Response of Economic Growth to the Dynamics of Financial Sector Development in the West African Economic and Monetary Union

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Abstract

This study examined the role of a regional body in the nexus between financial sector development and economic growth with special reference to West African Economic and Monetary Union (WAEMU) member states over the period 1985 to 2014. The overall results of panel unit root tests showed that only three variables (government final consumption expenditure, inflation, and FDI inflow) were stationary at levels, while the remaining five variables achieved stationarity after first differencing. The overall result of the panel cointegration tests indicates the presence of a long-run relationship between financial development and economic growth, irrespective of the financial development indicators considered. Moreover, the result of model estimation reveals that the variables explored in the study largely drive economic growth in the WAEMU region over the short to long term. Also, the WAEMU body had a positive influence on growth through the financial development indicators—liquid liabilities and private credit. The study recommends that the monetary union should ensure strict compliance with the convergence criteria by its member states. The growth potentials of the financial sector can be derived by ensuring the transfer of adequate liquidity from liquidity-surplus economies to liquidity-deficit economies across the region.

Keywords: Financial development, economic growth, monetary union.

JEL classification: E5, O4

Introduction

In recent times there has been a growing debate over the role of financial sector development in the growth process. Some authors have argued that finance promotes growth in what is described as a "supply-leading hypothesis". This particular opinion is held by Levine (1997, 2005) who categorized the role of financial services in advancing economic activities into five: facilitation of exchange of goods and services; mobilization of savings; allocation of resources; monitoring managers and exerting corporate control; and encouragement of trade, hedge, diversification and pooling of risks. Other studies that support this view include Keho (2017), Saqib (2015) and Huang and Chang (2014). Others have claimed that financial services evolve in response to the needs of the real sector in what is known in the literature as "demand-following hypothesis" as supported by the submissions of Robinson (1952) that "where enterprise leads, finance follows". Lucas (1988), however, has a pessimistic view about the would-be relationship between finance and economic growth, asserting that "the role of financial system is badly overstressed".

The claim by Lucas (1988) that financial sector development does not spur economic growth is nullified by the most recent global financial crisis (2008-09 subprime mortgage crisis) that crippled most economies of the developed countries, such as the United States and Western Europe, and left many developing countries helpless as the latter were indirectly affected through trade and investment channels. This has, therefore, shown that the level of development in a country determines the extent to which financial development impacts economic growth. This implies that each region needs to understand the workings of the financial system in promoting economic growth with a view to providing an effective macroeconomic policy that will help to address financial crisis (Agbelenko and Kibet, 2015). The need to maintain the exchange rate and macroeconomic stability across regional economies has partly informed the creation of monetary/currency unions by countries that share geographical boundaries. Thus, various countries around the world have formed themselves into different regional and sub-regional groupings,

which include European Union (EU), North American Free Trade Agreement (NAFTA), Economic Community of West African States (ECOWAS), Southern African Development Community (SADC), Common Market for Eastern and Southern Africa (COMESA), West African Monetary Zone (WAMZ) and West African Economic and Monetary Union (WAEMU), among others.

The creation of these unions come with some advantages such as price transparency, reduced transaction cost, and increased efficiency, among others. However, one of the major disadvantages of these groupings is that member states do not have control over their monetary policy. This implies that member states need to abandon the idea of setting independent monetary policies. Consequently, Fwangkwal (2014) argued that the commitment of member states in addressing challenges such as infrastructure deficit, barriers to trade, large informal sector, insufficiency of commodity diversification, and high transaction cost determines the success that would be recorded by the monetary union. However, in WAEMU countries, despite a proliferation of regional policy initiatives and institutions, actual market segment integration has been constrained by factors such as lack of political will in some countries, limited intra-regional trade, underdeveloped economic and financial infrastructures, and limited regulatory and supervisory capacities. The financial system of the WAEMU region is dominated by banks, and despite the presence of BCEAO (Banque Centrale des États de l'Afrique de l'Ouest), the central bank in the region, some national banking systems remain fragile. Moreover, the interbank market is still not well developed. Also, most activities of the regional interbanks are limited to in-group subsidiaries due to disparity in risk assessment. The poor integration in the financial market in WAEMU member states can be linked to disparities in liquidity availability (Wakeman-Linn and Wagh, 2008). In addition, evaluation of the role of WAEMU in the relationship between financial sector development and economic growth in line with the above-mentioned challenges remains the focus of this study since it is the only established monetary union in West Africa with a common currency called "Communauté Financière Africaine, CFA franc" while WAMZ is not yet established as the countries under it currently have their own independent currencies.

Many studies have examined and reported a positive impact of financial development on economic growth (Oyinlola and Adedeji, 2017; Agbelenko and Kibet, 2015; Abida, Shaier and Zghidi, 2015; Allen and Ndikummana, 1998, among others) while some others reported negative relationships (Gazdar and Cherif, 2015; Ardic and Danar, 2006; Al-Zubi, Al-Rjoub and Abu Mhareb, 2006, among others). Another strand of empirics reported mixed results (Seong-Hoon et al., 2015; Ariç, 2014, among others). On causal relationships, some of the studies that confirmed unidirectional causality are Moustain (2014), Balago (2014), and Ndolvu (2013), while Carby et al. (2012) confirmed bidirectional causality. The peculiarity of the aforementioned studies is that they unilaterally looked at the relationship between growth and finance across countries that are members and those that are non-members of regional bodies. However, none of the studies addressed the question of the influence of regional integration on the finance-growth nexus except Djeto and Bernard (2010) who examined the impact of colonial origin on the relationship between finance and economic growth in ECOWAS, and Gazdar and Cherif (2015) who analysed the role of institutional quality in the relationship between finance and growth in 18 MENA countries.

To this end, this study contributes in three distinct ways that are different from existing studies. First, this study investigates the role of WAEMU in easing liquidity and credit constraints among member countries to spur intra-regional trade, economic and financial infrastructure, and structural competitiveness among others. Second, the study examines the role of WAEMU in the financial development-economic growth relationship among its members since its creation in 1994. Lastly, since most of the panel data-related studies adopted a common methodology of general methods of moments (GMM), which captures the short-run dynamic and does not address the issues of cross-sectional dependence and heterogeneity problem, this study employs the pooled mean group (PMG) to capture the dynamic relationship between financial development and growth within the framework of the panel autoregressive distributed lag (ARDL) model. Thus, there is a need to understand the role of WAEMU both in the short and long run for the development of policy for West African countries.

