Real Deposit Rate and Credit Supply Nexus in ECOWAS Evidence From DCCE-MG and PMG Techniques

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Abstract

This study interrogates the McKinnon-Shaw hypothesis that artificial depression of the real deposit interest rate depresses the supply of credit by banks. The sample coverage from 1980 to 2015 consists of ten members of the Economic Community of West African States made up of Communauté Financière d'Afrique (CFA) and non-CFA countries. This two groups have very different monetary structures. Engaging the dynamic common correlated effects-mean group (DCCE-MG) and pooled mean group (PMG) techniques, findings validate the hypothesis as the real deposit rate exhibits a positive and long-run impact on credit supply. Monotonic impact is not sustained. These outcomes are corroborated with robustness checks from the respective sub-samples though country-level results are mixed. Similarly, causality test shows that the real deposit rate Granger-causes credit supply in the long-run. Overall, the findings support the McKinnon-Shaw hypothesis that interest rate is an essential ingredient in the intermediation role of the financial system.

Keywords: domestic credit; deposit interest rate; dynamic common correlated effects, pooled mean group, *xtdcce2*

JEL Codes: E43; E44; G18; G21

1 Introduction

The pioneering works of Schumpeter (1911), Schumpeter and Opie (1934) closely followed by those of Gurley and Shaw (1955) and Goldsmith (1969), amongst others, hold the view that financial repression is inimical to economic growth and development. They argue that where government interferes with financial systems with measures such as interest rate ceilings, high bank reserve requirements, and directing credit towards specific sectors stifles growth. Thus, financial markets when allowed to be freely dictated by demand and supply interactions stimulate growth by channelling savings to the most productive investment projects. The adverse effects on economic growth is evidenced when financial systems are repressed (McKinnon, 1973; Shaw, 1973; Roubini & Sala-I-Martin, 1992). Financial sector reforms are instrumental to driving growth, particularly through the mobilisation of savings, allocation of resources to the most productive investments, reducing information asymmetry, transaction and monitoring risks and costs, diversifying risks and facilitating the exchange of goods and services resulting in a more efficient allocation of resources, a more rapid accumulation of physical and human capital, and faster technological progress (Bencivenga & Smith, 1991; Greenwood & Smith, 1997).

On the interactions between interest rate and loanable funds, the basic theoretical context of the McKinnon (1973) and Shaw (1973) hypotheses is that the creation of higher interest rate leads to increase in saving from depositors, increase in financial intermediation as well as improving the efficiency of using saving (i.e. availing credits). Generally, the official short-term interest rate is the anchor rate that influences other money market rates and it has been the major tool of conducting monetary policy for many central banks under an inflation-targeting framework. When the central bank changes its official rate, it affects the money market rate, marginal cost of funds faced by banks, and then the retail (loan and deposit) rates

offered by banks to non-financial institutions and households, in order to achieve its aim for inflation and output (Ogundipe & Alege, 2014; Adeleye, 2020; Adeleye *et al.*, 2020). Therefore, setting an optimal rate is a precursor for financial efficiency. In essence interest rate determination achieves several objectives. Firstly, it should be competitive enough to drive saving from depositors without which financial intermediation is impossible. The reason is because deposits are instrumental to the accumulation of loanable funds needed for meeting maturing obligations, and more importantly, for granting loans and advances that would generate income. Consequently, funds accruing from deposits, to a very large extent, determine the performance of the banking sector in all economies (Ncube & Leape, 2008). Secondly, it should be modest to stimulate borrowing from the real sector as excessively high lending rate discourages borrowing.

The deposit rate is a fundamental component of financial intermediation and pricing, in addition to being a crucial factor for determining the volume of loanable funds, bank profitability and consumers' asset structure vis-à-vis deference for current or future consumption (Tule *et al.*, 2015; Borio & Gambacorta, 2017). When the rate is too low, savers no longer have the incentive to save and therefore react by shifting away from investing in financial assets into real assets (McKinnon, 1988). Also, a low deposit rate creates a prejudice for current consumption leading to reduction in loanable funds and investment and ultimately slows down economic activities. Consequently, the net effect on economic growth will inevitably be detrimental.

This study uses data from 10 selected countries within the Economic Community of West African States (ECOWAS) to investigate the nexus between the real deposit rate[1] and bank credit while controlling for per capita GDP and broad money supply. The focus on ECOWAS is intuitive due to its composition of Communauté Financière d'Afrique (CFA) franc and non-CFA franc countries which represent 95.97% of the total GDP and 92.8% of the total population of ECOWAS members and having different economic and monetary structures. For instance, in the non-CFA countries inflationary problems have made the average real deposit rate below -10%, with enormous year-to-year variation (see Table 1). In the CFA countries, the average real deposit rate is mostly slightly above zero. This different economic and monetary climate gives the basis for testing if the McKinnon-Shaw hypothesis holds. Furthermore, the study evaluates both the impact of increasing the real deposit rate on credit supply and causal relations between both variables. Given the role of credit to the real sector, answers to the above objectives will not only expand the frontiers of the extant literature but also shape economic policy.

A heterogeneous dynamic analysis is adopted with the engagement of the dynamic common correlated effects (DCCE) technique developed by Ditzen (2016) to achieve the study objectives. The DCCE technique is an improvement and extension of the common correlated effects (CCE) estimator of Pesaran (2006) and Chudik and Pesaran (2015a) who included a lagged dependent variable and weakly exogenous regressors. The DCCE estimator is known to perform well in terms of bias correction and in correcting for cross-sectional dependence and for robustness checks, the pooled mean group (PMG) of Shin, Pesaran and Smith (1999) is used. Findings, among others, support the hypothesis that the real deposit rate is a positive

[1]Real deposit rate which is computed as: nominal deposit rate minus inflation rate is used due to the fact that a sizeable number of countries lack data on the real interest rate. Besides, the deposit rate captures the supply drive for loanable funds.

and significant predictor of credit supply; that increasing the real deposit rate does not increase credit supply and that a unidirectional causal relation occurs from real deposit rate to credit supply without a feedback effect. The significance and contribution of this study exposes the heterogeneous nature of CFA franc and non-CFA countries franc as evident in the results. These distinct differences support the call that a unified-harmonisation of deposit rates for ECOWAS members seems implausible given their respective monetary policies, economic sizes and financial depth. The rest of the paper is organised as follows: after this introductory section, section 2 describes the empirical approach; results are presented and discussed in section 3 while section 4 concludes with policy implications.

