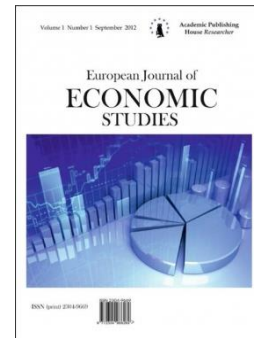


Copyright © 2020 by Academic Publishing House Researcher s.r.o.



Published in Slovak Republic
European Journal of Economic Studies
Has been issued since 2012.
E-ISSN: 2305-6282
2020, 9(2): 66-88

DOI: 10.13187/es.2020.2.66
www.ejournal2.com



Estimating the Strength of Interaction between Financial Market Integration, Financial Depth and Economic Growth in Economic Community of West African States: Simultaneous Equations Analysis

Solomon E. Effiong ^{a,*}

^a Department of Economics, Western Delta University, Benin City, Nigeria

^b Department of Economics, Edo University Iyamho, Edo State, Nigeria

Abstract

In this study, an attempt was made to investigate the strength of the interaction between financial integration, financial development and economic growth for countries of ECOWAS sub-region covering 1986 to 2019. The study employed ARDL model suitable for treatment of panel data with cross-sectional dependencies and heterogeneities. Unlike our previous study that measured financial depth by money supply/GDP ratio, financial depth was measured by domestic credit to private sector/GDP ratio. The results of the estimated regression revealed that the current degree of financial integration among ECOWAS countries is very low. The evidence shows that only four countries in the sub-region were more integrated when integration is measured as the ratio of a country's financial assets to the regional pool: Gambia (18.38 %), Ghana (22.87 %), Guinea (17.94 %) and Nigeria (20.22 %), at 0.10, 0.05, 0.10 and 0.05 levels of significance respectively. Interestingly, integration measured as interest rate convergence reveals that only Senegal exhibited significant integration level of 29.22 %, at the 0.05 significance level of the test. The result further shows that financial integration does not have short run significant effect on financial development, but, a deleterious effect on financial development, in the long run. A well-coordinated, capable and robust central regulatory oversight regulatory system cannot be over-emphasized. Such central agency is suited to provide timely support in macro-prudential management and generate both short run and long run macroeconomic stability that further enhances integration conditions in the long run and avert potential downside risks of spillovers and spillbacks which are often associated with increasingly regional interconnected financial markets. Policy coordination is necessary to avert potential detrimental impacts of financial integration on the domestic financial development.

Keywords: ECOWAS, financial sector development, financial integration.

1. Introduction

ECOWAS member countries' economies still face challenges of deepening and strengthening their domestic financial system to enhance economic growth. The financial services systems are still very fragmented. For OECD countries, impact of financial integration on economic growth is well established. But ECOWAS financial markets are very poorly developed. The few where evolving financial markets exist in the region, these markets are characteristically different and independent. The considerable diversity in degree of development and sophistication of ECOWAS

* Corresponding author

E-mail addresses: soloeffiong@gmail.com (S.E. Effiong)

financial system support argument in favor of financial integration. These diverse initial conditions should be potentially advantageous at a time where ECOWAS is poised to become an increasingly financially integrated area. Reason is, financial integration is bound to cause accelerated development in most backward financial market in the region, and allow consumers and corporations in these countries to access security markets and credits of the more advanced countries of ECOWAS.

In our previous study, we focused on identifying link between financial services sector development and economic growth for EOWAS nations. This study fills the gap and makes significant contribution to empirical literature of ECOWAS sub-region. The major strength of this study is that it evaluates the relationship between markets integration and growth using financial market development as intermediary factor.

The purpose of this research therefore is to estimate the strength of interaction between financial market integration, financial development and economic growth in ECOWAS sub-region. The study thus provided a simultaneous equation framework for determining the concurrent effect of financial markets integration and development on economic growth, while accounting for cross-section dependencies and heterogeneities problems present in the data set. Succeeding to this background is study environment. What follows next is empirical review of empirical literature. Thereafter, is the methodology used in carrying out the study, analysis/interpretation of econometric results and finally, we have concluding remarks respectively.

2. Discussion

Study Environment/Economy of ECOWAS Countries

ECOWAS comprises 15 countries in West Africa and was founded in 1975 with the aim of fostering and accelerating the economic and social development of member states. ECOWAS is home to about 240 million people, with an average per capita income just above US \$ 300, and about 50 % of the population lives in absolute poverty. Recorded intra-regional trade is very small about 10 % of ECOWAS' GDP. All members of ECOWAS, apart from Liberia and Cape Verde, are members of WTO and in principle have signed on to its market access commitments. Almost all ECOWAS countries have restrictions in place on capital account transfers.

Article 55 of ECOWAS Treaty states in part that “setting up of a West African monetary union, establishment of a single regional Central Bank and creation of a single West African currency”. The monetary integration process started with founding of West African Clearing House (later transformed to West African Monetary Agency, WAMA) in Freetown in 1975 to promote trade in sub-region by providing a payment mechanism for clearing and settlement of intra-regional transactions, as well as to encourage use national currencies in transactions.

In 1987 ECOWAS launched a Monetary Cooperation Program that defined the process leading to the creation of a single monetary zone and the introduction of a common currency. These goals were to be achieved in three phases: in short-term, objective was to strengthen payment mechanisms by introducing an ECOWAS-travelers check and a credit guarantee fund; in medium term, limited currency convertibility was to be achieved; and, in long term, achieve a single monetary zone with a common central bank and common currency. However, even short term objectives were achieved only after long delays, with ECOWAS travelers check introduced only in 1998.

ECOWAS could not proceed towards a single currency in immediate future. This led to instituting WAMZ amongst non-UEMOA countries. WAMZ members were Gambia, Ghana, Guinea (a Francophone country), Nigeria and Sierra Leone. [Table 1](#) gives a snapshot of relative sizes and some economic indicators of ECOWAS countries. Income per capita is higher on average for WAMZ when compared with UEMOA counterparts. Cote D'Ivoire and Nigeria are leading countries from each UEMOA and WAMZ in terms of income levels.

Table 1. Major economic indicators of ECOWAS countries

Country	Language	1990				2016			
		GDP per capita	GDP growth (%)	Inflation rate (%)	Pop. (Mill.)	GDP per capita (USD Mill.)	GDP growth (%)	Inflation rate (%)	Pop. (Mill.)
UEMOA									
Benin	French	1,469.86	8.976	1.112	5.001	1,964.74	4.027	-0.809	11.128
Burkina Faso	French	844.342	-0.603	-0.807	8.811	1,659.55	5.874	-0.194	18.42
Cote d'Ivoire	French	3,510.52	-1.09	-0.658	11.246	3,350.83	7.713	0.724	24.327
Guinea-Bissau	Portuguese	1,422.08	4.58	33.001	0.959	1,602.00	5.093	1.498	1.664
Mali	French	1,311.81	9.31	1.608	8.482	1,939.17	5.787	-1.8	18.289
Niger	French	953.764	-1.308	-2.026	7.523	1,039.42	5.033	0.298	18.194
Senegal	French	1,840.25	-0.676	0.325	7.562	2,355.96	6.743	0.851	15.6
Togo	French	1,591.63	5.897	1.13	3.666	1,437.14	5	0.857	7.509
Average							5.659		
WAMZ									
The Gambia	English	1,660.61	5.696	12.168	0.855	1,541.26	2.216	7.225	2.057
Ghana	English	1,959.54	3.329	37.241	14.306	4,064.31	3.469	17.455	27.573
Guinea	French	1,416.99	4.324	25.694	6.02	1,786.19	6.627	8.174	12.654
Nigeria	English	3,138.86			90.557	5,504.40	-1.617	15.696	183.636
Sierra Leone	English	1,798.42	1.611	110.946	4.043	1,568.88	6.067	11.542	6.439
Average							3.352		
Observer Members									
Liberia	English					788.958	-1.637	8.844	4.399
Cape Verde	Portuguese	2,528.08	0.692	11.111	0.354	6,159.50	3.817	-1.408	0.531

Source: World Bank, GDF and WDI Central (April 2016) Database

Interestingly, there is indication of higher per capita income for all countries in 2016, compared with 1990, although the increase for some countries is minimal. GDP growth rates are more impressive in UEMOA countries than in WAMZ countries, suggesting that economic management is better for countries in UEMOA region. Between the two periods, GDP growth in UEMOA sub-unit averaged 5.7 % against 3.35 % average in WAMZ. Perhaps difference in GDP growth rate between the two sub-blocs may be due to greater integration arising from monetary structure of a single monetary zone and adoption of common currency, the CFA Franc.

All countries in UEMOA sub-blocs exceeded regional average GDP growth rate of 5 % except Benin which had 4 percent. In WAMZ, only three out of five countries exceeded average of 3 %. The Gambia recorded 2.2 % Nigeria which is the biggest economy in the region exhibited negative growth rate of 1.6 % in comparable period. When we juxtapose this with GDP per capita, it could be reasonably explained that higher growth rate of smaller economies may be due to marginal productivity increase from increased capital. Figures 1, 2 give pictorial analyses of GDP and GDP growth rates, respectively, in ECOWAS member countries between the two periods under review.