The rest of this paper is structured as follows. The following section presents a brief review of the empirical literature. Next is the

methodology and model specification. The empirical analysis and discussion of results are then presented, followed by the conclusion.

Synopsis of the Literature

Many studies have examined the role of regional unions in developed and developing countries to assess the performance of these unions and also to serve as a reference point for other regions. Concerning their roles, the studies in the literature documented mixed results, which shows that there is no consensus about the essence of monetary unions. Starting with developed countries, studies on EU countries generated mixed results on the intervening role of monetary unions on financial development and growth relationship. The study by Caparole et al. (2009) investigated the effect of financial development on economic growth in 10 EU member states over the period 1994-2007. The authors adopted the general method of moments (GMM) as their estimation technique. Caporale et al. (2009) found that while stock markets limit growth, an efficient banking sector accelerates growth. This suggests that some components of financial development may be important for growth. The banking sector promotes different activities that are beneficial to growth. In another study by Aric (2014), carried out for 27 EU countries between 2004 and 2012, using the fixed-effect panel estimator, the results showed a negative relationship between domestic credit to private sector and growth, whereas, capitalization ratio and M2/GDP ratio affected growth positively. This therefore implies that the impact of finance on growth in European economies differs across the indicators of financial development. The nature of the economy may determine which measures of financial development are good drivers of growth.

Furthermore, adopting an asymmetric causality test based on the Toda-Yamamoto approach, Yildirim et al. (2013) examined the causality between finance and growth in 10 emerging EU countries using quarterly data over the period 1990–2012. The authors found unidirectional causality, running from negative growth shocks to negative financial development in the case of the European countries studied. In contrast, Lebe (2016) adopted the Bootstrap panel causality test to investigate the causal relationship between finance and growth for 16 European countries between 1988 and 2012. Lebe (2016) revealed a bi-directional

causality between finance and growth for the European countries considered. Using a province-level dataset on Turkey, Ardic and Damar (2006) revealed a strong negative relationship between financial deepening and economic growth. In another study by Seong-Hoon et al. (2015), the authors investigated the influence of financial development on regional growth in 283 cities in China between 2003 and 2010 with the aid of a two-way fixed effect panel estimator. In contrast, financial development was positively associated with regional growth in China, most especially in the country's manufacturing sector (Seong-Hoon et al., 2015). Also, Estrada et al. (2010) examined the finance-growth nexus in 116 countries (22 ADB members and 94 non-members) over the period 1987-2008 using system GMM. Similarly, in a study on 150 countries over the period 1975-2005, Barajas et al. (2013) adopted the GMM panel estimation technique to investigate the impact of financial deepening on economic growth. Estrada et al. (2010) and Barajas et al. (2013) reported a positive and significant effect of financial development on real per capita GDP growth regardless of the financial development indicators used.

On developing regions, Oyinlola and Adedeji (2017) explored the intervening role of financial development in the human capital-growth relationship between 1999 and 2014. The authors adopted the GMM estimation technique to observe the short-run dynamic relationship among the variables. They found a positive direct impact of financial development on growth in SSA and also observed that financial development contributes to some extent to human capital-inclusive growth nexus, irrespective of the indicators of financial development used. Ncanywa and Mabusela (2019) explored a panel autoregressive and distributed lag to analyse the link between financial development and economic growth in selected sub-Saharan African countries. Their findings showed that measures of financial development significantly enhanced economic growth in the long run. Examining the role of financial development in facilitating economic growth member countries of the Southern African Development Community (SADC), Allen and Ndikumana (1998) explored the fixed-effects and two-stage least squares approach. Their findings showed that financial development was positively correlated with real per capita GDP. The findings further reveal the essence of financial development increasing the opportunity for output expansion among countries. Accounting for the role of institutional quality in financial development and economic growth

relationship, Gazdar and Cherif (2015) examined the extent to which institutional quality created an enabling environment for the development of the financial sector, which in turn benefitted growth in 18 Middle East and North African (MENA) countries between 1984 and 2007. Using the GMM estimation technique to examine this relationship, the study found that irrespective of the indicators used, financial development had an unconditional negative impact on economic growth. However, the authors observed that institutional quality reduced the adverse effect as the interactive effect of institutional quality and financial development indicators were found to be positive.

Similarly, Abida et al. (2015) examined the causal relationship between financial development and economic growth for three North African countries (Tunisia, Egypt, and Morocco) between 1980 and 2012 using the GMM estimator. The authors observed a strong positive and unconditional link between financial development and economic growth in the three countries when alternative measures of financial development were used. In another study carried out on 11 Arab countries between 1980 and 2001, Al-Zubi et al. (2006) examined the finance-growth relationship using the pooled OLS, fixed-effect and random-effect estimation techniques. They found no positive and significant relationship between financial development and growth but established a positive effect of public credit ratio on economic growth.

Additionally, the role of financial development in the growth process in West Africa has been documented in the literature. A study by Agbelenko and Kibet (2015) showed a positive and significant impact of financial development on growth in WAEMU for the period 1981-2010. The study further found the causality between finance and growth to be bidirectional in the case of the WAEMU region. However, the important role of WAEMU in enhancing financial activities for growth in the region was not captured. Analysing the nexus between financial development and economic growth in ECOWAS countries, Esso (2009) indicated that financial development positively influences economic growth in the long run for some countries, while it is not so for other countries in the region. Extending this study, Esso (2010) re-investigated this relationship in the region using two approaches (autoregressive distributed lag and Granger causality). The study confirmed that financial development continues to amplify economic growth. Moreover, there is the presence of

unidirectional and bidirectional causality in some of the countries in the region. Aka (2010) examineded the relationship between financial development and economic growth in eight countries in WAEMU by computing a financial development index. The study relied on principal component analysis for the financial development index and found a unidirectional causality between finance and economic growth. Also, Keho (2020) examined the relationship between financial development, trade openness and economic growth in West African countries. His findings indicated that financial development contributes positively to the growth process in the region. Also, Afawubo and Fromentin (2013) explored the vector error correction model and posited that the use of a common currency facilitates stability of the financial system and liquidity, which in turn promote growth in WAEMU in the long run.