2 Brief Literature Review and Stylized Facts

The literature is inundated with studies such as Moyo *et al.* (2014), Alade (2015) and Borio and Gambacorta (2017) that analyse the relationship between interest rate variants such as short-term interest rate, lending rate, real interest rate and the interest spread on other macroeconomic variables with some extending the studies to finding their threshold points. For instance, on the threshold dynamics of short-term interest rates, Archontakis and Lemke (2007) use the threshold autoregressive (SETAR) process to provide evidence in favour of the threshold model for Germany and the US arbitrage-free term structure of interest rates. Similarly, Tule *et al.* (2015) use quadratic approach in determining the optimal threshold lending rate in Nigeria to be between 21% and 21.5% and conclude that a relatively high interest rate beyond this point can be detrimental to investment. In the same vein, Alade (2015) applies the threshold autoregressive (TAR) approach to determine the optimal monetary policy rate (MPR) threshold to be 10%, 9%, 15% and 8% for GDP growth, investment, external reserves and inflation respectively. Lastly, Dube and Zhou (2013) adopt the Hansen and Seo (2002) algorithm to extract maximum likelihood estimates in eight threshold cointegration

models that relate short-term to long-term interest rates for South Africa. We contribute to the literature by engaging a different line of argument to the McKinnon-Shaw (1973) hypothesis, which to the best of our knowledge is the first, by analysing the impact of the deposit rate on the credit supply role of banks.

Stylized Facts

The data explores some salient facts about the variables of interest. Figure 1 shows the trend of credit supply and deposit rate within the period under study. From the trend analysis, both variables reveal opposite movements. As the deposit rate moves from 6.92% in 1980 to 8.695% in 1985, credit supply declines from 20.626 (% of GDP) to 17.803. Also, between 1986 and 1990, deposit rate increases from 8.299% to 12.143% while credit supply declines from 18.796 to 16.132. Similar pattern is observed when deposit rate declines from 7.40% in 2000 to 5.83% in 2008, credit supply increases from 11.8 to 17.5 and when deposit rate falls further from 6.46% in 2009 to 5.15% in 2015, credit supply rises from 18.81 to 22.08. This trend analysis shows that some other factors may be responsible for the movements in credit supply. The real deposit rate for the most part is negative from -8.863 in 1980 it reaches a marginal 1.189% in 1993 from when it takes a huge dip to -25.19% in 1994. It rises to 3.04% in 1997 after which it falls to -6.19% in 2001. It continues a snake-like pattern up to 2009 where it hits 3.31%, falls again to -9.89% in 2010, rises to 2.47% and 2.63% in 2013 and 2014 and becomes -0.22% in 2015. Clearly, the pattern of the real deposit rate is indicative of rising inflation rates during these periods.

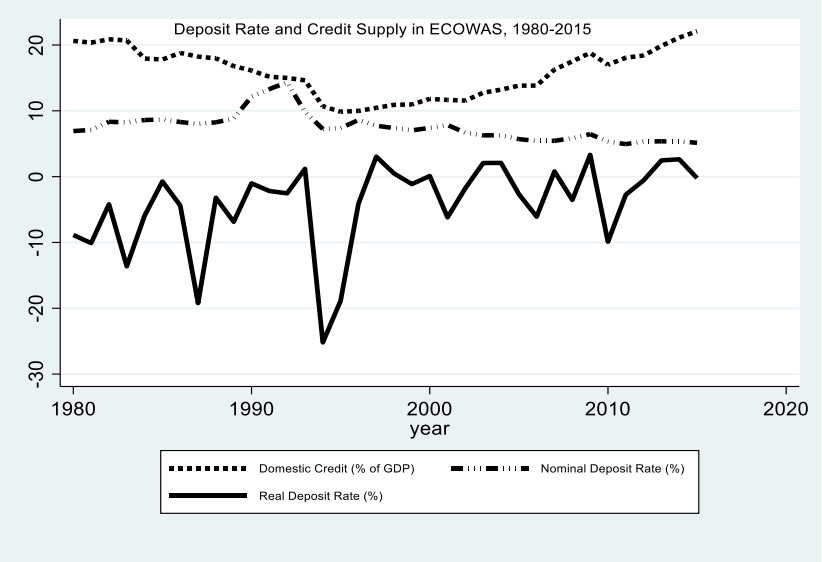

Figure 1: Trend of deposit rate and credit supply in ECOWAS, 1980-2015
Source: Authors' Computations

Figure 2 shows the distribution of real deposit rate and credit supply across the 10 countries. With the exception of Cote d'Ivoire, CFA franc countries have positive real deposit rates (see deviations from point 0) while non-CFA franc countries have negative real deposit rates. Also, close scrutiny reveal that CFA franc countries have more credit supply than their counterparts from non-CFA franc countries.

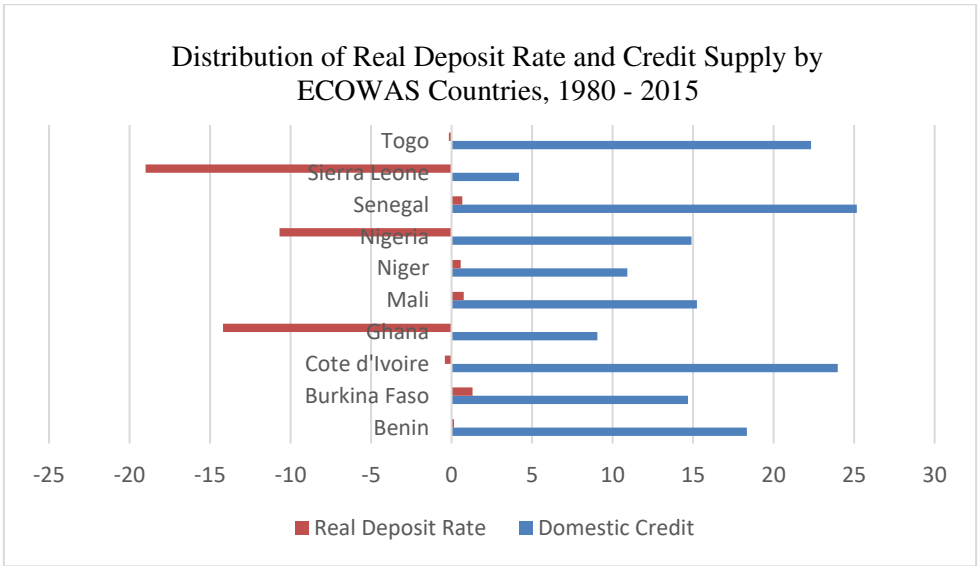

Figure 2: Real deposit rate and credit supply by ECOWAS Countries, 1980-2015
Source: Authors' Computations

3 Data and Empirical Approach

3.1 Data and Scope

This study uses annual data from 1980 to 2015 on 10 countries within the Economic Community of West African States (ECOWAS). The countries selected on the basis of requisite data on key variables include: Benin, Burkina Faso, Ghana, Cote d'Ivoire, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. Four variables, namely: domestic credit provided by banks (% of GDP), real deposit rate, gross domestic product (GDP) per capita (constant 2010 US$), and broad money supply (% of GDP) are used to investigate the credit-rate nexus and to establish if monotonic and causal relationships exists. All indicators are sourced from World Development Indicators of the World Bank (2017).

