation explores the linear effect of monetary development on economic growth.

$$GDPG_{it} = a_i + \beta_1 GDPG_{it-1} + \beta_2 FDEVT_{it} + \beta_3 FDEVT_{it}^2 + \beta_4 INV_{it} + \beta_5 TOP_{it} + \beta_6 GEXP_{it} + \beta_7 GEXP_{it}^2 + \beta_8 INF_{it} + e_{it} \cdots\cdots\cdots\cdots. \quad (5)$$

This equation considers the non-linear impact of financial development on economic growth.

3.2 Data Source

The data used for the analysis covers the period from 1990 to 2021 in accordance with the temporal delineation of the analysis. Thus, this period provides a sample of 32 observations for each variable to ensure good econometric modelling and a good specification of the analysis model. The data submitted in this study are essentially secondary data from the International Monetary Fund and the Bank of West African States.

3.3 Estimation Strategy

The estimation method in this study is the Generalized Method of Moments (GMM) estimator proposed by Arellano and Bond (1991) based on Holtz-Eakin, Newey and Rosen (1988). The dynamics excluded in the static panel data model can also be considered because the effect of the offset value of the dependent variable Bond (2002) is ignored. According to Arellano and Bond (1991), the GMM system moment conditions are set as follows:

$E[(Growth_{i,t-s} - aGrowth_{i,t-s-1}).(\eta_i + \varepsilon_{it})] = 0$ for s=1…….……(7)

$E[(FDEVT_{i,t-s} - FDEVT_{i,t-s-1}).(\eta_i + \varepsilon_{it})] = 0$ for s=1…….……(8)

$E[(FSTAB_{i,t-s} - FSTAB_{i,t-s-1}).(\eta_i + \varepsilon_{it})] = 0$ for s=1…….……(9)

$E[(X_{i,t-s} - X_{i,t-s-1}).(\eta_i + \varepsilon_{it})] = 0$ for s=1……..…(10)

Diagnostic consistency of GMM estimates was based on two normative tests. The first is the Sargan over-identification restriction test (1958). The expected value of the empirical moment is zero because there is no joint validation of all tools. Therefore, the Sargan test with χ2 degrees of freedom is distributed for over-identification. The second test tests the hypothesis that the error terms have no quadratic serial correlation. Not rejecting the null value of both tests provided support for the estimated model.

3.4 Sasabuchi-Lind-Mehlum "U" Test

To confirm our findings that there is an inverted or u-shaped relationship between financial development and economic growth, we applied the Sasabuchi U-shaped test (1980) by Lind and Mehlum (2010). In the quadratic case of equation (4), the composite null with the joint hypothesis based on the first order $\frac{\partial GROWTH}{\partial FDEVT}$ derivation was tested as follows:

$H_0 : (\beta_1 + \beta_2 2FDEVT_{min} \leq 0)\ U$

$(\beta_1 + \beta_2 2FDEVT_{max} \geq 0)$ …….. (11)

$H_1 : (\beta_1 + \beta_2 2FDEVT_{min} > 0)\ U$

$(\beta_1 + \beta_2 2FDEVT_{max} < 0)$ …….. (12)

Where, FDEVT min and FDEVT max respectively represent the minimum and maximum financial development values. If the null hypothesis is rejected, the existence of the inverted U-shape is confirmed. More precisely, this rejection is a convex cone.

$R_a = (\beta_1, \beta_2)$

$$\frac{\beta_1 + \beta_2 f'(FDEVT_{\min})}{\sqrt{S_{11} + 2f'(FDEVT_{min})S_{12} + f'(FDEVT_{min})^2 S_{22}}} < -t_a$$

$$\frac{\beta_1 + \beta_2 f'(FDEVT_{\max})}{\sqrt{S_{11} + 2f'(FDEVT_{max})S_{12} + f'(FDEVT_{max})^2 S_{22}}} > t_a$$

……..(13)

Where S11, S12, S22 represent the estimated variances of B1 and B2 respectively, the covariance between B1 and b2, ta is the appropriate degree of freedom and threshold for significance level a.