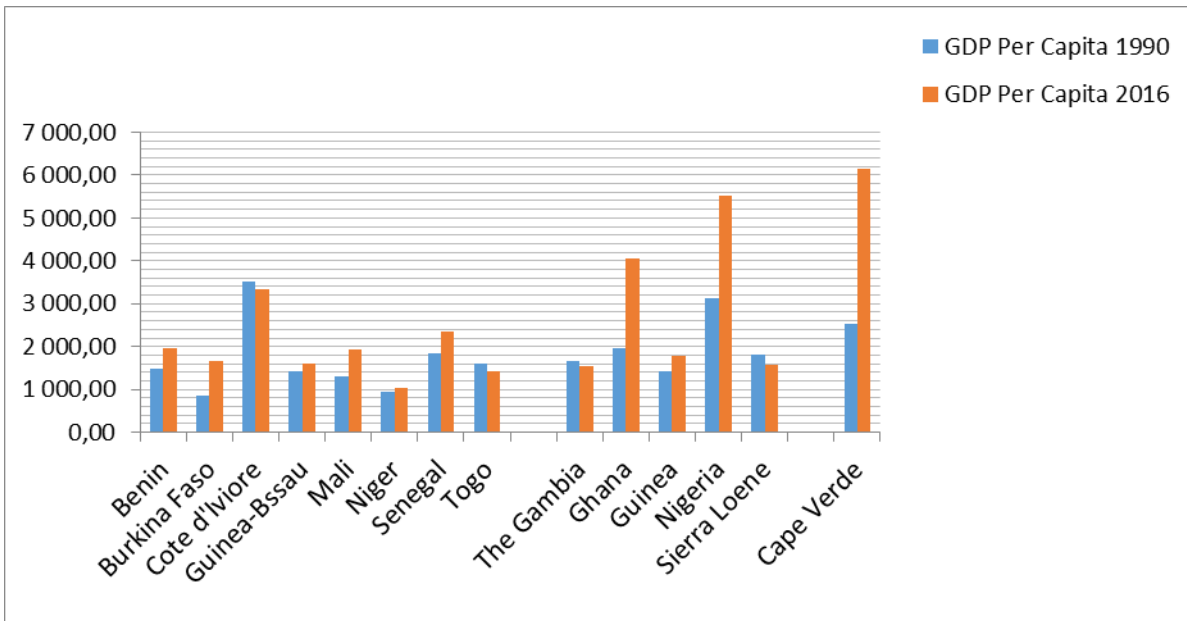


Fig. 1. GDP per capita in ECOWAS countries
Source: Compiled by authors

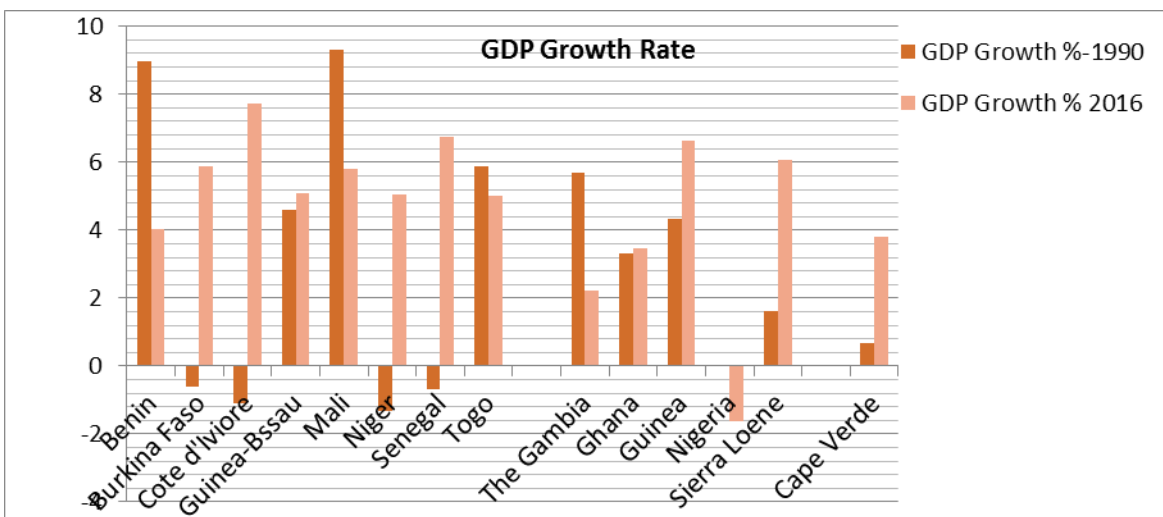


Fig. 2. GDP growth rate in ECOWAS countries
Source: Compiled by Authors

About financial sector in ECOWAS, bank or monetary financial intermediaries dominate SSA financial system, including that of ECOWAS sub-region. Other specialized institutions exist but they typically account for only a small proportion of total financial intermediation in the economy. Bank deposits remain most important form of household saving, and bank loans are most important source of finance for firms, both for working capital needs and fixed assets finance.

Table 2 below presents a summary of financial deepening within the region with respect to development of the banking sector in terms of financial inclusion (defined here as the ratio of bank accounts per 1,000 adults) and ease of accessibility to banks (the number of bank branches per 100,000 adults).

Table 2. Indicators of financial deepening

Country/Year	2010			2015		
	Bank accounts per 1,000 adults	Bank branches per 100,000 adults	Bank deposits to GDP (%)	Bank accounts per 1,000 adults	Bank branches per 100,000 adults	Bank deposits to GDP (%)
Benin	106.49	2.94	25.32	167.82	3.26	29.41
Burkina	78.64	1.94	20.40	137.88	2.71	30.77
Cape Verde	1457.12	31.18	72.18	1864.16	33.86	89.84
Civ	129.71	4.38	18.72	199.75	4.83	25.74
Gambia		9.47	39.33		9.05	
Ghana	282.91	5.36	20.73	599.33	7.17	24.41
Guinea	43.98	1.3	17.01	70.46	2.35	21.97
guinea Bissau	43.5	1.78	11.05	89.46	2.47	17.9
Mali	95.9	3.6	19.58	141.91	5.74	-
Niger	26.44	0.94	10.16	48.87	1.5	13.16
Nigeria	460.96	6.43	34.66	647.92	5.56	17.91
Senegal	93.81	3.92	26.39	163.44	4.62	33.71
s-l	112.2	2.74	13.29	249.52	4.93	38.21
Togo	198.61	4.06	28.73	253.52	4.98	40.78
SSA	129.71	3.6	19.34	165.665	4.75	21.02
World	366.8	13.49	41.77	638.14	14.06	49.54

Source: Author’s compilation. Data obtained from IMF Economic Structure Data, 2016

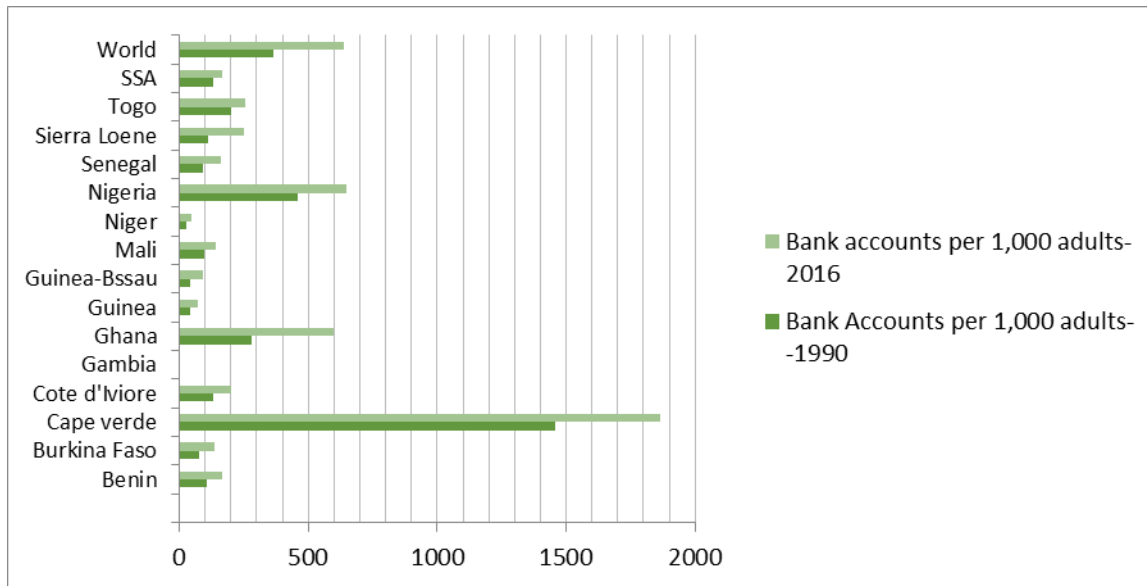


Fig. 3. Bank accounts per 1, 000 adults in ECOWAS sub-region
Source: Compiled by authors

Bank account per 1,000 adults is very low for most countries in ECOWAS. Only Nigeria and Cape Verde met world average of 638.14 accounts per 1,000 adults as at 2015. Ghana followed closely with an average of 599.33 accounts, although still short of world average figure of 638 accounts. Other ECOWAS member countries had very low figures comparable to the World.