Credit supply *(CREDIT)* is proxied by domestic credit provided by banks to non-financial corporations (NFCs). Apart from being a measure of financial depth and stability, it also captures the volume of credit facilities from banks availed to households and firms excluding public sector credits. The real deposit interest rate *(RATE)* represents the opportunity cost of holding money that endears depositors to increase their savings rather than invest in real assets thus, stimulating the accumulation of deposit liabilities and loanable funds by banks, per capita GDP (*INCOME*) is a measure of economic size, and broad money captures financial liquidity *(MONEY)*. Table 1 gives the summary statistics of each variable in relation to each country, the global sample and the zoning structure. It is expected that these regressors have positive effect on the dependent variable.

Table 1 Data Properties and Descriptive Statistics

Cross-Sections	*Domestic Credit*		*Real Deposit Rate*		*GDP per capita*		*Broad Money*		Zone
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
All Countries	15.88	8.87	-4.10	18.05	541.30	421.33	24.44	8.31	-
CFA	18.67	8.26	0.41	7.42	508.32	284.83	25.57	8.59	-
NCFA	9.38	6.54	-14.63	28.35	618.24	629.89	21.80	6.97	-
Benin	18.34	7.84	0.15	7.10	481.73	203.14	27.17	6.53	CFA
Burkina Faso	14.69	5.09	1.31	4.59	360.43	163.53	21.28	5.82	CFA
Cote d'Ivoire	23.99	10.46	-0.42	9.26	945.76	245.25	28.11	4.93	CFA
Ghana	9.06	5.60	-14.19	24.74	651.45	467.07	23.19	7.18	Non-CFA
Mali	15.24	3.68	0.76	9.07	401.95	215.49	22.07	3.58	CFA
Niger	10.92	4.80	0.57	7.39	277.33	80.25	16.10	5.07	CFA
Nigeria	14.90	6.07	-10.68	26.91	870.55	902.55	24.44	6.65	Non-CFA
Senegal	25.17	6.66	0.66	6.39	708.82	210.62	28.66	8.00	CFA
Sierra Leone	4.19	1.87	-19.00	32.94	332.71	172.42	17.83	5.24	Non-CFA
Togo	22.32	5.89	-0.17	7.62	382.24	110.09	35.58	8.94	CFA

Note: SD: Standard deviation; CFA: Communauté Financière d'Afrique
Source: Authors' Calculations

Limiting explanations to the variables of interest – domestic credit and real deposit rate - the summary statistics reveal marked differences within and across countries. The highest deposit interest rate of 54.67% is recorded for Sierra Leone in 1992. Further enquiry reveals that the country has the highest rates in the data: 40.5% in 1990 and 47.8% in 1991. Historically, the country's deposit rate has always been in the double-digits as opposed to interest rates recorded in other ECOWAS countries like Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger and Togo whose rates are consistently at 3.5% (the lowest in the dataset). In addition, the country with the highest credit volume is Cote d'Ivoire. Between 1980 and 1983, the country's volume averaged at 40.98%. As expected the countries with very high deposit rates (like Sierra Leone and Ghana) have very low credit volume. This shows that there is a positive relationship between deposit rate and credit volume as the high rate induces depositors to save more; thus, increasing the volume of loanable funds which induces banks to transform the liabilities into financial assets. Lastly, a closer comparison of the averages of domestic credit and deposit rate in CFA franc and non-CFA franc countries reveals that the deposit rate, on average, is higher

in non-CFA franc countries and the domestic credit is lower relative to CFA franc countries. Furthermore, having provided for inflation, Nigeria showed to have the highest figure of 17.62 for the real deposit rate in 2009 while Sierra has the lowest at -153.01 in 1987. These outcomes suggest that Nigeria's inflation rate at that time was -4.32 while that of Sierra Leone was 165.68 which is the highest in the data. The pairwise correlation analysis shown in Table 2 reveals that all the regressors exhibit statistically significant associations with domestic credit at the 1% level with each showing the a priori signs. Similarly, a cursory observation of the outcomes show that none of the regressors exert perfect representations of one another which averts the problem of multicollinearity.

Table 2 Pairwise Correlation Analysis

Variables	ln*DCB*	*RDR*	ln*PC*	ln*BM*
Domestic Credit by Banks, log	1.000			
Real Deposit Rate	0.407[a]	1.000		
GDP per capita, log	0.445[a]	0.136[b]	1.000	
Broad Money, log	0.668[a]	0.204[a]	0.509[a]	1.000

Note: [a] and [b] represent 1% and 5% statistical significance levels; ln = natural logarithm
Source: Authors' Computations

3.2 Empirical approach

This study investigates the real deposit rate – credit nexus in ECOWAS using data from 10 selected countries from 1980 to 2015 while controlling for per capita GDP and broad money supply. The study goes further to examine whether a monotonic relationship exists, that is, does increasing the deposit rate lead to increase in loanable funds which aids the supply of credit? Furthermore, the causal relation between the two variables is examined. To investigate the nexus, the analytical sequence employed in the data are detailed showing the step-by-step procedure from testing for cross-sectional dependence, to panel unit root tests, cointegration tests and the methods of estimations are cautiously explained.

3.2.1 Cross-sectional dependence test

Engaging a panel data analysis has several advantages ranging from using a more comprehensive dataset to having better degrees of freedom, improved variability, greater efficiency of the estimates, and reduced chances about the occurrence of multicollinearity. Nevertheless, the approach does not cater for the possibility of cross-sectional dependence (CSD) among the units in the panel. This is because the inability to control or ignore the presence of CSD in the data leads to biased estimates and inferences (Pesaran, 2015). In the strict sense, the hypothesis being tested for the Breusch and Pagan (1980) CSD test is zero cross-section correlations rather than independence of the errors and the null hypothesis is expressed as:

$$H_0: \rho_{ik} = corr(\lambda_{i,t}, \lambda_{k,t}) = 0, \ \forall\, i \neq k \qquad [1]$$

Where ρ_{ik} represents the pairwise correlation coefficient of the error term. Hence, to check for the presence of CSD, the study applies the Breusch and Pagan (1980) test that has been expansively used in the existing literature, but the method has several econometrics set-backs upon which Pesaran (2004) proposed a scaled-type of the LM test stated as:

$$CDLM = \left({}^{1}/_{N(N-1)}\right)^{1/2} \sum_{i=1}^{N-1} \sum_{k=i+1}^{N} \left(T\hat{\rho}_{i,k}^{2} - 1\right) \qquad [2]$$