According to Fieller (1954), Lind and Mehlum (2010) also provided the confidence interval (1-2a) for the estimated extreme point, that is -B1/2B2 in the quadratic case. Therefore, the extreme point must be within the 90% Fieller confidence interval.

$H_0 :(\beta_1 + \beta_2 2FDEVT_{min} \geq 0)\ U$

$(\beta_1 + \beta_2 2FDEVT_{max} \leq 0)$ ……..(14)

$H_0 :(\beta_1 + \beta_2 2FDEVT_{min} < 0)\ U$

$(\beta_1 + \beta_2 2FDEVT_{max} > 0)$ ……..(15)

If the null hypothesis is rejected, we confirm that the non-linear relationship between financial development and economic growth has a two-stage U-shape curve in this study.

4 Results

The results of a quadratic polynomial model estimating the relationship between financial development and economic growth using each of the two dimensions of financial development.

The results can be seen in the first and second columns of Table 6.3. Financial development, as measured by private capital and commercial bank assets, has a statistically significant negative impact on economic growth. Specifically, it is found that for every 1% increase in PRIV and CCB, economic growth decreases by 0.291251% and 0.231682% respectively. These estimates are based on equations (4) and (5). This indicates that the impact of financial development on economic growth is not linear. In particular, the impact of financial development on economic growth is U-shaped. This means that an excess of financial resources does not hinder economic growth, but rather contributes to it.

The Sabuh-Linda-Melum U-shaped test.

	MODEL 2A	MODEL 2B
	PRIVATE CREDIT (PRIV)	COMMERCIAL BANKASSETS (CCB)
Extreme point	-0.271163	-0.161017
90% Fieller interval	[-0.502682 ; -0.039645	[-0.517179 ; 0.195145]
Slope at FDEVTmin	-3,739783**	-399013*
	(-0,010166)	(0,175798)
Slope at FDEVTmax	2,377819*	2,385325*
	(0,107991)	(0,301744)
Hypothesis test	H_0: inverted U-shape	H_0: inverted U-shape
	H_1: U-shape	H_1: U-shape
SLM test for U-shape	3.762677**	3.302102*
P-value	0.0064	0.0140

(a) *** denotes significant level at 1%.(b) t-value in parenthesis.

Notes: (a) *** denotes significant level at 1%.

(b) t-value in parenthesis.

This null hypothesis is rejected by models 2A and 2B at significance levels of 5% and 1%, respectively. The results show that financial development has a U-shaped effect on economic growth (for Models 1B and 1D).

4.1 Effects of control variables on economic growth

As shown in Tables 6.3 and 6.4, the coefficients of the control variables have the same sign in all equations (3), (4) and (5). Trade openness and investment are positive and statistically significant at

Table 1. Financial Development and Economic Growth

	MODEL 1A PRIVATE CREDIT	MODEL 1B SQUARE OF PRIVATE CREDIT	MODEL 1C COMMERCIAL BANK ASSETS	MODEL 1D SQUARE OF COMMERCIAL BANK ASSETS
L.GDPG	0.451***	0.451***	0.451***	0.451***
	(0.001)	(0.001)	(0.001)	(0.001)
PRIV	-0.291251	-0.778563		
	(0.0171)	(0.3595)		
PRIV2		0.015609		
		(0.5604)		
GEXP	-1.348644	-1.640928	-0.054175	-0.096512
	(0.3938)	(0.3301)	(0.9732)	(0.9530)
GEXP2	0.019168	0.026399	-0.011315	-0.009382
	(0.6323)	(0.5348)	(0.78340)	(08230)
INF	-0.228273	-0.244110	-0.094216	-0.044035
	(0.3274)	(0.3054)	(0.6976)	(0.8678)
TOP	0.114723	0.160974	0.134692	0.099858
	(0.1776)	(0.1734)	(0.1483)	(0.38740
INV	0.896130	0.839952	0.745832	0.761244
	(0.0002)	(0.0011)	(0.0029)	(0.0031)
CCB			-0.231682	1.182123
			(0.2239)	(0.6678)
CCB2				-0.021980
				(0.6072)
_cons	9.187754	15.15898	0.646944	-21.25557
	(0.5756)	(0.4393)	(0,9729)	(0.6496)
Obs	32	32	32	32
R-squared	0.617530	0.623006	0.546014	0.551090
Adj R-squared	0.525737	0.513049	0.437058	0.420158
D.W	2.260118	2.253599	1.838896	1.880160
Prob value of AR (2)	0.4051	0.3007	0.1612	0.1915

a. p-values in parentheses
b. * p < 0.1, ** p < 0.05, *** p < 0.01

significant levels of 1% and 10%. This indicates that both trade openness and investment have a positive impact on economic growth.