Those figures did not show significant improvement between 2010 and 2015. This suggests that financial sector development is quite low for the ECOWAS region.

In same vein, bank branch per 100,000 adults is quite dismal for most countries when compared to the world average. Only Cape Verde had strong financial development in terms of this indicator. The country appears to be highly developed financially when compared to the other countries in the region. When we consider that most of the bank branches are concentrated in the cities, the distribution of bank branches per 100,000 adult indicates that a significant portion of the rural population is unbanked or under-banked.

Overall, data on ECOWAS region highlights quite low financial development in all indicators. These suggests that these countries (with the remarkable exception of Cape Verde) economic growth may be constrained by internal resource generation arising from an underdeveloped financial system. The trend in bank branches per 1,000 adult, bank accounts per 100,000 adult and deposit-to-GDP ratio imply that financial deepening as an aspect of financial development enhances saving mobilization and subsequently impact growth. The chart analysis in [Figure 4](#) below illustrates this fact.

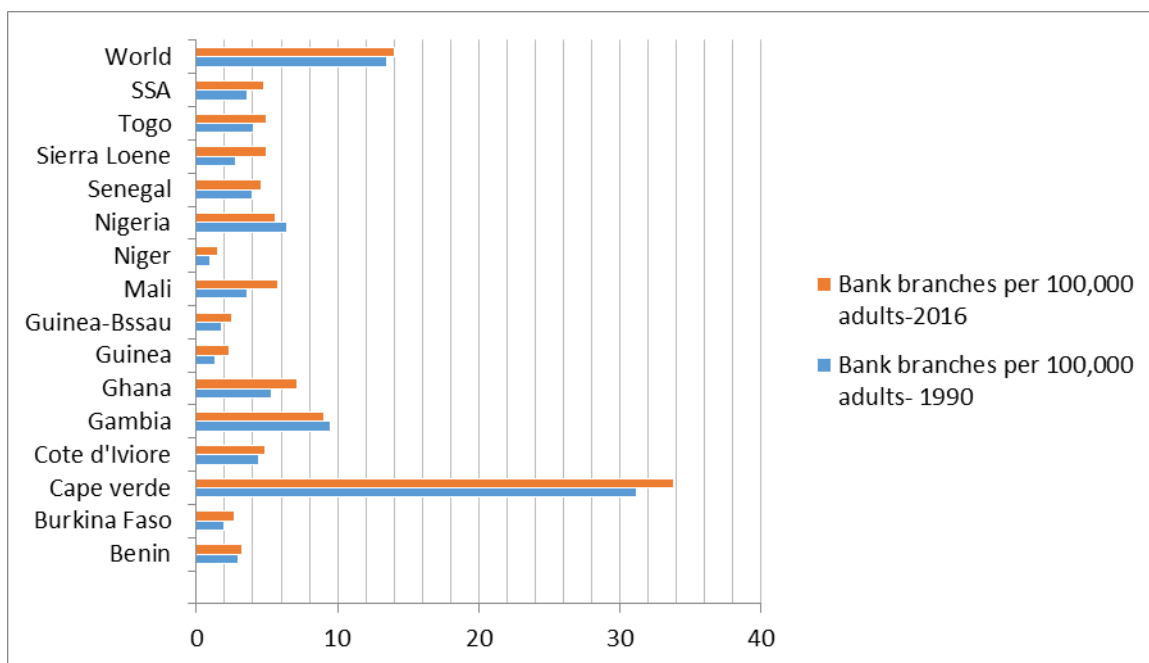


Fig. 4. Bank branches per 1,000 adults

Source: Compiled by Authors

From financial deepening metrics above, we observed how ease of access to bank, for instance, could have effect on economic growth through internal resource generation. The limit of availability of capital to agents may force the resort to borrowing from informal sources like money lenders whose cost of funds is usually very high. As captured by M2, financial systems in ECOWAS economies are extremely small. Except for Nigeria, the dominant economy in the region and to a certain extent the Cote d'Ivoire, Ghana and Senegal, the financial market size in the overwhelming majority of ECOWAS economies is below US 2 billion, i.e. less than that of a small bank in an industrial economy (see [IMF, 2007](#)).

The depth of the financial market for the entire economies are however low for all the countries (apart from Cape Verde) when compared to that of the whole world at 47.3% in 2015. The liquidity measure corroborates the evidence drawn from the financial deepening indicators (that is, financial deepening generally increases the ratio of money supply to GDP). Again Cape Verde with a highly developed financial system possess over 78 % M2/GDP.

In [Table 3](#), interest rate spread for most of the ECOWAS countries is quite higher than those of the world average. This gives implication that most money markets in the region are less efficiently run than those of the other countries in the world. Credit to GDP ratio is also lower for

SSA countries in comparison to that of the world. Credit appears to be scares in many of ECOWAS countries even though these countries require a lot of credit for development purposes.

Erstwhile Studies

As observed by Baele et al. (2004), financial integration provides additional opportunities for firms, households and countries to share financial risk and to smooth out consumption intertemporally such that by enabling domestic households to smooth their consumption path over time, capital flows can, therefore, increase welfare.

Bekaert, Harvey & Lundblad, (2006) found that financial liberalization (in the form of equity market liberalization and capital account openness) is indeed associated with lower consumption growth volatility. Berkaert et al discovered that countries that have more open capital accounts witnessed a greater reduction in volatility after opening their equity markets. They also found that financial liberalizations are closely associated with declines in the ratio of consumption growth volatility to GDP growth volatility. This suggests improved risk sharing.

Similar findings were reported for other empirical studeies carried out on the EU. For example, Edison, Levine, Ricci & Slok (2002); Prasad, Kose, & Terrones (2003), and other researchers like Guiso, Jappelli, Padula & Pagano (2004) in their study of European Union concluded that financial integration generates growth benefits, although to varying degrees. Specifically, using instruments such as country origin of financial assets, measures of creditor rights, quality of law enforcements to capture the effect of financial integration on financial development, the authors found that institutional quality determines the size and efficiency financial markets in Europe.

Accodiring to Kalemli-Ozcan & Manganeli (2008) financial integration enhances extensive investment prospects and financing sources that further licenses unfathomable liquid markets. Many other studies that posit that a well-functioning European financial system has the potential to foster the accumulation of physical capital, improve economic efficiency and thus promote long-term growth through the intermediation role of mobilizing saving from the surplus economic unit to the deficit units (Christopoulos, Tsionas, 2004; Levine, 2003; Bekaert et al., 2001; Levine et al., 2000). Jalilianm & Kirkpatrick (2007), Odhiambo (2010a,b) found that financial deepening, through improved intermediation efficiency, lowers the cost of credit and widen access to credit in the developing countries. This spurs economic growth as more people can access credit. This finding supports Tressel & Detragiache (2008) argument that financial reforms could led to financial deepening, and efficiency in allocation of investments.

Theoretical Frmework

The Solow-Swan growth model (Solow, Swan, 1969) provides us theoretical basis for the study as it shows that any positive change in net investment will increase income per worker and generate growth in short run taking economy to a new steady-state but without stable 'growth effect'.

The analytical form of neoclassical growth model begins with denoting production opportunities in the economy as a function that maps the vector of factors into a composite output, Y and focuses on four variables: output (Y), capital (K), labor (L) and *knowledge* or the *efficiency of labor* (A). At any time, the economy has some amount of capital, labor, and knowledge, and these are combined to produce output. The production function takes the form:

$$y(t) = f[k(t), A(t)L(t)] \quad (1)$$

Where t denotes time, time enters the production function indirectly through K , L , and A . This implies that output changes over time only if the inputs to production change. In particular, the amount of output obtained from given quantities of capital and labor rises over time only if there is technological progress. AL is referred to as *active labor*, and technological progress that enters in this fashion is known as *labor-augmenting* or *Harrod-nuetral* (Romer, 2012).