Where $\hat{\rho}_{ik}^{2}$ represents the sample estimate of the pairwise correlation of residuals from the panel's individual regressions. Under the null hypothesis, the cross-sectional dependency Lagrange multiplier (CDLM) test converges to the standard normal distribution. For

robustness, the Pesaran (2004)[2] test for cross-sectional dependency (CD test) is applied which is usable in moderate and large panels. The CD test which is suitable for dynamic panel models follows the normal distribution and is also efficient under the null hypothesis of no CSD and the test is given as:

$$CD = \sqrt{2T/N(N-1)}\left(\sum_{i=1}^{N-1}\sum_{k=i+1}^{N}\hat{\rho}_{i,k}\right) \quad [3]$$

Table 3 shows the analysis of the test for cross-sectional dependence for the full and sub-samples (CFA and non-CFA) using the Breusch and Pagan (1980) LM test, and Pesaran (2004) scaled LM test. The outcomes provide evidence on the presence of cross-sectional dependence at the 1% and 10% significance levels, respectively.

Table 3 Cross-Section Dependence Test

Variables	*DCB, log*	*RDR*	*PC, log*	*BM, log*
Breusch-Pagan (1980) LM	448.718[a]	467.451[a]	1114.429[a]	407.356[a]
Pesaran scaled (2004) CDLM	42.556[a]	44.530[a]	112.728[a]	38.196[a]
Bias-corrected scaled LM	42.413[a]	44.387[a]	112.585[a]	38.053[a]
Pesaran (2004) CD	14.229[a]	13.557[a]	33.101[a]	14.156[a]
CFA Franc Countries				
Breusch-Pagan (1980) LM	289.289[a]	440.064[a]	552.008[a]	273.423[a]
Pesaran scaled (2004) CDLM	41.398[a]	64.663[a]	81.936[a]	38.949[a]
Bias-corrected scaled LM	41.298[a]	64.563[a]	81.836[a]	38.849[a]
Pesaran (2004) CD	15.699[a]	20.89[a]	23.262[a]	15.586[a]
Non-CFA Franc Countries				
Breusch-Pagan (1980) LM	6.552[c]	1.543	81.066[a]	19.013[a]
Pesaran scaled (2004) CDLM	1.45	-0.595	31.870[a]	6.537[a]
Bias-corrected scaled LM	1.407	-0.637	31.828[a]	6.494[a]
Pesaran (2004) CD	1.328	0.835	8.991[a]	-0.588

Note: [a] represents 1% statistical significance level; cross-sectional dependence test employs centered correlations computed from pairwise samples; cross-section means were removed during computation of correlations; CFA: Communauté Financière d'Afrique; DCB = domestic credit provided by banks; RDR = real deposit rate; PC = GDP per capita; BM = broad money
Source: Authors' Computations

[2]Pesaran (2015) extends the analysis of the Pesaran (2004) CSD test and shows that the implicit null of the test is weak cross-sectional dependence. Interested reader is referred to Section 29.7 "Testing for error cross-sectional dependence" in Pesaran, HM (2015) Time Series and Panel Data Econometrics, 1Ed., Oxford Press

3.2.2 Panel unit root tests

The existence of cross-sectional dependence in the data invalidates the outcomes of conventional unit root tests and subsequent analyses. This is because correlation within the units in the panel could have serious setbacks on the commonly adopted panel unit root tests because on the assumption of *independence*. Hence, when applied to cross-sectional dependent panels, such unit root tests can have substantial size distortions (O'Connell, 1998). Therefore, consistent with Pesaran (2007), the cross-sectional augmented Dickey-Fuller (CADF) and cross-sectional augmented Im, Pesaran, and Shin (CIPS) (2003) unit root tests are deployed. The equation for the CADF is stated as:

$$\Delta y_{it} = a_i + d_i y_{i,t-1} + c_i \bar{y}_{t-1} + b_i \Delta \bar{y}_t + u_{i,t} \quad [4]$$

Where z_{it} represents the variable being tested. The CIPS test which is the augmented variant of Im *et al.* (2003) unit root test is expressed as:

$$CIPS(N,T) = \bar{T} = N^{-1} \sum_{i=1}^{N} t_i(N,T) \quad [5]$$

Where N and T are number of cross sections and number of years respectively. The left hand side of Equation [5] is unit root test for heterogeneous panels while on the right hand side the term t_i is the ordinary least square (OLS) *t*-ratios employed in cross-sectional averaged augmented Dickey-Fuller (ADF) regression. Given the presence of cross-sectional dependence, the second-generation CIPS panel stationarity test proposed by Pesaran (2007) in conjunction with the CADF test is used with the results displayed in Table 4. The outcomes show that none of variables is integrated of order two and, with the exception of real deposit rate, all the variables are stationary after first-difference.

Table 4 Panel Unit Root Tests

Variables		Level		First Difference	
		CIPS	*CADF*	*CIPS*	*CADF*
Full Sample	*DCB, log*	0.084	17.183	-8.191[a]	107.78[a]
	RDR	-7.859[a]	100.445[a]	*N/A*	*N/A*
	PC, log	2.189	7.745	-8.943[a]	115.226[a]
	BM, log	1.886	13.497	-9.611[a]	125.488[a]
CFA Countries	*DCB, log*	0.826	7.421	-5.792[a]	63.086[a]
	RDR	-7.037[a]	75.327[a]	*N/A*	*N/A*
	PC, log	1.314	6.885	-7.775[a]	84.019[a]
	BM, log	2.637	4.531	-7.757[a]	84.536[a]
Non-CFA Countries	*DCB, log*	-1.106	9.762	-6.107[a]	44.694[a]
	RDR	-3.60[a]	25.118[a]	*N/A*	*N/A*
	PC, log	1.989	0.859	-4.452[a]	31.207[a]
	BM, log	-0.583	8.965	-5.698[a]	40.952[a]

Note: [a] represents 1% statistical significance level; estimations done with 1 lag; test employs Newey-West automatic bandwidth selection and Bartlett kernel; Δ = difference operator; DCB = domestic credit provided by banks; RDR = real deposit rate; PC = GDP per capita; IPS = Im, Pesaran and Shin W-stat; ADF = Augmented Dickey-Fuller.
Source: Authors' Computations