Extant studies have also attempted to provide evidence at country-specific level. A study by Adelakun (2010) examined the relationship between financial development and economic growth in Nigeria between 1980 and 2008 using the OLS estimator and Granger causality test. In a similar study by Balago (2014), the finance-growth relationship was examined for the Nigerian economy over the period 1990-2009, using VECM-based causality and three measures of financial development, including market capitalization, domestic credit from banks and FDI. While Adelakun (2010) found a positive relationship between financial development and economic growth, both Adelakun (2010) and Balago (2014) observed unidirectional causality running from financial development to economic growth. In another study by Ndolvu (2013), the authors investigated the nature of causality between finance and growth in Zimbabwe for the period 1986-2006, with the aid of the Granger causality test. Ndolvu (2013) reported that financial development in Zimbabwe was demand-following as causality ran from economic growth to financial development.

Also, Moustain (2004) examined the causality between financial development and economic growth in Morocco over the period 1970-2000 with the aid of the Granger causality test. The author found that financial development in Morocco was supply-leading as causality ran from financial development to economic growth. Similarly, Carby et al. (2012) analysed the direction of causality between financial development and economic growth in Barbados between 1946 and 2011, also with the aid of

the Granger causality test. The authors confirmed Patrick's stage of development hypothesis, which implies the existence of bidirectional causality between financial development and economic growth in the case of Barbados. In contrast to the studies reviewed above, Keshavarzi and Akan (2014) examined the impact of financial development on economic growth in Iran between 1980 and 2013 within the framework of the autoregressive distributed lag (ARDL) model. They found a positive and significant impact of financial development on economic growth in the Iranian economy.

From the foregoing survey of the literature, studies have provided mounting evidence of the relationship between financial development and economic growth in WAEMU. However, evidence of the role of the monetary unions in enhancing financial development to amplify economic growth remains scanty in WAEMU. Hence, this study attempts to advance the research frontier by providing empirical evidence on the role of WAEMU in the finance-growth nexus in the West African region.

Methodology and Model Specification

This study employs the technique of pooled mean group (PMG) estimator. In panel data analysis with individual effects, there is an inherent challenge such as biasness arising from the correlation between the mean-differenced regressors. To some extent, only biasness in the large number of observations can be removed while the one arising from increased number of cross sections is not accounted for. Therefore, a model such as the dynamic GMM estimators was developed to circumvent this challenge using small T and large N (See Arellano and Bond, 1991). However, in the case of large T, this assumption underlying dynamic GMM (which is N > T) becomes unsuitable and the estimator remains unreliable. In such cases, a popular alternative is the pooled mean group (PMG) estimator developed by Pesaran et al. (1999). These authors also refer the PMG as the maximum likelihood (ML) estimator since the long-run parameters are nonlinear functions of the short-run parameters in the panel ARDL model. Before model estimation, there is a need to conduct preliminary assessments including panel unit root and panel co-integration tests. The tests for panel unit root employed in this study include the Levin, Lin and Chu test (2002), the Breitung test (2000), and the Im, Pesaran, and Shin test (1997). The tests for panel co-

integration include the Pedroni test (2004) and the Kao residual-based test (1999).

The PMG is an intermediate estimator which allows intercepts, short-run coefficients, and error variances to differ freely across groups, but constrains the long-run coefficients to be the same. This is unlike the two extreme estimators, mean group (MG) and fixed-effects panel estimators, where the former assumes heterogeneity in all coefficients (intercept, short-run and long-run coefficients) and error variances across the cross sections, while the latter assumes that only the intercept coefficient differs across cross sections, while other coefficients (short and long run) and error variance are homogeneous across groups/cross sections (Pesaran, Shin, and Smith, 1997). The study shows the effect of financial development on economic growth while capturing the possible role of WAEMU in the financial development-growth nexus by interacting financial development indicators with WAEMU dummy variables as follows:

$$GDP_{it} = \beta_1 GCF_{it} + \beta_2 FIN_{it} + \beta_3 GCONS_{it} + \beta_4 INF_{it} + \beta_5 TOP_{it} + \beta_6 FDI_{it} + \beta_7 WAEMU + \beta_8 (FIN_{it} * WAEMU) + \mu_i + e_t + \epsilon_{it} \quad (1)$$

where:

subscripts *i* and *t* = country and time period respectively

GDP = natural log of real gross domestic product

GCF = gross capital formation, % of GDP (a proxy for domestic investment)

FIN = financial development indicators (which in this case, are liquid liabilities and domestic credit to private sector, % of GDP)

GCONS = government final consumption expenditure (% of GDP)

INF = inflation rate (%)

TOP = trade openness (%)

FDI = net foreign direct investment inflow, % of GDP (a proxy for financial openness)

WAEMU = dummy variable that takes the value of 1 for the period

after the creation of the monetary union (1994-2014) and 0 for the period before the creation of the monetary union (1986-1993).

An indirect way of accounting for the efficiency of capital (technology) is to incorporate the role of the financial development indicators. Since the WAEMU region's financial sector is dominated by the banking system, two bank-related financial indicators, including liquid liabilities and domestic credit to private sector, are captured in the model. To account for the role of WAEMU in promoting regional growth, a dummy variable (WAEMU) and an interaction between the dummy and each of the financial sector development indicators are included in the model. Data on all the variables were sourced from the World Development Indicator database of the World Bank (2015), covering the period 1985 to 2015.