The production function is assumed to exhibit constant returns to scale in its two arguments, capital, and effective labor. This allows us to work with production function in *concentrated form*. Hence, dividing equation (1) by $1/AL$ yields:

$$y = f(k,1) = f(k) \quad (2)$$

where $y \equiv Y/AL$, output per unit of effective labor; $k \equiv K/AL$, is amount of capital per unit of effective labor; $f(k) = f(k,1)$, output per unit of effective labor as a function of capital per unit of effective labor. Setting the model in continuous time, implying that arguments are stock variables such that the initial levels of capital, labor, and knowledge are exogenously determined and are assumed to be strictly positive; labor and knowledge grow at constant rates, n and g respectively, thus:

$$\dot{L} = nL(t) \tag{3}$$

$$\dot{A}(t) = gA(t) \tag{4}$$

The growth rate of L and A are constant at n and g , respectively. Accordingly, from eqns (3) and (4) can be expressed as:

$$\ln L(t) = [\ln L(0)] + nt \tag{5}$$

$$\ln A(t) = [\ln A(0)] + gt \tag{6}$$

where $L(0)$ and $A(0)$ are values of stock of labor and knowledge at time 0. Exponentiating (5) and (6) give us:

$$L(t) = L(0)e^{nt} \tag{7}$$

$$A(t) = A(0)e^{gt} \tag{8}$$

Eqns (7) and (8) imply that L and A each grow exponentially. Given that capital stock increases in any given situation especially that people saves constant fraction “ s ” of gross income Y , and that the constant fraction “ δ ” of capital stock depreciate each year, the rate at which new capital accumulates is sY , and the rate at which old capital wears out is δK . So, the net rate of increase in capital stock, (capital accumulation) is given by:

$$\dot{K}(t) = sY(t) - \delta K(t), 0 < \delta, \delta < 1 \tag{9}$$

Eqn (9) incorporates equilibrium condition of goods market, that is, equality between investment and saving, $I = sY$. Since economy may be growing over time, we focus on dynamics of capital stock per unit of effective labor, k , rather than on unadjusted capital stock, $K(t)$ Since $k = K/AL$. Hence,

$$\dot{K}(t) = sf(k) - [n + g + \delta]k(t) \tag{10}$$

With eqn (10), net rate of increase in capital stock per unit of labour man-hour is the resultant of rate at which new saving raises k and amount of investment that is just sufficient to replace worn out capital. The long-run growth rate of the economy can then be represented as:

$$g \equiv \frac{\dot{A}}{A} + Af_k \frac{\dot{k}}{k} + Af_n \frac{\dot{n}}{n} = g_A + \beta_k g_k + \beta_n g_n \tag{11}$$

where g is rate of growth of TFP, g_A is rate of growth of FTP that controls shift in the aggregate production function; $\alpha_k g_k + \alpha_n g_n$ adjust movement along steady state growth path of the economy.

Our Model

We specified simultaneous equations model to determine impact of interaction between financial development and financial integration on economic growth as well as the impact of financial integration on financial sector development are specified below:

$$\begin{aligned} D(y_n)t = & b_0 + b_1(y_n)t-1 + b_2(fng)t-1 + b_3(fsd * fng)t-1 + \\ & b_4sav(t-1) + b_5I_Q(t-1) + \sum_{i=1}^{p-1} a_1D(y_n)t-i + \sum_{i=1}^{p-1} a_2D(fng)t-i + \\ & \sum_{i=1}^{p-1} a_3D(fsd * fng)t-i + \sum_{i=1}^{p-1} a_4D(sav)t-i + \sum_{i=1}^{p-1} a_5D(I_Q)t-i + \varepsilon_t \end{aligned}$$

$$D(fsd)t = d_0 + d_1(fsd)t-1 + d_2(fng)t-1 + b_3(I_Q * fng)t-1 +$$

$$\sum_{i=1}^{p-1} \delta_1 D(fsd)t-i + \sum_{i=1}^{p-1} \delta_2 D(fng)t-i + \sum_{i=1}^{p-1} \delta_3 D(I_Q * fng)t-i + \varepsilon_t$$

where *yn* is real GDP growth rate, *sav* is sum of private and public sector saving, and *I_Q* represent institutional quality, *fsd* is measure of financial depth; *fng* is financial integration, *I* refers to institutional quality. Financial depth was measured by domestic credit to private sector/GDP ratio (*cregdp*).

The variable (*I_i * fng_i*) is an interactive variable that indicates that institutional quality tends to interact with financial integration to determine level of financial development in a given country. Issues of restrictions and capital account liberalization are highly political and institutional, hence the use of this variable.

Data Sources and Measurement of Variables

Panel data involving annual values for the entire 15 ECOWAS countries were used in the empirical analysis of the study. The data is obtained from Development Indicators of World Bank; and UNCTAD World Investment Report Database.

Table 3. Description of Variables

S/N	name	symbol	description	used to measure:
1	growth rate of real gross domestic products (gdp)	yn	This is the real income level in the economy which shows the basic structure of an economy in terms of aggregate income levels.	Economic Growth Variable
2	lag of real gross domestic products	rgp	Represents the initial economic condition of a country	Economic Growth Variable
3	credit rate	cregdp	Ratio of Credit to the private sector to GDP and measures the extent of bank-based financial intermediation in an economy.	Financial development variable
4	interest rate gap	inrg	Computed spread between Average Interest rate in ECOWAS and an individual country's interest rate	Financial Integration variable
5	assets	assets	The ratio of a country's external assets to that of ECOWAS regional total	Financial Integration variable
6	number of convergence criteria met	convergence index	Formal commitment made by ECOWAS member country to deepen integration in the sub-region in line with the ECOWAS Monetary Cooperation Program (EMCP)	Financial Integration variable
7	capital account openness	kpn	The level at which countries allow inflow and outflow of capital formulated by Chinn and Ito	Financial Integration variable
8	investment profile	inprl	Explains the bureaucratic and legal hurdles that an entrepreneur has to overcome to establish a business and the efficiency of a country's contract enforcement process.	Institutional Quality Variable
9	law and order	law	Explains the general respect to the rule of law (as opposed to arbitrariness or discretionary behavior) in a country, as measured by the International Country Risk Guide (ICRG)	Institutional Quality Variable
10	government stability	gst	Explains the degree of stability and consistency in the policy environment, as measured by as measured by the International Country Risk Guide (ICRG)	Institutional Quality Variable
11	gdp per capita	gpc	The ratio of RGDP to Population of a country	Control Variable
12	interest rate	intr	Defined as a country's lending Rate	Control Variable
13	saving rate	sav	The rate at which output of a country is preserved (not consumed) for future production	Control Variable
14	consumer price index	cpi	The rate of change in commodity prices over time in a given country	Control Variable
15	inflation rate	inl	Average rate of change in the general price level of a country over time	Control Variable
17	Exchange Rate	exr	The rate at which a country exchanges a unit of her currency of another's	Control variable

Source: Authors' construction

The study analyzed linkage between financial market integration and economic growth in ECOWAS sub-region. The choice of ECOWAS sub-region for this study is due to existing legal instrument in the form of the ECOWAS' treaty of 1975 which provide for economic integration of the sub-region. The empirical analysis covers 15 countries of ECOWAS for the period, 1986 to 2019. The selection of the period is to further evaluate strength of market integration, financial sector development and growth in ECOWAS countries using credit/GDP ratio as monetary policy variable.

The study adopted fixed effect within group model for the estimation. All observations in this case are pooled together, but for each unit, we express each variable as a deviation from its mean value and then estimate an OLS regression on such 'mean-corrected' values (Gujarati, Porter, 2009). In this study, estimation of ARDL models and their error corrections-representation for estimation of long-run relationships, was employed for the dynamic analysis. This procedure lends itself for application to models with mixed stationary properties of variables in our sample. It also allows for inferences on long-run estimates, which is not possible under alternative co-integration procedures.

The procedure is suitable irrespective of whether series are integrated to order zero $I(0)$ or integrated to order $I(1)$. The bounds testing procedure process by Pesaran, Shin & Smith (2001) is used to test for the existence of a linear long-run relationship, when orders of integration of underlying regressors are not known with certainty. But before this application, as suggested by Westerlund (2007), study addressed issues of cross-section dependency that may arise in panel dataset like those employed in this study.

According to Kuoassi, Silue & Brou (2017) acknowledging problem of cross-section dependency constitutes a bridge between first and second generation tests of unit root and co-integration in panel data (Baltagi, 2013). Hence, we carried out necessary check for presence of cross-section dependence in our data-set using the average pairwise correlation coefficient. The CD_{LM} diagnostic test based on the above pair-wise correlation coefficients as suggested by Frees (1995) was also carried out.

3. Results

Descriptive Analysis

The initial aspects of the empirical analysis of the study consider the basic characterization of the datasets used in the study by considering the moment conditions and other time series characteristics of the data. The descriptive statistics are presented in Table 4. It should be noted that the descriptive statistics are reported for all cross sections (countries) combined and for individual countries for each of the variables. Table 4 presents the summary statistics of all the variables used in the study for a combined process of the 14 countries used in the empirical analysis.

The Table 4 shows that average real GDP growth for the entire ECOWAS sub-region is 3.49 for the entire period which is relatively low, considering that a much larger value of consistent growth rate (average 7.0 percent) was suggested by the World Bank in 1999 as the basic rate that will ensure sustainable long run welfare benefits for countries like those in the ECOWAS. Moreover, a minimum value of 24.79 growth rate for a given year is rather dramatic, highlighting the highly unstable patterns of growth experienced by countries in the sub-region.

The standard deviation of growth rate for the period is slightly higher than mean value, which suggests that growth was largely inconsistent either over time within economies or by comparing countries in the sample. Indeed, there is highly significant J-B value for real GDP growth (and for all other variables) shows that the datasets are non-normally distributed with a high degree of heterogeneity among the countries.