3.2.3 Panel cointegration tests

To ascertain the existence of cointegration, the study engages two procedures: Kao (1999), and Westerlund (2007) tests. These tests which serve as robustness for one another are used to examine the existence of long-run relationships among the variables. The generalised cointegration equation is expressed as:

$$y_{i,t} = \beta_i x'_{i,t} + \gamma_i z'_t + e_{i,t} \quad [6]$$

Where the covariates in $x'_{i,t}$ are assumed not cointegrated; β_i is the co-integrating phenomenon which may differ across the panels; γ_i is the parameter of z'_t which is a vector containing deterministic terms of panel-specific effects and linear time trends; $e_{i,t}$ is the white noise error term that is independently and identically distributed (i.i.d). Kao (1999) indicates the assumptions of co-integrating vector from Equation [6] with $\beta_i = \beta$ which implies that the panels follow common slope coefficients. Westerlund (2007) is the second test for cointegration which employs the error correction mechanism and examines the significance of

the error correction term based on structural dynamics and not on the residual of the regression. Such that the null hypothesis of no cointegration is rejected once the null hypothesis of no error correction is rejected. The generalized cointegration equation is expressed as:

$$\Delta y_{i,t} = \gamma_i' z_t + \sigma_i y_{i,t-1} + \beta_i' x_{i,t-1} + \sum_{j=1}^{pi} \sigma_{i,j} \Delta y_{i,t-j} + \sum_{j=0}^{pi} \theta_{i,j} \Delta x_{i,t-j} + e_{i,t} \quad [7]$$

Where σ_i is the error correction parameter that determines the speed of reversion to equilibrium subsequent upon the occurrence of an unpredicted shock; z_t = (1, t)′ comprises the deterministic components of the constant and trend with $\gamma_i = (\gamma_{1i}, \gamma_{2i})'$ as the vector of parameters. The outcomes of the cointegration relations from Kao (1999) and Westerlund (2007) are shown in Table 5 which confirm the existence of long run associations.

Table 5 Panel Cointegration Results

		Full Sample		CFA Countries		Non-CFA Countries	
Cointegration Tests		*Intercept*	*No Cross-Sectional Means*	*Intercept*	*No Cross-Sectional Means*	*Intercept*	*No Cross-Sectional Means*
Kao (1999)	Modified Dickey-Fuller	-2.641[a]	-3.169[a]	-1.809[b]	-1.963[b]	-3.532[a]	-5.086[a]
	Dickey-Fuller	-2.845[a]	-2.964[a]	-2.132[b]	-1.614[c]	-2.751[a]	-3.156[a]
	Augmented Dickey-Fuller	-3.344[a]	-3.533[a]	-2.592[a]	-1.592[c]	-3.147[a]	-3.614[a]
	Unadjusted modified Dickey-Fuller	-3.056[a]	-3.722[a]	-1.784[b]	-2.122[b]	-4.078[a]	-4.438[a]
	Unadjusted Dickey-Fuller	-3.002[a]	-3.156[a]	-2.121[b]	-1.68[b]	-2.869[a]	-3.069[a]
Westerlund (2007)	Variance ratio	3.947[a]	0.309	4.645[a]	-0.496	0.11	0.229

Note: Tests performed using 2 lags; [a, b, c] represent statistical significance at the 1%, 5% and 10% levels, respectively.
Source: Authors' Computations

3.2.4 Dynamic Common Correlated Effects Mean Group (DCCE-MG) Technique

Following the presence of cross-sectional dependence, the estimation procedure uses the dynamic common correlated effects (CCE) estimator. Several Monte Carlo simulations in Chudik and Pesaran (2015a) reveal that the dynamic common correlated effects (DCCE) procedure performs reasonably well in terms of bias, root mean square error, size and power.

The technique which allows for mean group (MG) and pooled mean group (PMG) analysis constrains coefficients (both short- and long-run) to be either heterogeneous or homogeneous has several endearing properties: performs pooled mean group estimations, controls for CSD by adding cross-sectional means and lags, corrects for small sample bias, uses the jacknife correction method and the recursive mean adjustment, and supports unbalanced panels (Pesaran, 2006; Chudik and Pesaran, 2015a)

The adoption of the DCCE-MG (the mean group variant of the DCCE) procedure is justified for this study because: (1) there is evidence of cross-sectional dependence; (2) we use an unbalanced panel data; (3) sample size is small with 35 observations; (4) credit supply is dynamic as the past lending behaviour of financial intermediaries is expected to influence future behaviours. Hence, the lagged dependent variable is included as a regressor; and (5) we assume homogeneity of the slope coefficients since ECOWAS countries have some level of commonness such as common trade terms, technologies etc. The estimation technique follows Ditzen (2016)[3] which improves Chudik and Pesaran (2015b) and the generalized equation adapted from Ditzen (2016) is specified as:

$$y_{i,t} = \vartheta_i + \varphi_i y_{i,t-1} + \beta_i x_{i,t-1} + u_{i,t} \quad [8]$$

Where, $u_{i,t}$ represent idiosyncratic errors that are cross-sectionally weakly dependent and $E(\varphi_i) = \varphi$. The lagged dependent variable is now endogenous and therefore the estimator becomes inconsistent. On the assumption of long-run slope homogeneity, the error correction mechanism and becomes:

[3]Ditzen (2016) developed the *xtdcce2* routine in Stata16.

$$\Delta y_{i,t} = \emptyset_i\left(y_{i,t-1} - \theta_{1,i}x_{i,t}\right) + \delta_{0,i} + \delta_{0,i}\Delta x_{i,t} + e_{i,t} \quad [9]$$

Where, $\emptyset_i$ the coefficient of the lagged dependent variable is expected to be negative because it represents the error-correction speed of adjustment parameter. θ is the long-run coefficient which is and assumed to be homogeneous, while δ captures short term dynamics and are heterogeneous across units. For robustness, the pooled mean group[4] (Shin et al., 1999) technique is used. The pooled mean group (PMG) procedure is the intermediate between a pure pooled estimation (homogeneous coefficients) and a mean group estimation (heterogeneous coefficients). The assumption of the PMG estimator is, that regressors have a homogeneous long-run and a heterogeneous short run effect on the dependent variable which suits our study approach. After all, the assumption that countries with different economic conditions or institutional frameworks in the same data having homogeneous slope coefficients will likely be violated in reality (Chen & Vujic, 2016).

4 Results and Discussions

The main focus is the outcomes reported for the full sample while estimations of CFA and non-CFA franc categorization are used as robustness checks. The results shown in Table 6 provide evidence on the level and monotonic relationships between the real deposit rate and credit supply in ECOWAS. Findings reveal that the real deposit rate is a positive and significant predictor of credit supply which is an indication that the real deposit rate aids financial intermediation. The coefficient (0.0127) which is significant at the 1% level shows that a percentage point change in the real deposit rate increases credit supply by 0.0127 percent, on average, *ceteris paribus*. This outcome aligns with *a priori* expectations that an increase in the deposit rate creates the incentive for a consumer to save or postpone immediate consumption

[4]For country-level analysis, only the *xtpmg* routine is used.

for the future. That is, such persons will choose to consume less than their income during the first period and save some of the first-period consumption for a later date. This is also referred to as inter-temporal choice. The saving choice due to increase in the real deposit rate contributes to the pool of loanable funds which drives credit supply because financial intermediation thrives when pooled funds from savers are channelled to *demanders* of credits. Similar studies have also reported the positive relation between the deposit rate and financial intermediation (Odhiambo, 2010; Adeleye *et al.*, 2018; Adeleye *et al.*, 2019).