Inflation is negative and statistically significant at the 10% level in Models 1A,1B, 1C, and 1D. This is consistent with the conclusions of Boyd et al. (2001) and Stockman (1981) that inflation has a negative impact on economic growth.

The coefficient and square of public expenditure are statistically positive and negative at the significance level of 1%. This clearly shows that public investment has an inverted U-shaped effect

on economic growth and confirms Wagner's law. When governments resort to public borrowing to deal with future events and uncertainties, total debt and interest rates rise.

4.2 Sensitivity of results

For the estimates derived from equations (3), (4), and (5) to be useful for policymaking or even forecasting, they must be reliable. We follow a two-step procedure. First, the model is estimated using robust selection that takes into account serial correlation and heterogeneity. AR(2) autocorrelation tests are described for each estimated model. The p-values of AR(2) for all estimated subsamples in Tables 6.3 show that there is no second order serial correlation. In this study, Sargan tests were performed to check the validity of the additional pairwise constraints required for the systematic estimation of the GMM in (3), (4), and (5). The p-values of the Sargan tests for all subsamples show that they accept the null hypothesis that the instruments used in the estimation procedure are valid.

Equations (3), (4), and (5) were then estimated using a different estimation procedure to check the robustness of the estimates. Equations (3), (4), and (5) were estimated using the robust fixed effects, random effects and ordinary least squares (OLS) estimation methods; the OLS method used the Huber-White sandwich estimator to test for heteroscedasticity. The results showed that the signs and statistical significance of equations (3), (4), and (5) were consistent when estimated using the fixed effects, random effects, and robust OLS methods. This implies that the estimates of equations (3), (4), and (5) are robust and are therefore not affected by the econometric estimation methods. These data are presented in Tables 6.5, and 6.6.

Table 2.. Robustness Check of the Effect of Private Credit on Economic Growth

	(1) FE_PRIV	(2) FE_PRIV2	(3) RE_PRIV	(4) RE_PRIV2	(5) OLS_PRIV	(6) OLS_PRIV
LGDPG	0.178***	0.176***	0.202***	0.210***	0.250***	0.250***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PRIV	-0.955***	-1.658	-0.348	0.172	-0.201	0.329
	(0.008)	(0.120)	(0.309)	(0.866)	(0.366)	(0.637)
PRIV2		0.160		-0.0868		-0.0954
		(0.465)		(0.562)		(0.364)
GEXP	3.578**	3.690**	3.664***	3.473***	3.070**	2.999**
	(0.031)	(0.034)	(0.008)	(0.007)	(0.021)	(0.022)
GEXP2	-0.945**	-0.973**	-0.968***	-0.913***	-0.692**	-0.694**
	(0.019)	(0.023)	(0.000)	(0.000)	(0.016)	(0.014)
INF	-0.264	-0.279	-0.222	-0.183	-0.0599	-0.0343
	(0.227)	(0.211)	(0.271)	(0.345)	(0.666)	(0.798)
TOP	3.253***	3.339***	1.866***	1.577**	0.655*	0.717*
	(0.000)	(0.001)	(0.007)	(0.013)	(0.098)	(0.059)
INV	0.482	0.531	0.981	1.021	1.454***	1.380***
	(0.537)	(0.495)	(0.190)	(0.159)	(0.005)	(0.006)
_cons	-13.49***	-13.44***	-11.12***	-10.64***	-8.511***	-9.033***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
N	31	31	31	31	31	31

p-values in parentheses
* p < 0.1, ** p < 0.05, *** p < 0.01
Note
a. FE Fixed Effects estimation
b. RE Random Effects estimation
c. OLS Ordinary Least Squares

Table 3. Robustness Check of the Effect of Commercial Bank Asset on Economic Growth