Table 4. Descriptive statistics of variables taken as a Group

variables	mean	max	min	std. dev.	skew	kurtosis	j-b	prob.
yn	1856.19	6326.97	718.10	966.82	2.31	9.38	1373.2	0.000
rgdp	3.49	26.43	-24.79	4.79	-0.90	9.80	1097.5	0.000
cre	16.07	120.04	0.41	12.17	2.42	14.98	3700.0	0.000
inr	15.55	62.83	4.74	9.18	1.27	5.59	290.82	0.000
ctia	4.78	9.00	0.00	1.87	-0.41	2.80	16.1	0.000
assets	7.05	84.10	0.00	15.57	3.33	13.17	3271.9	0.000
inrg	0.01	39.62	-17.27	8.39	1.22	4.85	207.7	0.000
kpn	-0.91	2.35	-1.92	0.89	2.14	8.48	1072.5	0.000
sav	11.00	44.29	-98.14	11.01	-3.12	35.43	24168.8	0.000
gst	6.91	11.00	2.00	2.23	-0.06	2.17	15.4	0.000
inprl	6.09	11.50	0.00	2.07	-0.13	3.05	1.6	0.443
law	2.76	5.00	0.44	0.95	-0.04	3.05	0.2	0.897
cpi	148.68	3007.01	0.07	306.53	5.51	38.45	30554.1	0.000
inl	11.06	178.70	-24.52	19.10	3.66	22.15	9321.7	0.000

Source: Authors' compilation

The mean of ratio of credit to private sector to GDP rate is 16.07 % respectively. These values are essentially low, especially when the critical relevance of credit as a major component of private sector development is considered. The values suggest the continued predominance of informality in the financial sectors of most ECOWAS countries.

For financial development variables, standard deviation values are relatively low, which shows that average financial development value is quite representation of most of ECOWAS countries. Accompanying low financial development indicators is high average interest rate for the sub-region at 15.55 %. Apparently, these figures suggest that financial environment for these countries is stringent and offers little room for financial inclusiveness. This is as expected especially with the high mean interest rate of 15.55 which tend to attract foreign investment into the region.

The characteristics of four measures of financial integration provide insight into extent of financial interactions among countries. The average number of convergence conditions met by countries in the region over the years is 4.78 out of 11 conditions provided in ECOWAS Monetary Cooperation Program manual. Thus, less than half of the conditions were met within period of study by countries which underlies difficulty of integration within the sub-region.

The other measure of financial integration is share of individual country's external assets to the total for the sub-region. The average value for this measure is 7.05 %, which is also low and indicates that most of countries have less shares of the aggregate financial position of the ECOWAS. For interest rate gap (as a measure of integration), the average gap value is 0.01, which very low and impressive. It shows that interest rates across region reflect average value of 15.55 % and rates are stable among countries. This suggests that cost of funds is high and domestic investment may be constrained by low fund availability. However, relative stability of rates demonstrates a form of efficiency of financial sector management which should provide more impetus for inflow of foreign capital into the sub-region.

Though interest rate gap suggests attraction for more foreign capital inflow, average capital account openness for the sub-region at -0.91 shows less open financial sectors among the countries. Largely, average figures highlight ECOWAS countries appear to be less integrated than is to be desired. The indicators of institutional quality for the region are shown by government stability, investment profile and law and order. The average values for each of the variables are at

half-way level (around 6.0 out of 12.0 for government stability and investment profile, and around 3.0 out of 6.0 for rule of law). Essentially, there is more room for improvement in institutional quality for the countries, especially for government stability which is a critical aspect for developing a strong financial sector in a country.

Table 5 analyses only indicators of financial development for each country. The mean value of financial development indicator is quite low in the region, with exception of Cape Verde, which has a comparable high degree of financial development to that of developed economies. Only Cape Verde had a liquidity value of over 50% and a corresponding credit to GDP ratio of over 30 %. Guinea has least liquidity ratio and it also has least credit to GDP ratio along with Sierra Leone. The average values for these countries are so low that they suggest strong liquidity constraint for both fiscal management and private sector participation in the respect economies. Surprisingly, large economies in sub-region (Nigeria and Ghana) do not appear to possess higher liquidity when compared to other economies.

Table 5. Descriptive statistics of financial development variables, country per country

country	credit	
	mean	std. dev.
Benin	17.82	7.90
Burkina Faso	14.64	5.40
Cape Verde	35.58	18.28
CIV	23.58	10.85
Gambia	12.69	6.24
Ghana	12.45	18.89
Guinea	4.84	2.00
Guinea-Bissau	10.11	6.34
Mali	15.14	4.35
Niger	10.74	4.88
Nigeria	15.00	5.94
Senegal	25.09	7.22
Sierra Leone	4.43	1.93
Togo	22.91	7.83
All	16.07	12.17

Source: Authors' results using Eviews 9.0

Table 6 presents mean values and standard deviations of financial integration variables which is measured by assets, capital account openness (kpn), interest rate gap (inrg), and number of convergence criteria me. It can be seen that 60.13 % of external central bank assets for countries in sub-region is owned by Nigeria, while 11.66 % is owned by Cote d'Ivoire. Clearly, countries with larger economies (and perhaps possessing capital markets) dominate in external asset ownership within the sub-region.

This pattern of asset ownership may present certain challenges in terms of financial sector integration, especially with respect to currency and Central Banks' unification. Interestingly, index of capital account openness among the countries is similar. Only Gambia has a positive indicator of capital account openness, suggesting that country is most financially open in ECOWAS. Few of countries (including Ghana, Gambia, Sierra Leone, and Senegal) report high average interest rate gaps, but several others have low gaps which are a sign of more integration. In terms of criteria met for the convergence conditions, no country actually stood out in its quest to facilitate convergence within the ECOWAS sub-region.

Table 6. Descriptive statistics of financial integration variables per country in ECOWAS region

country	capital account							
	assets		openness		interest rate gag		convergence	
	mean	std. dev.	mean	std. dev.	mean	std. dev.	mean	std. dev.
Benin	2.42	0.99	-0.76	0.53	-6.56	2.04	6.34	1.24
Burkina Faso	2.52	1.08	-1.01	0.58	-3.48	2.63	6.08	0.94
Cape Verde	1.13	0.68	-1.17	0.22	-5.04	3.23	4.29	0.90
CIV	11.66	5.48	-0.93	0.48	-6.72	1.77	5.26	0.79
Gambia	0.41	0.17	1.18	1.64	10.16	6.54	2.68	1.60
Ghana	7.03	2.83	-1.54	0.44	12.04	6.80	2.34	1.17
Guinea	1.39	0.42	-1.47	0.35	1.50	2.00	3.47	1.52
Guinea-Bissau	0.19	0.16	-1.25	0.23	4.40	9.93	4.89	1.31
Mali	2.68	1.21	-0.76	0.53	-2.86	3.27	6.11	1.29
Niger	1.42	0.85	-0.84	0.50	-2.79	5.17	6.08	1.15
Nigeria	60.13	13.56	-1.08	0.50	2.00	4.40	5.13	0.96
Senegal	5.27	2.23	-0.76	0.53	-9.02	4.00	6.34	1.38
Sierra Leone	0.61	0.22	-1.24	0.67	10.11	9.05	2.39	1.24
Togo	1.87	0.93	-1.06	0.38	-3.57	3.43	5.55	1.13
All	7.05	15.57	-0.91	0.89	0.01	8.39	4.78	1.87

Note: Authors' results using EViews 9.0

Table 7 presents descriptive statistics of growth rate of ECOWAS countries measured by real output/GDP and some selected macroeconomic control variables which comprise, saving rate, interest rate, exchange rate and inflation. Most of the countries of ECOWAS, with exception of Sierra Leon, Togo, Cote D'Ivoire and Guinea-Bissau appear to have relatively good growth rate when compared with the sub-regional average growth rate of 3.49 %.

Cape Verde, Burkina Faso and Ghana grew at an average rate of 5.2 %, 4.9 % and 4.5 %, respectively over the period. Most of the other countries of the ECOWAS grew at above the region's mean growth rate of 3.5 %. Similarly, GDP per capita is highest in Cape Verde (averaging 3922.97), followed by Cote D'Ivoire (average of 3246.22) and Ghana (averaging 2546.06). Although the rgdp in Cote D'Ivoire is low, gdp per capita is high due to size of country's population. But sustained growth is better accounted for when it is accompanied by a high Saving rate, again, highest in Cape Verde (21 %) followed by Mali (18.87 %) and Nigeria (18.11 %).