Following Pesaran and Smith (1995), equation (1) can be rewritten in terms of a panel autoregressive distributed lag model of order (p, $q_1,\ldots,q_6$) as follows:

$$\begin{aligned}\Delta GDP_{it} = {} & \emptyset_1 GDP_{i,t-1} + \emptyset_2 GCF_{i,t-1} + \emptyset_3 FIN_{i,t-1} + \emptyset_4 GCONS_{i,t-1} + \\ & \emptyset_5 INF_{i,t-1} + \emptyset_6 TOP_{i,t-1} + \emptyset_7 FDI_{i,t-1} + \emptyset_8 WAEMU + \emptyset_9 (FIN_{it} * \\ & WAEMU) + \sum_{j=1}^{p} \alpha_j \Delta GDP_{i,t-j} + \sum_{j=0}^{q_1} \lambda_j \Delta GCF_{i,t-j} + \\ & \sum_{j=0}^{q_2} \delta_j \Delta FIN_{i,t-j} + \sum_{j=0}^{q_3} \gamma_j \Delta GCONS_{i,t-j} + \sum_{j=0}^{q_4} \theta_j \Delta INF_{i,t-j} + \\ & \sum_{j=0}^{q_5} \pi_j \Delta TOP_{i,t-j} + \sum_{j=0}^{q_6} \rho_j \Delta FDI_{i,t-j} + \mu_i + e_t + \epsilon_{it} \end{aligned} \quad (2)$$

where:

p is the lag length associated with the dependent variable for $i = 1,\ldots N$ and $j = 1,\ldots p$;

q_k is the lag length associated with the k-regressors (X's) for $i = 1,\ldots N$; $j = 1,\ldots q_k$, where $k = 1,\ldots,6$.

The error correction version of equation (2) is derived as follows:

$$\Delta GDP_{it} = \emptyset_1[GDP_{i,t-1} - \left(-\frac{\emptyset_2}{\emptyset_1}GCF_{i,t-1} - \frac{\emptyset_3}{\emptyset_1}FIN_{i,t-1} - \frac{\emptyset_4}{\emptyset_1}GCONS_{i,t-1} - \frac{\emptyset_5}{\emptyset_1}INF_{i,t-1} - \frac{\emptyset_6}{\emptyset_1}TOP_{i,t-1} - \frac{\emptyset_7}{\emptyset_1}FDI_{i,t-1}\right)] + \sum_{j=1}^{p}\alpha_j\Delta GDP_{i,t-j} + \sum_{j=0}^{q_1}\lambda_j\Delta GCF_{i,t-j} + \sum_{j=0}^{q_2}\delta_j\Delta FIN_{i,t-j} + \sum_{j=0}^{q_3}\gamma_j\Delta GCONS_{i,t-j} + \sum_{j=0}^{q_4}\theta_j\Delta INF_{i,t-j} + \sum_{j=0}^{q_5}\pi_j\Delta TOP_{i,t-j} + \sum_{j=0}^{q_6}\rho_j\Delta FDI_{i,t-j} + \varphi WAEMU + \psi(FIN_{it} * WAEMU) + \mu_i + e_t + \epsilon_{it} \quad (3)$$

Thus,

$$ECT_{i,t-1} = GDP_{i,t-1} - \propto_1 GCF_{i,t-1} - \propto_2 FIN_{i,t-1} - \propto_3 GCONS_{i,t-1} - \propto_4 INF_{i,t-1} - \propto_5 TOP_{i,t-1} - \propto_6 FDI_{i,t-1} \quad (4)$$

where $\propto_1 = -\frac{\emptyset_2}{\emptyset_1}$, $\propto_2 = -\frac{\emptyset_3}{\emptyset_1}$, $\propto_3 = -\frac{\emptyset_4}{\emptyset_1}$, $\propto_4 = -\frac{\emptyset_5}{\emptyset_1}$, $\propto_5 = -\frac{\emptyset_6}{\emptyset_1}$, $\propto_6 = -\frac{\emptyset_7}{\emptyset_1}$

Equation (3) becomes:

$$\Delta GDP_{it} = \emptyset_1 ECT_{i,t-1} + \sum_{j=1}^{p}\alpha_j\Delta GDP_{i,t-j} + \sum_{j=0}^{q_1}\lambda_j\Delta GCF_{i,t-j} + \sum_{j=0}^{q_2}\delta_j\Delta FIN_{i,t-j} + \sum_{j=0}^{q_3}\gamma_j\Delta GCONS_{i,t-j} + \sum_{j=0}^{q_4}\theta_j\Delta INF_{i,t-j} + \sum_{j=0}^{q_5}\pi_j\Delta TOP_{i,t-j} + \sum_{j=0}^{q_6}\rho_j\Delta FDI_{i,t-j} + \varphi WAEMU + \psi(FIN_{it} * WAEMU) + \mu_i + e_t + \epsilon_{it} \quad (5)$$

where:

Δ = first difference operator

$ø_1$ = speed of adjustment parameter

$ECT_{i,t}$ = error correction term

It is expected that the adjustment parameters $ø_1$ be negative, less than one in absolute terms, and statistically significant as this would imply convergence of each country to the same long-run equilibrium growth path, following shocks to financial development indicators and other control variables.

From equation (2), $\emptyset_2,\ldots,\emptyset_9$ are long-run parameters, while from equation (4), α_j, λ_j, δ_j, γ_j, θ_j, π_j, ρ_j, φ, and ψ are short-run parameters, and the three components of the error term (μ, e, and ϵ) are as defined previously. With reference to equations (1) and (4) respectively, the expected signs of the regression coefficients are as follows:

$\emptyset_2 > 0$; $\emptyset_3 >$ or < 0; $\emptyset_4 >$ or < 0; $\emptyset_5 < 0$; $\emptyset_6 < 0$; $\emptyset_7 >$ or < 0; $\emptyset_8 >$ or < 0; $\emptyset_9 >$ or < 0

$\lambda_j > 0$, $\delta_j >$ or < 0, $\gamma_j >$ or < 0, $\theta_j < 0$, $\pi_j < 0$, $\rho_j >$ or < 0, $\varphi >$ or < 0; $\psi >$ or < 0

Empirical Results and Discussion

Table 1 shows a summary of descriptive statistics on the eight variables for the five countries over the period of 1985 to 2014 only, due to data availability. The variable with the highest mean is trade openness (63.15%), whereas the variable that has the lowest mean is net foreign direct investment, % of GDP (1.87%). In terms of range (which is the difference between maximum and minimum values), variables with outliers include all eight variables except the natural log of real gross domestic product (GDP). In terms of deviation of series from their mean values, the most volatile series is trade openness since it has the highest standard deviation (21.78%), while the least volatile series is the natural log of real gross domestic product with the lowest standard deviation of 0.79%.