Table 6 DCCE-MG Results (Dependent Variable: Δ Domestic Credit, log)

Variables	*Level*			*Monotonic*		
	Full	CFA	Non-CFA	Full	CFA	Non-CFA
Constant	-0.0450	-0.5829	1.0376[c]	-0.1725	-0.8170	1.8065[a]
	(-0.07)	(-0.85)	(1.88)	(-0.25)	(-1.11)	(4.63)
Domestic Credit_1, log	-0.4115[a]	-0.3767[a]	-0.4925[a]	-0.4174[a]	-0.3837[a]	-0.4761[b]
	(-8.96)	(-6.20)	(-3.07)	(-8.47)	(-7.40)	(-2.47)
Real Deposit Rate	0.0127[a]	0.0094	0.0056[b]	0.0104[a]	0.0083	0.0131
	(3.40)	(0.97)	(2.41)	(3.02)	(0.70)	(1.53)
Real Deposit Rate Squared				-0.0004	0.0024[c]	0.0001
				(-1.10)	(1.65)	(1.46)
GDP per capita, log	0.2608	0.9403[b]	0.6506[b]	0.2998	1.1284[b]	0.4516
	(1.25)	(2.18)	(2.03)	(1.30)	(2.09)	(1.04)
Broad Money, log	0.6226[b]	0.3245	1.2981[a]	0.6607[b]	0.5202[a]	1.1378[a]
	(2.06)	(1.14)	(5.37)	(2.32)	(2.70)	(2.97)
No. of Obs.	349	245	104	349	245	104
R-Squared	0.493	0.581	0.481	0.491	0.506	0.470
F Statistic	2.954[a]	2.080[a]	3.082[a]	2.255[a]	2.128a	2.422[a]
CSD Statistic	-1.52	-2.14[b]	-1.99[b]	-1.11	-2.2[b]	-1.63

Notes: [a,b,c] represent statistical significance at 1%, 5%, and 10% levels respectively; *t*-statistics in ( ).
Source: Authors' Computations

Consistent evidence about the positive impact of real deposit rate on credit supply is observed in the NCFA sample with the statistically significant coefficient of 0.0056 at the 5% level. Though the magnitude of impact is minute, nevertheless, this indicates that a percentage point change in the real deposit rate increases credit supply by 0.0056 percent, on average, *ceteris*

paribus. Contrarily, similar finding is not observed from the CFA though the coefficient is positive bit statistically insignificant. The disparities between these may not be unconnected to their different monetary policy dictates. For instance, central banks in CFA countries do not enjoy the monetary independence and financial market competition like their counterparts in Non-CFA countries because the CFA franc pegged to the euro which therefore follows stricter monetary policy directives of the European Central Bank (ECB) (Agbor, 2012). So, while central banks in Non-CFA countries are able to vary their deposit rates to stimulate more loanable funds those in CFA countries do not have such privilege.

A salient condition for the existence of a long-run relationship (dynamic stability) is that the coefficient on the adjustment term be negative and lies between 0 and 1. The coefficient of the lagged dependent variable which represents the error correction term falls within the dynamically stable range suggestive that the dynamic stability condition holds for the full and sub-samples. Findings show that current errors are corrected for within the year from between 37.67% to 49.25% indicating convergence to long-run equilibrium. It is a pointer that any deviations to credit supply from the value predicted by the long-run relationships with real deposit rate, per capita income and broad money triggers a change in the opposite direction in credit supply. For the control variables, per capita income though positive yet it is statistically not significant when considering the full sample. It is an indication that an increase in income does not contribute to credit supply. However, from the CFA franc and non-CFA franc results, per capita income is a positive and statistically significant predictor of credit supply. The positive and statistically significant coefficient of broad money suggest that it increases credit supply based on the full sample and non-CFA franc countries at the 1% level, on average, *ceteris paribus*.

On whether a monotonic relationship exists, from the full sample we do not find any evidence that increasing the real deposit rate impacts credit supply significantly. Though negative, the coefficient of the squared rate is not statistically significant. However, an interesting observation is that despite the inclusion of its squared term, the level of the real deposit rate is positive and statistically significant at the 1% level. This goes to show that the real deposit rate is an essential determinant of financial intermediation in ECOWAS. In comparison to the CFA franc and non-CFA franc countries the results are conflicting. While the coefficient of the *level* of real deposit rate is positive, it is not statistically significant but the square is both positive and statistically significant for CFA franc countries at the 10% and otherwise for non-CFA franc countries. In other words, the deduction is that increasing real interest rate will cause some increase in the volume of loanable funds to aid financial intermediation.

Similar to the outcomes from the level analysis, the coefficient of the lagged dependent variable (captures the error correction term) shows that reversion to long-run equilibrium occurs at an adjustment speed of between 38.37% and 47.61%. It implies that credit supply moves first when shocks hit the regressors in the model. Broad money supply shows to be a consistent predictor of credit supply with positive and statistically significant coefficients at the 1% level which the impact of per capita income is positive and statistically significant for CFA franc countries and otherwise for the full sample and non-CFA franc countries.

For robustness, the pooled mean group (PMG) estimator is engaged to check the consistency of our results. The estimator allows for both pooling and averaging of coefficients - the intercepts, short-run coefficients, and error variances are heterogeneous across groups, but constrains the long-run coefficients to be homogeneous across groups (Pesaran *et al.*, 1999). Emphasis is on the long-run homogeneous results (upper part) shown in Table 7 that support

earlier findings from the DCCE-MG estimations. The level of the real deposit rate contributes significantly to increasing credit supply in ECOWAS across all model specifications. Analogous interpretations hold.