Table 7. Descriptive statistics of real gdp and some selected macroeconomic control variables in ECOWAS (country-by-country)

Country	rgdp		rgp		sav		inr		exr		inl	
	\bar{X}	S.D	\bar{X}	S.D	\bar{X}	S.D	\bar{X}	S.D	\bar{X}	S.D	\bar{X}	S.D
Benin	3.76	2.62	1659.17	158.45	13.9 3	5.50	8.97	2.64	466.23	136.10	3.80	6.86
Burkina Faso	4.93	3.09	1110.13	299.26	11.43	4.34	12.0 5	5.23	83.96	16.76	3.50	5.29
Cape Verde	5.16	3.08	3922.9 7	1594.0 1	21.0 0	28.7 7	10.5 0	0.88	466.68	136.48	5.76	5.99
CIV	2.59	3.75	3246.2 2	553.99	10.0 6	6.29	8.81	2.74	466.68	136.48	4.31	4.70

Gambia	3.27	5.16	1587.3 9	106.62	9.94	5.52	25.6 9	4.96	17.84	13.41	8.99	9.60
Ghana	4.53	3.64	2546.0 6	756.80	8.70	5.47	27.5 7	7.18	0.84	1.16	27.17	25.30
Guinea	3.69	1.78	1457.6 2	166.29	5.44	6.51	17.0 4	3.78	2711.74	2823.1	18.02	13.61
Guinea-Bissau	2.64	4.44	1446.4 5	91.99	5.47	4.12	19.9 4	13.3 4	466.68	136.48	26.26	30.78
Mali	3.95	4.39	1505.9 6	293.58	18.8 7	8.17	12.6 7	5.79	466.68	136.48	3.59	6.93
Niger	2.97	5.59	927.14	148.37	11.9 0	7.60	12.7 4	6.81	466.68	136.48	3.34	7.73
Nigeria	3.89	4.35	1696.7 5	482.34	18.11	6.33	17.53	5.07	80.50	80.35	8.72	12.05
Senegal	3.47	2.71	1991.2 6	176.66	11.02	6.29	6.51	2.00	466.68	136.48	3.76	6.61
Sierra Leone	1.73	10.1	1473.7 9	369.21	0.58	5.46	25.6 4	11.43	1973.5 4	1985.0 1	33.46	37.42
Togo	2.32	5.85	1415.7 0	188.58	7.55	6.80	11.97	5.40	466.68	136.48	4.18	7.11
All	3.49	4.79	1856.1 9	966.82	11.0 0	11.0	15.55	9.18	614.39	1180.3 3	11.06	19.10

Note: Authors' results using Eviews 9.0

Unit Root Test Results

Country specific characteristics (individual heterogeneity) and common (homogenous) characteristics of the ECOWAS' member countries reflect in the data employed for this study. This calls for use of panel unit root tests to check for the stationarity of the data, in order to avoid incidence of "spurious" inference. We used the tests developed by Levin, Lin and Chu (LLC) and Breitung, to examine the stationarity properties of the homogenous panel.

These tests assume identical co-integration vectors among countries. But ECOWAS member countries are likely to exhibit differences in their economic, policy, institutional and other unobserved space, hence the common unit root assumption may not be sufficiently realistic. To overcome this seemingly unrealistic assumption for the ECOWAS sub-region, we undertake Im, Pesaran and Shin (IPS, 2003) and ADF tests, which allows for heterogeneity in panel's cross-section and assumes a null hypothesis of no co-integration in panel data. Results are reported below (Table 8).

Table 8. Panel unit root tests results

variable	intercept and trend								remarks: variables are all stationary @ I(1)
	homogenous unit root process				heterogeneous unit root process				
	LLC		Breitung		IPS		ADF-Fisher		
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
rgd	-16.33**	-31.83**	-11.17**	-20.59**	-15.68**	-32.09**	252.36**	899.45**	Stationary
cpi	10.44	12.18**	14.69	-8.30**	8.45	-12.06**	12.92	177.97**	Stationary
rgp	-2.04*	-16.95**	5.26	-9.25**	-2.61	-16.44**	35.76	259.07**	Stationary
sav	5.39**	-25.98**	-2.62**	-14.43**	-6.59**	-23.13**	100.55**	481.75**	Stationary
exr	4.30	-10.35**	6.26	-9.00**	4.40	-11.93**	11.36	174.41**	Stationary
cre	0.78	-18.01**	3.63	-4.35**	3.87	-17.09**	10.31	264.47**	Stationary
asset	0.70	-13.43**	1.99	-1.39**	0.24	-15.80**	26.22	235.66**	Stationary
kpn	0.65	-16.57**	-0.62	-4.45**	0.29	-16.54**	27.55	256.31**	Stationary
inrg	-0.84	-17.55**	-1.67*	-13.70**	-1.06	-16.93**	31.78	257.06**	Stationary
converge ence	-8.82**	-26.69**	-9.09**	-16.71**	-11.86**	-30.34**	176.62**	666.27**	Stationary

law	-0.06	-13.83**	-0.88	-9.62**	0.23	-11.88**	33.91	172.56**	Stationary
gst	1.32	-12.47**	-0.25	-13.76**	3.20	-11.13**	6.92	152.29**	Stationary
inprl	0.11	-15.53**	-1.71*	-13.85**	-0.53	-12.72**	22.82	184.17**	Stationary

Source: Authors' results using Eviews 9.0, ** and * indicate significant at 1 % and 5 % levels respectively; IPS = Im, Pesaran & Shin; LLC = Levin, Lin & Chu

In unit root results, it can be seen that coefficient of test for the variables in levels indicates that only the coefficients of real GDP growth, rgp, sav, and convergence index are significant. These are the only variables that are stationary in levels either for the homogenous tests or for heterogeneous tests. Other variables are I[1]. The mixture of variables in the model in terms of level of integration either I[0] or I[1] does not however matter for the ARDL estimation procedure since the estimator account for the different integration levels.

Co-integration Test Results

Given the unit root results strongly indicate that the stationarity status of the variables are mixed with certain variables I[1] and others at I[0], long run conditions of the variable interactions can however be established to present a stronger circumstance for a dynamic relationship among the variables. Table 9 shows outcomes of the Pedroni and Kao panel co-integration tests on both panel and group assumptions along with respective variance ratios and rho statistics (non-parametric tests). We use both within dimension and between-group dimension tests to check whether panel data are co-integrated.

Table 9. Panel co-integration test result

Growth-Creyr (credit) equation	Panel Statistics	Group Statistics	Kao (ADF)
variance ratio	0.636	--	
rho	1.259	1.014	-2.440*
pp	-0.304*	-2.130*	
adf	0.133*	-1.548*	
financial development and financial integration interacting equation (creyr), with control for institution quality	Panel Statistics	Group Statistics	Kao (ADF)
variance ratio	6.042	--	
rho	3.929	4.954	2.772**
pp	2.586	2.490	
adf	-3.618*	-1.757*	

** , * indicates the rejection of the null hypothesis of no co-integration at the 0.01 and 0.05 level of significance respectively

The coefficients of PP & ADF test statistics for both panel and group assumptions are significant at the 0.05 % significant level. Thus, there is strong evidence of panel co-integration according to both ADF-t and non-parametric-t statistics. These results are complemented by another residual based (kao) panel co-integration test. The kao residual co-integration test indicates that null hypothesis of no co-integration can be rejected for each of equations at the 0.05 significant level.

Results of Financial Integration and Financial Sector Development

In Table 10, the result of the financial integration measured by domestic private credit is presented.

Table 10. Regression results

variable	no interaction			interaction effect		
	convergence conditions	inrg	assets	convergence conditions	inrg	assets
<i>long run results</i>						
fng	0.077**	-0.003	-0.672***	0.281***	0.409***	-0.041***
fng*I	--	--	--	-0.030***	-0.066***	0.010***
lnrgp	1.379***	2.152***	3.036***	1.408***	1.570***	1.669***
kpn	-0.097	-0.035	-0.119**	-0.134***	-0.240***	-0.007
gst	0.040*	0.117***	0.139***	0.153***	0.084***	0.023
inprl	-0.080***	0.087***	0.063*	-0.066***	-0.083***	0.021
<i>short run results</i>						
ecm _{t-1}	-0.198***	-0.206**	-0.198***	-0.239***	-0.251***	-0.198***
Δ (fng)	0.002	-0.014***	0.161***	-0.065**	0.097	-0.024
Δ (fng _{t-1})	-0.099	0.002	0.130***	--	0.175	0.024
Δ (I*fng)	--	--	--	0.009*	-0.009	0.002
Δ (I*fng _{t-1})	--	--	--	--	-0.019	-0.004
Δ (lnrgp)	0.074	-0.131	-0.186	-0.124	-0.195	-0.111
Δ (lnrgp _{t-1})	-0.028*	0.159	0.044	--	0.131	0.314
Δ (ops)	0.008	0.120	0.038	0.098*	0.109*	0.090*
Δ (ops _{t-1})	-1.566***	-0.039	-0.052	--	-0.125	-0.055
Δ (gst)	0.009	-0.019*	-0.008	-0.063**	0.016	-0.014
Δ (gst _{t-1})	0.239	0.006	-0.003	--	0.025	0.008
Δ (inprl)		-0.015	-0.034	0.004	-0.017	-0.033
Δ (inprl _{t-1})	24.497	-0.003	-0.011	--	0.023	-0.023
c	184.025	-3.174**	-4.289***	-2.151***	-2.366***	-2.000***
mean (yn)		0.009	0.009	0.009		
s.e.e.(reg)		0.224	0.213	0.237		

Source: Authors' results using Eviews 9.0, ***, **, * indicates the 0.01, 0.05 and 0.10 level of significance, respectively

Short-run estimates show financial integration does not have strong short term relevance for financial sector development among ECOWAS countries. The convergence coefficient has significant negative impact on credit ratio in short run, although its effect is positive with interactions with institutions. The share of regional assets also has significant positive impact on financial development, both by itself and with interactions with institutional quality. There is therefore evidence that financial integration in the form of asset shares and convergence criteria have short term effects on credit supply in a country.

Error correction results show that each coefficient had expected negative sign and are significantly different from zero at the 1 percent level. Since these values are both significant and negative, it is shown that long run stability is present within the estimates and any short-term deviation from equilibrium will be restored over time. Again, capacity for restoring long run equilibrium is also low, considering the low values of the coefficients of error correction term in each equation. This denotes that up to 25 % of long run adjustments to equilibrium is completed within the first year for each equation. This shows that financial integration tends to provide more long run stability for credit supply than for overall financial market depth among ECOWAS countries.