Table 1: Descriptive statistics

Variable	Obs	Mean	Max	Min	Std Dev
RGDP	150	22.305	23.898	20.989	0.796
INV	150	17.721	40.268	4.704	7.435
LLT	150	25.106	47.42	6.91	8.378
PCR	150	17.35	37.86	3.54	7.47
GCONS	150	15.432	26.065	8.416	3.747
INF	150	3.148	39.163	-7.797	6.51
TOP	150	63.148	151.184	28.374	21.776
FDI	150	1.866	19.376	-2.138	2.954

Source: Authors' computation.

Further, the results of the panel unit root tests including: the Levin, Lin, and Chu (LLC) test; the Im, Pesaran, and Shin test (IPS), and the Breitung test, are presented, respectively, in Tables 2, 3 and 4. Also, the comparison of the tests is contained in Table 5. All tests arrived at the conclusion that both the natural log of real GDP and liquid liabilities, % of GDP are non-stationary at levels, but are stationary after first differencing. In other words, the two series are said to be integrated of order one. All three tests confirmed that inflation and net foreign direct investment inflow, % of GDP are stationary at levels, and hence they do not require any differencing. In other words, both series are said to be integrated of order zero.

Table 2: Levin, Lin, and Chu (LLC) test

Variable	Level			First Difference			Remark
	A	B	C	A	B	C	
RGDP	0.4087	3.7317	12.3656	-8.1015***	-7.9526***	-3.4467***	I(1)
INV	-1.4597*	0.9574	0.9816	-	-10.6317***	-13.1425***	I(0)
LLT	0.4163	1.5706	2.0359	-8.0063***	-9.8082***	-10.351***	I(1)
PCR	0.8246	-1.5748*	-1.78**	-5.7541***	……..	……	I(0)
GCONS	-1.3109*	-2.2952**	-0.7354	……..	……..	-13.734***	I(0)
INF	-7.1139***	-7.9972***	-8.036***	……..	……..	……..	I(0)
TOP	-0.4343	1.8966	0.5934	-4.0811***	-5.6395***	-10.608***	I(1)
FDI	-1.6056*	-1.3042*	-0.9715	……..	……..	-12.068***	I(0)

***, **,* represent 1%, 5% and 10%, level of significance respectively; A, B and C denote the unit root results with constant and trend, constant only and none, respectively.

Source: Authors' computation.

The three tests are however divided with respect to the remaining four variables, including domestic investment, private credit (% of GDP), government final consumption expenditure, and trade openness. While the LLC test concluded that domestic investment and private credit are stationary at levels, the other two tests reported that both series are not stationary until after first differencing. Nonetheless, based on majority rule, domestic investment and private credit are non-stationary. In addition, only the IPS test concluded that government final consumption expenditure became stationary after first differencing, while the other two tests confirmed the stationarity of the series at levels. As a result, government final consumption expenditure is said to be stationary.

Lastly, only the IPS test shows that trade openness is stationary after second differencing, while the two other tests confirmed that the series is stationary after taking the first difference. As a result, it can be concluded that trade openness is non-stationary.

Table 3: Im, Pesaran, and Shin (IPS) test

Variable	Level		First Difference		Remark
	A	B	A	B	
RGDP	0.2699	6.9647	-9.3057***	-8.7367***	I(1)
INV	-0.8684	0.5358	-10.3773***	-11.0745***	I(1)
LLT	1.7249	2.1295	-6.5820***	-9.1701***	I(1)
PCR	2.5054	-0.8513	-5.106***	-6.0333***	I(1)
GCONS	-0.4514	-2.7193***	-11.2168***	……†	I(0)
INF	-5.8398***	-7.0996***	…….	…….	I(0)
TOP	-0.8551	1.8839	-5.5281***	-6.7259***	I(1)
FDI	-2.873***	-1.9***	…….	…….	I(0)

***, **,* represent 1%, 5% and 10%, level of significance respectively; A, B and C denote the unit root results with constant and trend, constant only and none, respectively.

Source: Authors' computation.

Table 4: Breitung test

Variable	Level	First Difference	Second Difference	Remark
	B	B	B	
RGDP	0.2565	-6.3493***	NA	I(1)
INV	-0.4449	-5.8739***	NA	I(1)
LLT	0.3385	-5.3908***	NA	I(1)
PCR	1.4646	-5.3908***	NA	I(1)
GCONS	-0.9421	-8.4294***	NA	I(1)
INF	-6.9865***	……†	NA	I(0)
TOP	2.6226	-0.9839	-1.9547**	I(2)
FDI	-2.1654**	…….	NA	I(0)

***, **,* represent 1%, 5% and 10%, level of significance respectively; A, B and C denote the unit root results with constant and trend, constant only and none, respectively. NA implies "not applicable".

Source: Authors' computation.

Table 5: Comparison of results of panel unit root tests

Variable	LLC Test	IPS Test	Breitung Test	General Remark
RGDP	I(1)	I(1)	I(1)	Non-stationary
INV	I(0)	I(1)	I(1)	Non-stationary
LLT	I(1)	I(1)	I(1)	Non-stationary
PCR	I(0)	I(1)	I(1)	Non-stationary
GCONS	I(0)	I(1)	I(0)	Stationary
INF	I(0)	I(0)	I(0)	Stationary
TOP	I(1)	I(2)	I(1)	Non-stationary
FDI	I(0)	I(0)	I(0)	Stationary

Source: Authors' computation.

The next discussion focuses on the results of the Pedroni test on the two strands of the model estimated in this study, based on two indicators of financial development (liquid liabilities and private credit) and presented in Tables 6 and 7 respectively. Also, the result of the Kao residual-based test is shown in Table 8. Under the Pedroni test in Table 6, the test regression with constant showed that having controlled for other variables, liquid liabilities and growth were not cointegrated, which implies that there is no long-run relationship since the entire 11 test statistics had probabilities that were greater than 0.1, which led to the acceptance of the null hypothesis of no cointegration. However, the test regression with constant and trend concluded otherwise as the majority of the test statistics had probabilities that were less than 0.1. Similarly, in Table 7, the test regression with constant showed that having controlled for other variables, private credit and growth were not cointegrated or do not have a long-run relationship since the entire 11 test statistics had probabilities that were greater than 0.1, which led to the acceptance of the null hypothesis of no cointegration. However, the test regression with constant and trend concluded otherwise as almost half of the test statistics had probabilities that were less than 0.1. These results further corroborate the findings of existing studies (Keho, 2020; Ncanywa and Mabusela, 2019; Esso, 2010).