Table 7 Pooled Mean Group Results (Dependent Variable: Δ Domestic Credit, log)

	Level			*Monotonic*		
Variables	Full Sample	CFA	NCFA	Full Sample	CFA	NCFA
Long-run:						
Constant	-0.3318[a]	-0.4737[a]	-0.2477[a]	-0.3796[a]	-0.2042[b]	-0.2262[a]
	(-4.17)	(-8.40)	(-2.78)	(-6.92)	(-2.41)	(-3.13)
Real Deposit Rate	0.0673[a]	0.0690[a]	0.0026	0.0594[a]	0.0347[a]	0.0090
	(4.46)	(4.42)	(0.70)	(5.06)	(2.83)	(1.33)
Real Deposit Rate Squared				0.0005[a]	-0.0059[a]	0.0001
				(3.18)	(-4.06)	(1.15)
GDP per capita, log	0.8873[a]	0.9149[a]	0.0930	0.6655[a]	0.8975[a]	0.0743
	(2.81)	(2.80)	(1.19)	(3.22)	(4.73)	(1.01)
Broad Money, log	0.6319[b]	0.6281[b]	0.8610[a]	0.7056[a]	-0.1116	0.8653[a]
	(2.04)	(1.98)	(3.31)	(3.05)	(-0.39)	(3.58)
Short-run:						
Error Correction Term	-0.0726[a]	-0.0983[a]	-0.2498[a]	-0.1053[a]	-0.0946[b]	-0.2627[a]
	(-4.29)	(-7.51)	(-3.17)	(-6.62)	(-2.35)	(-3.08)
ΔReal Deposit Rate	0.0001	0.0000	-0.0000	-0.0008	0.0002	-0.0018[b]
	(0.09)	(0.01)	(-0.06)	(-0.77)	(0.11)	(-2.28)
ΔReal Deposit Rate Squared				-0.0001	0.0002[c]	-0.0000[b]
				(-0.95)	(1.91)	(-2.52)
ΔGDP per capita, log	0.0539	0.0869	0.0662	0.0244	0.1094	0.0441
	(1.09)	(1.28)	(1.61)	(0.35)	(1.32)	(0.75)
ΔBroad Money, log	0.2892[b]	0.0915	0.6667[a]	0.2780[b]	0.2083[a]	0.6891[a]
	(2.32)	(1.12)	(4.81)	(2.39)	(3.52)	(5.77)
No. of Obs.	349	245	104	349	245	104

Notes: [a, b, c] represent statistical significance at 1%, 5% and 10% levels respectively; *t*-statistics in ( ).
Source: Authors' Computations

Monotonicity explains if increasing the real deposit rate leads to an increase in credit supply. That is, a monotonic relationship will exist if the first derivative of deposit rate with respect to credit does not change in sign. Therefore, using the functional form of semi-elasticity and the quadratic approach, the study establishes if there exists a monotonic long-run relationship

between both variables and whether the relationship is non-linear. In essence, it measures the increasing effect of real deposit rate on credit. To achieve this, the models are augmented by including the square of real deposit rate. The outcome from the monotonic regressions confirms existence of an increasing monotonic relationship since the coefficient of the square of the real deposit rate is both positive and statistically significant at the 1% for the full sample. It shows that increasing the deposit rate boosts credit supply as savers will have greater incentive to defer present consumption and contribute to the pool of loanable funds. This aligns with *a priori* expectations. In other words, central banks may increase deposit rate to initiate greater financial intermediation in ECOWAS. On the other hand, while the relationship shows an inverted-U for CFA franc countries, it does not exist for non-CFA franc countries. It implies that increase in the real deposit rate initially leads to an increase in credit supply but a further increase leads to a decline in credit supply for CFA countries. This suggests that when the real deposit rate is beyond a given threshold it may hamper the intermediating role of the financial system. On the reversion to long-run equilibrium, the speed of adjustment ranges between 7.26% and 25% for the level regressions and between 9.46% and 26.27% for the monotonic models. As expected per capita income and broad money are positive and significant enhancers of credit supply in ECOWAS in most of the model specifications. Overall, this study submits that real deposit rate stimulates credit supply in ECOWAS but the evidence for a monotonic relationship is not explicitly certain.

As explained earlier, the PMG technique is used to derive the short-run coefficients that are not restricted to be the same across countries, so that we do not have a single *pooled* estimate for each coefficient. Nevertheless, the *average* short-run effect is analysed by considering the mean of the corresponding coefficients across the full sample. The results for level equations are indicated on the upper panel A, while those for the monotonic models are in the lower panel

B. For the level equation, the short-run average relationship between credit supply and real deposit rate is statistically significant in 3 out of 10 countries. With varying signs, in the short-run, the real deposit rate increases credit supply in Cote d'Ivoire and Mali at the 10% significant level while it decreases credit supply in Niger at the 1% level, on average, *ceteris paribus*. Also, with the exception of Benin, Ghana, Nigeria, and Sierra Leone the adjustment term is statistically significant for the rest of the countries evidencing convergence to long-run equilibrium from 5.8% (Mali) to 13.74% (Togo). It shows that the convergence rate is faster in some countries and slower in others. From the monotonic results displayed in panel B, Cote d'Ivoire, Ghana, and Mali show that increasing real deposit rate will significantly reduce credit supply by 0.0001, 0.0001 and 0.0003 percent, respectively, on average, *ceteris paribus*. These relationships are statistically significant at the 10% significant at the 1% level. Deductively, only Ghana evidences a decreasing monotonic relationship. Similarly, as in panel A, with the exception of Benin and Nigeria the error correction term is statistically significant for the rest of the countries demonstrating convergence to long-run equilibrium from 8.61% (Mali) to 19.21% (Togo). This shows that the reversion rate is quicker in some countries and slower in others. For both level and monotonic relationships, the short-run effects of per capita income and broad money are mostly statistically not significant and asymmetric where a significant relation occurs.

Table 8 Pooled Mean Group Results (Dependent Variable: Δ Domestic Credit, log) - Countries