For long run results in upper panel of Table 7, it can be seen that when institutional quality is not taken into cognizance, both convergence and regional asset shares have significant impacts on financial development as measured by credit supply. This implies that meeting convergence conditions tends to aid domestic financial sector in terms of loan provision and loan access. Conversely, larger share of external financial assets owned within sub-region by a country, implies lower credit supply to the economy. So, effects of financial integration on the economy is rather mixed, and strictly depends on indicator used for measuring integration.

When policy interactions with integration variables are included in estimates, each coefficients becomes significant at 1% level; although that of share of assets becomes negative and that of institutional quality is positive which indicates capacity for interest rate alignment to reduce credit supply. The size of positive coefficient of conditions met increases with inclusion of institutional interaction. This shows that better institutions strengthen benign impact of convergence conditions on credit supply in a country. Coefficient of per capita income is explicitly positive and significant. It is an indication that economic performance significantly increases credit supply in the economy. Financial openness has significant negative impacts on credit supply, while institutional factors are shown to be mainly positively related to credit supply. Essentially, better institutions tend to stimulate either credit availability of means of assessing credit among ECOWAS countries.

Results of Financial integration (interface with financial development) and Economic Growth

Finally, effects of financial integration and its interaction with financial development on economic growth is estimated and analyzed. The results of estimation are reported in Table 11.

Table 11. Regression results

variable	<i>dep.v (yn)</i>			
	assets	convergence conditions	k account	inrg
<i>long run results</i>				
ln(cre)	0.082	1.818**	0.129***	0.178***
fng	-0.185*	1.093**	--	-0.031**
cre*fng	0.127***	-0.334**	-0.027***	0.012**
ln(sav)	0.211***	1.136***	0.135***	0.003***
gst	0.009	0.058	-0.021	-0.003
inprl	0.070***	0.177***	0.102***	0.130***
law	0.061	0.068	0.142***	-0.004
<i>short run results</i>				
ecm _{t-1}	-0.069***	-0.022***	-0.087***	-0.094***
Δ(lncre)	0.048	-0.008	-0.004	-0.010
Δ(fng)	0.094	-0.009	--	-0.005
Δ(cre*fng)	-0.028	0.001	0.000	0.003
Δ(lnsav)	0.007	-0.002	0.004	0.002**
Δ(gst)	0.000	0.000	0.002	-0.001
Δ(inprl)	0.004	0.003	0.001	0.000
Δ(law)	-0.002	0.001	-0.008	0.006
c	0.419***	-0.056**	0.518***	0.588***
mean (yn)	0.006	0.006	0.006	0.006
s.e.e.(reg)	0.046	0.046	0.045	0.046

Source: Authors' results using Eviews 9.0, ***, **, * indicates the 0.01, 0.05 and 0.10 level of significance

The short run estimates are mostly not significant, but coefficient of error correction term is significant and negative. The coefficients of error correction term are also very low and show that adjustment to long run equilibrium is slow. The long run estimates also show that credit rate is significant and has positive impact on economic growth, moreover, assets share in region has significant negative effect on the economy, while the interaction of the integration indicator with credit supply has a significant positive effect on the economies.

This shows that though credit ratio and regional asset shares have unfavorable effects on economic growth when considered apart, their interaction tends to provide strong growth-enhancing effects in the economies. In contrast, while credit ratios and financial integration have positive impacts on growth when considered apart, their interaction has significant negative impacts on growth. The same unfavorable effect is found for impact of interaction of capital account openness and credit ratios as well as interaction between interest harmonization and credit ratio. The results clearly reveal that interactions of most financial integration components and financial development measured as credit supply have debilitating effects on growth in the sub-region.

Financial Integration, Financial Development and Economic Growth

The results shows that in short run, financial integration measured by number of conditions met has significant negative impact on economic growth, while effects of others are insignificant.

Table 12. Regression results

Variable	<i>dep.v (yn)</i>			
	assets	convergence conditions	k-account	inrg
<i>long run results</i>				
ln(cre)	0.216***	0.028	0.159***	0.155***
fng	0.086***	0.248***	0.036	0.001
ln(sav)	0.092***	1.199***	0.053**	0.005***
gst	-0.016	0.048	-0.003	0.008
inprl	0.117***	0.209**	0.145***	0.114***
law	0.024	0.097	0.014	0.008
<i>short run results</i>				
ecmt-1	-0.090***	-0.021***	-0.087***	-0.107***
Δ(lncre)	-0.008	0.006	-0.004	-0.007
Δ(lnfng)	0.007	-0.006**	-0.006	-0.001
Δ(lnsav)	0.010	-0.002	0.008*	0.001**
Δ(gst)	0.002	0.000	-0.001	-0.002
Δ(inprl)	0.000	0.003	-0.001	0.001
Δ(law)	0.002	-0.003	0.006	0.011
c	0.541***	0.035***	0.532***	0.669***
mean (yn)	0.006	0.006	0.006	0.006
s.e.e.(yn)	0.045	0.046	0.045	0.046

Source: Author’s result using Eviews 9.0, ***, **, * indicates the 0.01, 0.05 and 0.10 level of significance, respectively

Capital account openness, once again, does not appear to possess any long run relevance in promoting economic growth. Indeed, when credit to private sector is considered, only asset shares and conditions met have significant effects on economy in the long run. Only coefficient of investment profile passed significance test among institutional variables and these coefficients are all positive.

Robustness Checks for Regression Results

The results provided by ARDL estimates are evaluated using robustness checks with estimations from panel estimation technique. In Table 13, result for financial integration effect on financial development is shown. The focus is especially on signs of coefficients in order to evaluate coefficient performances. It can be seen that coefficients are similar to those of estimates in Table 12.

Table 13. Robustness estimates

variable	cregdp		
	1	2	3
c	-2.45***	-1.23***	-0.04
convergence	0.10***		
inrg		-0.03***	
assets			0.15***
ln(gpc)	0.57***	0.51***	0.31***
kpn	0.19***	0.24***	0.20***
gst	0.09***	0.06***	0.06**
inprl	0.03*	0.03	0.07***
Adj. R ²	0.39	0.46	0.43
F-statistic	9.12	11.71	10.35

Source: Authors' results using Eviews 9.0, ***, **, * indicates the 0.01, 0.05 and 0.10 level of significance, respectively

With results of Table 14, there is a role for financial integration in stimulating economic growth in SSA of ECOWAS.

Table 14. Robustness estimates

variable	dep v (lncregdp)			
	1	2	3	4
c	6.428***	6.378***	6.587***	6.794***
ln(cre)	0.206***	0.204***	0.162***	0.287***
inrg	0.006***			
kpn		-0.075***		
assets			0.060***	
convergence				-0.078***
sav	0.002	-0.017	-0.028*	-0.006
gst	0.010	0.006	-0.011	0.006
inprl	0.049***	0.053***	0.064***	0.041***
law	0.035**	0.051***	0.051***	0.005
adjusted R ²	0.271	0.280	0.304	0.350
F-statistic	5.583	5.814	6.384	7.649

Source: Authors' results using Eviews 9.0, ***, ** and * indicate significant at 0.01, 0.05 and 0.10 levels

The panel estimation results of interaction between financial integration and financial development on growth are shown in Table 15. As can be seen, results show that coefficients switch between lone variables and interface variables just as was demonstrated in ARDL estimates. Apparently, results show that financial integration and financial sector development needs deeper analysis to evaluate interactive impact on economic growth.

Table 15. Robustness estimates

	ln(cregdp)			
	1	2	3	4
c	6.281***	7.27***	6.476***	6.21***
	0.194***	-0.012	0.130***	0.234***
assets	-0.08***			
assets*fsd	0.059***			
convergence		-		
		0.18***		
convergence*fsd		0.05***		
kpn				
kpn*fsd			-0.02***	
inrg				0.061***
inrg*fsd				-0.02***
ln(sav)	-0.014	0.04***	0.021	0.004***
gst	-0.006	-0.014	-0.005	0.002
inprl	0.064***	0.08***	0.07***	0.064***
law	0.059***	-0.024	0.017	0.012
adjusted R ²	0.333	0.265	0.234	0.294
F-statistic	7.022	5.350	4.764	6.026

Source: Authors' results using Eviews 9.0, ***, ** and * indicate significant at 0.01, 0.05 and 0.10 levels

Diagnostic Test Results

In order to observe relevance of estimations provided in this study, post-estimation tests are conducted. In particular, test for multicollinearity among variables of study is performed on basis of Variance Inflation Factor (VIF). The results of VIF are reported in Tables 16 and 17. Theoretically, VIF ranges from 1 upwards. The numerical value of VIF gives an indication of percentage of inflation of variance. The results from Table 16 and Table 17 showed that all variables have variance inflation ratio of less than 10, which is the condition for relative absence of multicollinearity.