In contrast, the result of the Kao residual-based test on the two models estimated in this study on the basis of two financial development indicators showed that there exists a long-run relationship between financial development indicators and economic growth in the WAEMU region. This is due to the fact that the residuals from each model were found to be stationary at levels as reflected in the too low probabilities associated with the ADF statistics. In other words, since the probabilities were less than 0.1, the null hypothesis of no cointegration under the Kao test is rejected. Generally, since the two tests showed strong signs of the presence of cointegration, it can be concluded that having controlled for other variables, there is a long-run relationship between the two financial development indicators and economic growth.

Table 6: Pedroni test on model I: Finance (liquid liabilities)-growth nexus

Within-Dimension Statistics				
	Intercept		Intercept and Trend	
	Statistic	Weighted Statistic	Statistic	Weighted Statistic
Panel v-Statistic	-2.214[0.987]	-1.976[0.976]	15.441[0.000]	12.441[0.000]
Panel rho-Statistic	1.746[0.959]	1.532[0.937]	1.204[0.886]	1.029[0.848]
Panel PP-Statistic	0.226[0.589]	-0.389[0.349]	-1.293[0.098]	-1.517[0.065]
Panel ADF-Statistic	0.215[0.585]	-0.372[0.355]	-1.898[0.029]	-2.091[0.018]

Between-Dimension Statistics		
	Intercept	Intercept and Trend
	Statistic	Statistic
Group rho-Statistic	2.221[0.987]	2.084[0.981]
Group PP-Statistic	-0.135[0.446]	-1.102[0.135]
Group ADF-Statistic	0.190[0.576]	-1.689[0.046]

The value in [ ] represents the probability of the corresponding statistic

Source: Authors' computation.

Table 7: Pedroni test on model II: Finance (private credit)-growth nexus

Within-Dimension Statistics				
	Intercept		Intercept and Trend	
	Statistic	Weighted Statistic	Statistic	Weighted Statistic
Panel v-Statistic	-2.687[0.996]	-2.355[0.991]	18.220[0.000]	12.068[0.000]
Panel rho-Statistic	2.773[0.997]	2.116[0.983]	1.198[0.885]	0.967[0.833]
Panel PP-Statistic	2.054[0.98]	0.694[0.756]	-1.040[0.149]	-1.181[0.118]
Panel ADF-Statistic	2.075[0.981]	0.764[0.778]	-1.866[0.031]	-1.884[0.029]

Between-Dimension Statistics		
	Intercept	Intercept and Trend
	Statistic	Statistic
Group rho-Statistic	2.216[0.437]	1.937[0.974]
Group PP-Statistic	-0.159[0.987]	-1.145[0.126]
Group ADF-Statistic	0.039[0.516]	-1.857[0.032]

The value in [ ] represents the probability of the corresponding statistic

Source: Authors' computation.

Table 8: Kao residual-based test

Model	ADF stat
Model I†	-2.6019[0.0046]
Model II††	-4.6135[0.0000]

†the model does not account for the role of WAEMU in the finance (liquid liabilities)-growth nexus; ††the model accounts for the role of WAEMU in the finance (private credit)-growth nexus; the value in [ ] represents the probability of the corresponding statistic.

Source: Authors' computation.

Since there is co-integration between the financial development indicators and growth, both the short run and the long run models are estimated with respect to the two indicators used in this study. Focusing on the results in Table 9, we examined the role of WAEMU in the relationship between financial development and growth. Against expectations, there is a negative relationship between domestic investment and real GDP, and the short run coefficient is negative and not statistically significant. However, in the long run, its coefficient is positive and statistically significant. This suggests that domestic investment is critical to the growth process in the long run. Theoretically, an increase in investment is expected to spur growth in the long run. For instance, a one percent increase in domestic investment will lead to approximately a 0.05% increase in the economic growth of the region. Its contribution is however still very low, and this may be attributed to unfriendly business environment and low incentive for domestic investors. This result contradicts the argument of Oyinlola and Adedeji (2017) that domestic investment dampens economic growth, while it supports the finding of Keho (2020).

Similarly, we now focused on liquid liabilities, which include currency plus demand and interest-bearing liabilities of banks and other financial institutions. There is an inverse relationship between liquid liabilities and growth. The short-run coefficient is also negative and not statistically significant at the 10% level. In the long run, liquid liabilities continue to exert a negative influence on growth. This implies that liquid liabilities continue to dampen economic growth in the WAEMU region. The implication is that low liquid liabilities are detrimental to growth as its important role in facilitating economic activity is not apparent in most of these countries. The key intermediating role of the financial system that is expected in this setting (WAEMU) to achieve sustainable growth is not evident. The coefficient is not negligible. For instance, if the liquid liabilities are increased by 100%, the economic growth will reduce by 1.94%. The plausible reason may be the level of development and wide disparities in the level of liquidity across the WAEMU member countries. This finding is in line with the findings of Afawubo and Fromentin (2013). However, it does not support the findings of Ncanywa and Mabusela (2019) and Diallo and Mendy (2017) who argued that liquid liabilities are positively related to economic growth.

Further, the short-run coefficient of government final consumption is negative and statistically significant. This suggests that government final consumption has a drag effect on the growth process as a 100% increase in government final consumption leads to a 0.3% decline in economic growth. Expectedly, most countries in the WAEMU region are characterized by a large public sector, which may necessitate huge recurrent expenditure. Similarly, there is a negative relationship between government final consumption expenditure and growth in the long run as shown by the sign. Its coefficient is also statistically significant. This is an indication of government spending being unproductive as more resources are allocated to recurrent spending with little or no impact on the growth process. For instance, a 100% increase in government final consumption leads to a 0.26% decline in economic growth. Moreover, this may imply that government expenditure strongly crowds out private investment in the WAEMU region, which in turn reduces economic growth over the short term to long term. On inflation, the coefficient exerts a positive and insignificant short-run effect on growth. However, in the long run, its influence exerts an expected negative impact on growth, which implies that for a 100% increase in inflation, economic growth declines by 1.12%. The negative growth effect of inflation is usually transmitted via the nominal interest rate channel where an increase in inflation rate leads to an increase in the cost of borrowing. This in turns reduces investment and then output.