	(1) FE_CCB	(2) FE_CCB2	(3) RE_CCB	(4) RE_CCB2	(5) OLS_CCB	(6) OLS_CCB2
LGDPG	0.175***	0.175***	0.201***	0.206***	0.250***	0.251***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CCB	-1.141***	-1.399	-0.468	0.0814	-0.189	0.250
	(0.002)	(0.276)	(0.1430	(0.926)	(0.440)	(0.705)
CCB2		0.0545		-0.0897		-0.0758
		(0.835)		(0.490)		(0.492)
GEXP	3.733**	3.770**	3.715***	3.545***	3.027**	2.961**
	(0.023)	(0.025)	(0.006)	(0.006)	(0.022)	(0.023)
GEXP2	-0.971**	-0.979**	-0.967***	-0.930***	-0.685**	-0.684**
	(0.015)	(0.015)	(0.000)	(0.000)	(0.017)	(0.007)
INF	-0.296	-0.300	-0.235	-0.208	-0.0573	-0.0416
	(0.190)	(0.187)	(0.250)	(0.297)	(0.682)	(0.763)
TOP	3.200***	3.215***	1.882***	1.746***	0.667*	0.726*
	(0.000)	(0.001)	(0.007)	(0.008)	(0.093)	(0.064)
INV	0.494	0.501	0.991	1.005	1.443***	1.398***
	(0.521)	(0.512)	(0.186)	(0.176)	(0.006)	(0.007)
_cons	-12.71***	-12.57***	-10.91***	-10.98***	-8.445***	-8.991***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
N	31	31	31	31	31	31

a. p-values in parentheses
b. * p < 0.1, ** p < 0.05, *** p < 0.01
Note
c. FE Fixed Effects estimation
d. RE Random Effects estimation
e. OLS Ordinary Least Squares

4.3 Granger Causality Test

Consider two stationary variables X and Y, observed in units T and N. Let X_(i,t) ,(y_(i,t)) with the relation i = 1.2,....N and t = 1.2... T is bound to the variable X(Y). In this study, the following linear model was used to test the non-causality hypothesis:

$$y_{i,t} = a_i + \sum_{j=1}^{j} \delta_i^j y_{i,t-1} + \sum_{j=1}^{j} \beta_i^j X_{i,t-j} + \varepsilon_{i,t} \cdots\cdots\cdots\cdots\cdots\cdots$$

$$X_{i,t} = \square_i + \sum_{j=1}^{d} \gamma_i^j Y_{i,t-1} + \sum_{j=1}^{j} d_i^j Y_{i,t-j} + \varepsilon_{i,t} \cdots\cdots\cdots\cdots\cdots\cdots$$

Avec j$\square$ N^* and $\varepsilon_{i,t}$ is i.i.d. (0, $\delta_{i,t}$)

Table 4. Granger causality test

	F-Statistic	Prob
PRIV does not Granger Cause GDPG	0.32188	0.7277
GDPG does not Granger Cause PRIV	2.21162	0.1305
CCB does not Granger Cause GDPG	2.33779	0.1173
GDPG does not Granger Cause CCB	0.08446	0.9193

Note: All variables are in logarithm.

5. Conclusion and implication

This study attempts to establish the relationship between the financial system and economic growth in the WAEMU zone. The results of equation (4) show that financial development has a

negative impact on economic growth. However, the results of the dynamic panel model show that the coefficients of FDVT and FDVT2 in equation (5) are negative and positive respectively, and both statistically significant, indicating U such as demonstrated with the Lind-Mehlum test for the U-shaped profile. This means that economic growth is independent of financial development. The hypothesis of "more finance hurts economic growth" was challenged in this study but follows that of Levine (2003).

Policymakers need to implement policies that channel credit for productive purposes into the private sector and the WAEMU institutions should finance innovation for local entrepreneurs. This will increase investment, economic efficiency, and productivity within this area. The WAEMU government is responsible for increasing confidence in savings and increasing lending to the private sector, with the ultimate goal of stimulating the WAEMU economy. In addition, policymakers should take appropriate measures to strengthen banking supervision and improve the WAEMU economy and lastly, banking regulations need to be revised to strengthen credit and liquidity regulations.

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