Table 16. Variance inflation factor (VIF) test for multicollinearity

Statistics	cre		convergence conditions		fng		gpc	
	max z	prob.	max z	prob.	max z	prob.	max z	prob.
Benin	2.74	0.02	2.53	0.04	0.85	0.87	2.12	0.13
Burkina Faso	2.24	0.10	1.33	0.56	1.17	0.67	0.82	0.88
Cape Verde	0.47	0.98	1.61	0.36	1.02	0.77	4.21	0.00
CIV	4.07	0.00	1.98	0.18	0.97	0.80	3.73	0.00
Gambia	2.56	0.04	1.96	0.19	1.35	0.54	1.18	0.66

Ghana	11.3	0.00	2.02	0.16	2.34	0.07	3.30	0.00
Guinea	0.29	1.00	2.40	0.06	2.33	0.08	0.40	0.99
Guinea-Bissau	1.21	0.64	2.21	0.11	2.12	0.13	1.35	0.54
Mali	0.35	0.99	2.11	0.13	0.97	0.80	0.56	0.97
Niger	5.77	0.00	2.15	0.12	2.63	0.03	2.28	0.09
Nigeria	1.00	0.79	1.54	0.41	0.62	0.95	6.25	0.00
Senegal	4.48	0.00	2.42	0.06	1.15	0.69	1.64	0.35
Sierra Leone	0.25	1.00	2.44	0.06	1.76	0.28	3.50	0.00
Togo	1.15	0.68	1.82	0.25	1.87	0.22	1.12	0.70

Source: Authors' results using Eviews 9.0

*Probability approximation using studentized maximum modulus with parameter value 14 and infinite degrees of freedom

Table 17. Variance inflation factor (VIF) test for multicollinearity (cont'd)

statistics	gst		inrg		inprl		df.
	max z	prob.	max z	prob.	max z	prob.	
Fisher Combind	52.98	0	28.93	0.42	26.6	0.54	28
cross- section	max z	prob.*	max z	prob.*	max z	prob.*	obs.
Benin	0.75	0.91	0.63	0.95	0.71	0.92	37
Burkina Faso	1.44	0.48	0.83	0.88	1.62	0.36	37
Cape Verde	1.6	0.37	1.66	0.33	1.43	0.49	37
CIV	2.2	0.11	1.23	0.63	1.11	0.71	37
Gambia	1.32	0.56	1.2	0.65	1.35	0.54	37
Ghana	1.83	0.24	1.84	0.24	2.01	0.17	37
Guinea	2.56	0.04	1.16	0.68	2.65	0.03	37
Guinea- Bissau	1.18	0.66	2.22	0.1	2.08	0.14	37
Mali	2.46	0.05	1.05	0.75	1.96	0.19	37
Niger	2.58	0.04	1.28	0.59	0.75	0.91	37
Nigeria	1.75	0.29	0.96	0.81	0.9	0.84	37
Senegal	2.18	0.11	3.52	0	1.13	0.7	37
Sierra Leone	2.19	0.11	1.16	0.68	1.51	0.43	37
Togo	3.15	0.0065	1.2	0.65	0.9	0.84	37

Source: Authors' results using Eviews 9.0

*Probability approximation using studentized maximum modulus with parameter value 14 and infinite degrees of freedom

4. Conclusion

In this study, an attempt was made to investigate relationship between financial integration, financial development and economic growth for countries in ECOWAS sub-region. The place of interactions between financial integration and development on economic growth was also examined. Financial development was considered in terms of credit supply, while financial integration were taken as share of a country's external assets in the regional pool of assets; number

of convergence conditions that a country has met at a given year, gap in interest rates between a country and that of a sub-regional benchmark; and extent of capital account openness in a country.

A dynamic framework was devised for empirical analysis and ARDL panel data estimator was used in analysis because of dynamic nature of financial sector. Based on empirical analysis, to the extent that bank lending and financial depth could be constrained by monetary policy, restrictive monetary policy may affect the economy through channels demonstrated in this study. However, policy measures themselves could be highly influenced by regional integration factors. Financial integration is shown to be more related to financial development than with overall economic growth. Moreover, significant role of institutional quality in effective interactions was also demonstrated. Hence, a major lesson from the study is that financial integration needs to be properly guided with efficient institutions. The pursuance of financial integration as a strictly independent policy from that of financial sector development among economies in sub-region could be catastrophic to financial sectors of economies.

Even when financial integration has become desired policy choice for the sub-region, need for strong and quality institutional involvements is critical. Uncoordinated regimes of financial openness and integration policies may hurt financial markets and could be precursor for deeper financial sector problems in a country. Although assumed in this study, financial markets may not represent only channel through which financial integration can influence economies of ECOWAS sub-region. Also, domestic moves in financial sectors could also have significant impacts on financial integration in ECOWAS.

The study found that financial integration constructed based on dispersion of a country's interest rate spreads from average spread of countries in the sub-region, is negatively related to GDP growth. Additionally, a coordinated central regulatory oversight regulatory system cannot be over-emphasized in face of imminent challenges that an integrated financial ECOWAS market poses to the sub-regional financial systems stability. Such central agency is best suited to provide timely support in macro-prudential management and generate both short run and long run macroeconomic stability that further enhances integration conditions in the long run and avert potential downside risks of spillovers and spillbacks which are often associated with increasingly regional interconnected financial markets.

References

- Baele et al., 2004 – Baele, L., Ferrando, A. Hordahl, P. Krylova, E., Monnet, C. (2004). Measuring financial intergration in the euro area. European Central Bank, Occasional Paper Series N^o 14.
- Baltagi, 2013 – Baltagi, B. (2013). *Econometric Analysis of Panel Data* (5th ed.). Chichester: John Wiley and Sons
- Bekaert, G., R. Harvey, & C. Lundblad (2001). Does financial liberalization spur growth? *Journal of Financial Economics*. 77 (1): 3-55.
- Bekaert et al., 2006 – Bekaert, G., Harvey, R., Lundblad, C. (2006). Growth volatility and financial liberalization *Journal of International Money and Finance*. 25(1): 370-403.
- Christopoulos, Tsionas, 2004 – Christopoulos, D.K., Tsionas, E.G. (2004). Financial Development and Economic Growth: Evidence from Panel Unit Root and Cointegration Tests. *Journal of Development Economics*. 73: 55-74.
- Economic Commission for Africa, 2008 – Economic Commission for Africa (2008); *Assessing regional integration in Africa III (ARIA III). Towards monetary and financial integration in Africa*, Addis Ababa: United Nations Economic Commission for Africa.
- Edison et al., 2002 – Edison, H.J., Levine, R., Ricci, L., Slok, T. (2002). International financial integration and economic growth. *Journal of International Money and Finance*. 21: 749-825.
- Guiso et al., 2006 – Guiso, L., Sapienza, P., Zingales, L. (2006). Does culture affect economic outcomes. *Journal of Economic Perspectives*. 20: 23-48.
- Guiso et al., 2004 – Guiso, L., Jappelli, T., Padula, M., Pagano, M. (2004). Financial market Integration & economic growth in the EU, *Centre for Studies in Economics and Finance (CSEF) Working paper No. 118*.
- Gujarati, Porter, 2009 – Gujarati, D.N., Porter, D.C. (2009). (Fifth ed.). New York: McGraw-Hill.
- Jalilian, Kirkpatrick, 2007 – Jalilian, H., Kirkpatrick, C. (2007). Does financial development contribute to poverty reduction? *Journal of Development*. 41 (4): 636-656.

[Kalemli-Ozcan, Manganelli, 2008](#) – *Kalemli-Ozcan, S., Manganelli, S. (2008). Financial integration and risk sharing: The role of the monetary union. In 5th European Central Banking Conference on The Euro at Ten: lessons and challenges. Frankfurt: European Central Bank.*

[Levine, 2003](#) – *Levine, R. (2003). Stock market liquidity and economic growth: theory and evidence. In L.P. Phelps. Finance, Research, Education and Growth (pp. 1-24). New York: Palgrave MacMillan.*

[Levine et al., 2000](#) – *Levine, R., Loayza, N., Beck, T. (2000). Financial intermediation and growth: causality and causes. Journal of Monetary Economics. 46 (1): 31-77.*

[Odhiambo, 2010a](#) – *Odhiambo, N.M. (2010). Are banks and stock markets positively related? empirical evidence from South Africa. Journal of Applied Business Research. 26(6): 17-26.*

[Odhiambo, 2010b](#) – *Odhiambo, N.M. (2010). Financial deepening and poverty reduction in Zambia: An empirical investigation. International Journal of Social Economics. 37(1): 41-53.*

[Pesaran et al., 2001](#) – *Pesaran, M., Shin, Y., Smith, R. (2001). Bounds testing approaches to the analysis of level of relationship. Journal of Applied Economics, 289-326.*

[Prasad et al., 2003](#) – *Prasad, E., Kose, M.A., Terrones, M. (2003). Financial integration and macroeconomic volatility. IMF Staff Paper No.50.*

[Westerlund, 2007](#) – *Westerlund, J. (2007). Testing for error correction in panel data. Oxford Bulletin of Economics and Statistics. 69: 709-748.*

[Tressel, Detragiache, 2008](#) – *Tressel, M.P., Detragiache, E. (2008). Do financial sector reforms lead to financial development? Evidence from New Dataset. International Monetary Fund, Business and Economic Working paper. Pp. 1-44.*