Trade openness captures a country's receptiveness to foreign business. Its coefficient is negative and statistically significant. This suggests that the benefit that should come with the openness of countries in WAEMU is not substantial enough to spur growth in the short run. Contrary to expectations, there is a positive long-run relationship between trade openness and growth. By implication, it can be observed that trade openness has both short-run and long-run effects on output. Also, the short-run coefficient of foreign direct investment is negative and statistically insignificant. Also, in the long run, foreign direct investment inflow influences growth negatively. This continues to support the argument that the nature of FDI in African countries, such as countries in the WAEMU region, does not promote productive activities that can allow more people to engage in the production process. Our finding contradicts that of Keho (2020) that posited that trade openness has the potential to enhance economic growth.

The subsequent discussion focuses on the role of WAEMU under liquid liabilities measure of financial development. The coefficient of differential intercept, which captures the role of WAEMU, is negative and statistically insignificant. This implies that average economic growth following the creation of WAEMU is not statistically different from its level before the creation of WAEMU. To capture the indirect role of WAEMU in these countries, an interaction term was introduced. The differential slope coefficient was positive and significant. This implies that the monetary union has the potential to stimulate growth through the financial sector development liquid liabilities, despite the underdeveloped nature of the financial sector in region. Thus, the objective of strengthening economic and financial competitiveness may be better achieved if these countries show more commitment.

The second part of the discussion focuses on the results when credit to the private sector as another measure of financial development was introduced. From the result in Table 8, the coefficient of domestic investment is still positive but not statistically significant in the short run. Also, the long-run coefficient of domestic investment is still positive and statistically significant as observed in the model with liquid liabilities. However, its magnitude is higher under the model with domestic credit to the private sector. The results of the other traditional determinants are similar to the results under liquid liabilities measure of financial development. Government final consumption and trade openness still return as negative in the short run but not statistically significant in the model with domestic credit. In the long run, government final consumption remains negative but is now statistically significant and trade openness is still positive and significant. Inflation is also positive and statistically insignificant in the short run. Also, its long-run coefficient remains negative and statistically significant. The short-run coefficient of FDI remains negative and statistically significant but its long-run coefficient is now statistically significant. The implication of this result is that FDI flow into WAEMU countries is market-seeking, which in turn crowds out domestic investment and in turn reduces domestic output.

The second measure of financial development is captured by domestic credit to the private sector. In the short run, the coefficient is negative and statistically significant. This implies that domestic credit

does not spur growth. This measure of financial development does not benefit output expansion. This means that the financial system may be ineffective in playing its intermediating role to significantly improve growth in the WAEMU region. The long-run coefficient is negative but a little twist to the discussion is statistically insignificant of domestic credit to the private sector. In addition, the role of WAEMU in these countries is captured by the differential intercept. Its coefficient still remains negative and not statistically significant, which does not change the previous narrative. The interaction terms (WAEMU and domestic credit to private investors) which are captured by the differential slope are positive and statistically significant. This suggests that the monetary union has the potential to stimulate growth through financial sector development in the short run for the WAEMU region. These findings contradict the results reported by Esso (2010), Adu et al. (2013), and Ncanywa and Mabusela (2019), while they support the result of Adusei (2013).

Further, the coefficient of speed of adjustment with liquid liabilities is negative and statistically significant at 1% level of significance, implying that there is a convergence towards a steady-state growth rate, but the convergence rate is slow, approximately 13%. The result of Hausman's test between pooled mean group (PMG) and dynamic fixed effect (DFE) estimators shows that the null hypothesis that the DFE is efficient can be rejected in favour of PMG since the probability associated with the chi-square stat is less than 0.1. On the other hand, the coefficient of speed of adjustment with domestic credit is negative and statistically significant at 1% level of significance, implying that there is convergence towards a steady-state growth rate, but the convergence rate is faster (approximately 32%) than the model with liquid liabilities. Private credit as a financial development indicator improves the convergence of the WAEMU member countries towards the long-run output path. The result of Hausman's test between pooled mean group (PMG) and dynamic fixed effect (DFE) estimators shows that the null hypothesis that the DFE is efficient can be rejected in favour of PMG, since the probability associated with the chi-square stat is less than 0.1.

Table 9: Finance-growth nexus: the role of WAEMU

	The case of liquid liabilities	The case of domestic credit
Short-run Model	**Dependent variable**: $\Delta RGDP_t$	
	-0.126***	-0.316***
ECT	(0.048)	(0.102)
	-0.0023	-0.0021
ΔINV_t	(0.0021)	(0.0017)
	-0.0024	
ΔLLT_t	(0.0022)	
		-0.0038**
PCR_t		(0.0018)
	-0.0029***	-0.0017
$\Delta GCONS_t$	(0.0009)	(0.0013)
	0.0008	0.0005
ΔINF_t	(0.0006)	(0.0003)
	-0.0015***	-0.0014***
ΔTOP_t	(0.0004)	(0.0003)
	-0.0016	-0.0021
ΔFDI_t	(0.0016)	(0.0018)
	-0.0608	-0.0023
WAEMU	(0.0466)	(0.0245)
	0.0045*	
$WAEMU*LLT_t$	(0.0026)	
		0.0043*
$WAEMU*PCR_t$		(0.0026)
Long-run Model	**Dependent variable**: $RGDP_t$	
	0.0514***	0.0246***
INV_t	(0.0134)	(0.0033)
	-0.0194*	
LLT_t	(0.0111)	
		-0.00144
PCR_t		(0.0061)

	The case of liquid liabilities	The case of domestic credit
	-0.0261*	-0.0028
$GCONS_t$	(0.0146)	(0.0054)
	-0.0112***	-0.0088***
INF_t	(0.0035)	(0.0016)
	0.0071**	0.0016**
TOP_t	(0.0032)	(0.0007)
	-0.0168	-0.007*
FDI_t	(0.0105)	(0.0036)
Hausman's test (PMG versus DFE)‡	606.09	153.56
	[0.0000]	[0.0000]
Number of observations	145	145

Note: ***, **, * indicate the statistical significance of coefficients at 1%, 5%, and 10% respectively; †the model is estimated using PMG, see the Appendices for estimates based on MG and DFE techniques; ‡see the Appendices for the summary of Hausman's test; the values in [ ] and ( ) are the probability of the corresponding statistic and standard error of each coefficient, respectively.

Source: Authors' computation.

Conclusion

The study investigated the role of the West African Economic and Monetary Union (WAEMU) in the nexus between financial (sector) development and economic growth across five out of the eight-member states between 1985 and 2014. The study found that liquid liabilities exerted a significant negative influence on regional growth in the long run only. On the other hand, private credit exerted a significant negative effect on output growth in the short run only. This result did not conform with the findings of Agbelenko and Kibet (2015) that financial development has a positive impact on economic growth in WAEMU countries. Overall, government expenditure and trade openness had both short-run and long-run effects on regional growth. Also, domestic investment and inflation turned out as significant determinants of growth only in the long run. FDI inflow exerted only a significant long-term effect on regional growth, which in turn reflects the low openness of the financial sector of the WAEMU region to international investment

opportunities. This, therefore, makes FDI flows into the region to be market seeking, with the associated negative output growth.

Moreover, WAEMU has been a positive driver of growth across the member states ever since its creation, through the two indicators of financial development (liquid liabilities and private credit), except that the financial sector in the region is still underdeveloped. This finding contrasts with those of Djeto and Bernard (2010) that the currency union (CFA Zone) hinders financial depth from having a positive impact on growth in the CFA countries. Since the regional financial sector has growth potentials, the monetary union should improve on its role in financial intermediation so that financial development can be enhanced across the region. One way to achieve this is to ensure the reduction of interest rate spread that would, in turn, encourage domestic investment and then stimulate output growth. Another way is to ensure that excess liquidity in one part of the region is channeled to other parts that have deficit liquidity so that the growth potentials of the financial sector can be exploited throughout the region.

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Appendices

Table A: Financial development (liquid liabilities)-growth nexus

Short-run Model	**Dependent variable**: $pRGDP_t$	
	MG estimates	**DFE estimates**
ECT	-0.382***(0.103)	-0.0193(0.0271)
ΔINV_t	-0.0034*(0.00174)	0.00167*(0.000965)
ΔLLT_t	-0.0016(0.00282)	-0.00380***(0.00122)
$\Delta GCONS_t$	0.000887(0.000836)	-0.00373**(0.00179)
ΔINF_t	0.000573(0.000656)	-0.000308(0.000462)
ΔTOP_t	-0.00214*(0.00121)	-0.00125**(0.000549)
ΔFDI_t	0.00154(0.00617)	0.000570(0.00148)
WAEMU	-0.32***(0.122)	-0.0250(0.0260)
$WAEMU*LLT_t$	0.0136***(0.00424)	0.00281**(0.00111)
Long-run Model	**Dependent variable**: $RGDP_t$	
INV_t	0.0388*(0.0227)	0.101(0.140)
LLT_t	-0.0634*(0.0384)	-0.0765(0.142)
$GCONS_t$	-0.0301(0.0232)	0.0428(0.127)
INF_t	-0.000532(0.00248)	0.0158(0.0481)
TOP_t	0.00771**(0.00358)	0.0404(0.0646)
FDI_t	-0.0279(0.0333)	-0.0949(0.159)
CONSTANT	-8.291(11.09)	3.479(2.233)
Number of observations	145	145

***, **, * indicate the statistical significance of coefficients at 1%, 5%, and 10% respectively; the values in ( ) are standard errors of the regression coefficients

Source: Authors' computation.

Table B: Financial development (private credit)-growth nexus

Short-run Model	**Dependent variable**: $pRGDP_t$	
	MG estimates	**DFE estimates**
ECT	-0.555***(0.0639)	-0.116***(0.0357)
ΔINV_t	-0.00289(0.00193)	0.00198**(0.000992)
ΔPCR_t	-0.00449**(0.00221)	-0.00332**(0.00154)
$\Delta GCONS_t$	0.00149(0.000907)	-0.00369**(0.00179)
ΔINF_t	-9.64e-05(0.000512)	-0.000113(0.000523)
ΔTOP_t	-0.00139(0.00109)	-0.00122**(0.000535)
ΔFDI_t	-0.00087(0.00479)	9.81e-05(0.00154)
WAEMU	0.00195(0.0778)	0.0683***(0.0263)
WAEMU*PCR_t	0.00259(0.00525)	0.0011(0.00115)
Long-run Model	**Dependent variable**: $RGDP_t$	
INV_t	0.0171***(0.00581)	0.0167**(0.00723)
PCR_t	0.00616(0.00616)	0.0280***(0.00804)
$GCONS_t$	-0.0132***(0.00281)	0.00552(0.0170)
INF_t	-0.00391(0.00291)	-0.0097(0.00760)
TOP_t	0.000434(0.00289)	0.00841**(0.00398)
FDI_t	-0.00596(0.0127)	-0.0206(0.0144)
CONSTANT	-14.82(11.10)	1.437(1.882)
Number of observations	145	145

***, **, * indicate the statistical significance of coefficients at 1%, 5%, and 10% respectively; the values in standard errors of regression coefficients

Source: Authors' computation.

Table C: **Summary of Hausman's test**

	Chi-square stat	Probability	Preferred Estimator
Liquid liabilities			
MG versus PMG	-182.71 < 0	……	Inconclusive
PMG versus DFE	606.09 > 0	0.0000	PMG
MG versus DFE	-1479 < 0	……	Inconclusive
Private credit			
MG versus PMG	-58.85 < 0	……	Inconclusive
PMG versus DFE	153.56 > 0	0.0000	PMG
MG versus DFE	-0.00000136 < 0	……	Inconclusive

Source: Authors' computation.