Variables	*Benin*	*B/ Faso*	*C/d'Ivoire*	*Ghana*	*Mali*	*Niger*	*Nigeria*	*Senegal*	*S/ Leone*	*Togo*
Panel A: Level										
Error Correction Term	-0.0482	-0.1244**	-0.0933***	-0.0036	-0.0580*	-0.1280***	-0.0084	-0.1147***	-0.0101	-0.1374***
	(-1.05)	(-1.97)	(-4.55)	(-0.11)	(-1.79)	(-2.67)	(-0.39)	(-3.99)	(-0.45)	(-3.37)
ΔReal Deposit Rate	-0.0007	0.0005	0.0020*	0.0005	0.0038*	-0.0088***	-0.0010	0.0022	0.0013	0.0011
	(-0.17)	(0.11)	(1.86)	(0.42)	(1.70)	(-3.13)	(-1.11)	(1.09)	(1.06)	(0.64)
ΔGDP per capita, log	0.3358	0.1210	-0.1281	-0.0054	0.2823	-0.0181	0.0168	-0.0958	-0.0743	0.1051
	(1.48)	(0.70)	(-1.27)	(-0.03)	(1.38)	(-0.11)	(0.13)	(-0.84)	(-0.39)	(0.94)
ΔBroad Money, log	0.3246	-0.1574	0.2291**	0.7167*	-0.2165	0.2417	1.0853***	-0.0114	0.4594	0.2210
	(1.09)	(-0.74)	(2.06)	(1.83)	(-0.78)	(1.54)	(5.23)	(-0.05)	(1.33)	(1.47)
Constant	-0.2493	-0.5447*	-0.4907***	0.0323	-0.2703*	-0.5754**	-0.0187	-0.5484***	-0.0509	-0.6021***
	(-1.15)	(-1.92)	(-3.42)	(0.22)	(-1.89)	(-2.29)	(-0.20)	(-3.34)	(-0.51)	(-2.99)
Panel B: Monotonic										
Error Correction Term	-0.0453	-0.1266*	-0.1165***	-0.1291**	-0.0861**	-0.1211**	-0.0098	-0.1281***	-0.0975*	-0.1929***
	(-0.87)	(-1.88)	(-5.36)	(-2.36)	(-2.34)	(-2.28)	(-0.28)	(-4.17)	(-1.71)	(-3.80)
ΔReal Deposit Rate	0.0062	0.0010	-0.0016	-0.0057*	-0.0004	-0.0042	-0.0003	-0.0005	-0.0020	-0.0003
	(0.98)	(0.21)	(-0.85)	(-1.88)	(-0.16)	(-1.06)	(-0.18)	(-0.12)	(-0.77)	(-0.12)
ΔReal Deposit Rate Squared	0.0003	-0.0004	-0.0001***	-0.0001**	-0.0003***	0.0002	0.0000	-0.0001	-0.0000	-0.0001
	(1.25)	(-0.98)	(-2.94)	(-2.13)	(-2.68)	(1.22)	(0.36)	(-0.94)	(-1.49)	(-0.80)
ΔGDP per capita, log	0.5193**	0.1326	-0.2242**	0.0399	0.0427	0.0324	0.0176	-0.0860	-0.2824	0.0517
	(2.02)	(0.78)	(-2.14)	(0.23)	(0.20)	(0.18)	(0.13)	(-0.73)	(-1.29)	(0.39)
ΔBroad Money, log	0.2653	-0.1474	0.2289**	0.6179*	-0.0957	0.2704*	1.1103***	0.0294	0.3539	0.1471
	(0.90)	(-0.70)	(2.09)	(1.93)	(-0.37)	(1.72)	(6.15)	(0.13)	(1.11)	(0.97)
Constant	-0.1904	-0.4206*	-0.4643***	-0.4692**	-0.3018**	-0.4227**	-0.0184	-0.4603***	-0.3995*	-0.6491***
	(-1.01)	(-1.72)	(-3.57)	(-1.98)	(-2.33)	(-2.02)	(-0.15)	(-3.28)	(-1.69)	(-3.11)

Notes: ***, **, * represent statistical significance at 1%, 5% and 10% levels respectively; *t*-statistics in ( ).
Source: Authors' Computations

The DCCE-MG and PMG techniques provide information about the long-run relationships, hence, it becomes essential to test for the direction of causality for such relationships. Therefore, the heterogeneous Dumitrescu and Hurlin (2012) panel causality test which is helpful in the correction of cross-sectional dependence and heterogeneity issues is used to recognize the nature of causal relationships among the variables. The results shown in Table 9 show that real deposit rate causes credit supply without any feedback causal effect from credit supply. Hence, a unidirectional causal relation exists. This outcome is consistent with findings obtained earlier. Similarly, per capita income causes credit supply, real deposit rate, and broad money while bi-directional causality exists between broad money/credit supply and between broad money/real deposit rate.

Table 9 Pairwise Dumitrescu-Hurlin Panel Causality Tests

Null Hypotheses:	*W-Stat.*	*Zbar-Stat.*	*Prob.*	Decision
RDR ⇏ ln*DCB*	2.274[a]	0.172[a]	8.64E-01	Unidirectional causality
ln*DCB* ⇏ *RDR*	1.424	-0.990	0.3219	
lnPC ⇏ lnDCB	5.098[a]	4.029[a]	6.00E-05	Unidirectional causality
lnDCB ⇏ lnPC	1.834	-0.430	0.6671	
lnBM ⇏ lnDCB	3.749[a]	2.187[a]	2.87E-02	Bi-directional causality
lnDCB ⇏ lnBM	4.751[a]	3.554[a]	0.0004	
lnPC ⇏ RDR	5.640[a]	4.773[a]	2.00E-06	Unidirectional causality
RDR ⇏ lnPC	1.695	-0.618	0.5361	
lnBM ⇏ RDR	3.403[c]	1.714[c]	0.0866	Bi-directional causality
RDR ⇏ lnBM	1.794[a]	-0.485[a]	6.28E-01	
lnBM ⇏ lnPC	3.304	1.578	0.1146	
lnPC ⇏ lnBM	5.949[a]	5.191[a]	2.00E-07	Unidirectional causality

Note: [a, c] represent 1% and 10% statistical significance levels; ⇏ = does not homogeneously cause; ln = natural logarithm; DCB = domestic credit provided by banks; RDR = real deposit rate; PC = GDP per capita; BM = broad money
Source: Authors' Computations

5 Conclusion and Policy Recommendations

This paper uses DCCE-MG and PMG estimators to investigate the relationship between real deposit rate and credit supply analysed with data (1980-2015) from 10 selected countries within the Economic Community of West African States (ECOWAS). Generally, a positive and statistically significant relationship is observed between real deposit and credit supply in the long-run. The causality tests reveal that in the long-run, the real deposit rate causes credit supply. With respect to the monotonic relationship between real deposit rate and credit supply, we find no evidence using the DCCE-MG technique while the PMG analysis reveal increasing monotonic relationship on the full sample and an Inverted-U relationship for the CFA franc sub-sample. At the country level, a decreasing monotonic relationship is observed in Ghana. Based on these results, the study argues that at competitive deposit rates, depositors are *incentivised* to give up present consumption by saving, thus contributing to the pool of loanable funds necessary for lending to the real sector. This evidence upholds the McKinnon-Shaw (1973) hypothesis that interest rate is an essential ingredient in the intermediation role of the financial system.

One important implication of our findings deserves to be emphasized. The heterogeneous nature of CFA and non-CFA countries is evident in our results. Therefore, a unified-harmonisation of deposit rates for ECOWAS members seems implausible given their respective monetary policies, economic sizes and financial depth. We, therefore, suggest that monetary regulators in our sample should keep their deposit rates within an appreciable range. Besides, they should make them competitive enough to drive up loanable funds for effective financial intermediation. In doing this, they should keep in mind the devastating impact of real deposit rates beyond a given threshold. This study has focused on ten ECOWAS countries. Therefore, the results may not be generalizable to all African countries. Future research may

further interrogate the issues interrogated in this study using a larger sample size. Besides, the use of different analytical approach may enhance our understanding of the relationship between real deposit rates and credit supply.

Declarations

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request
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Figures

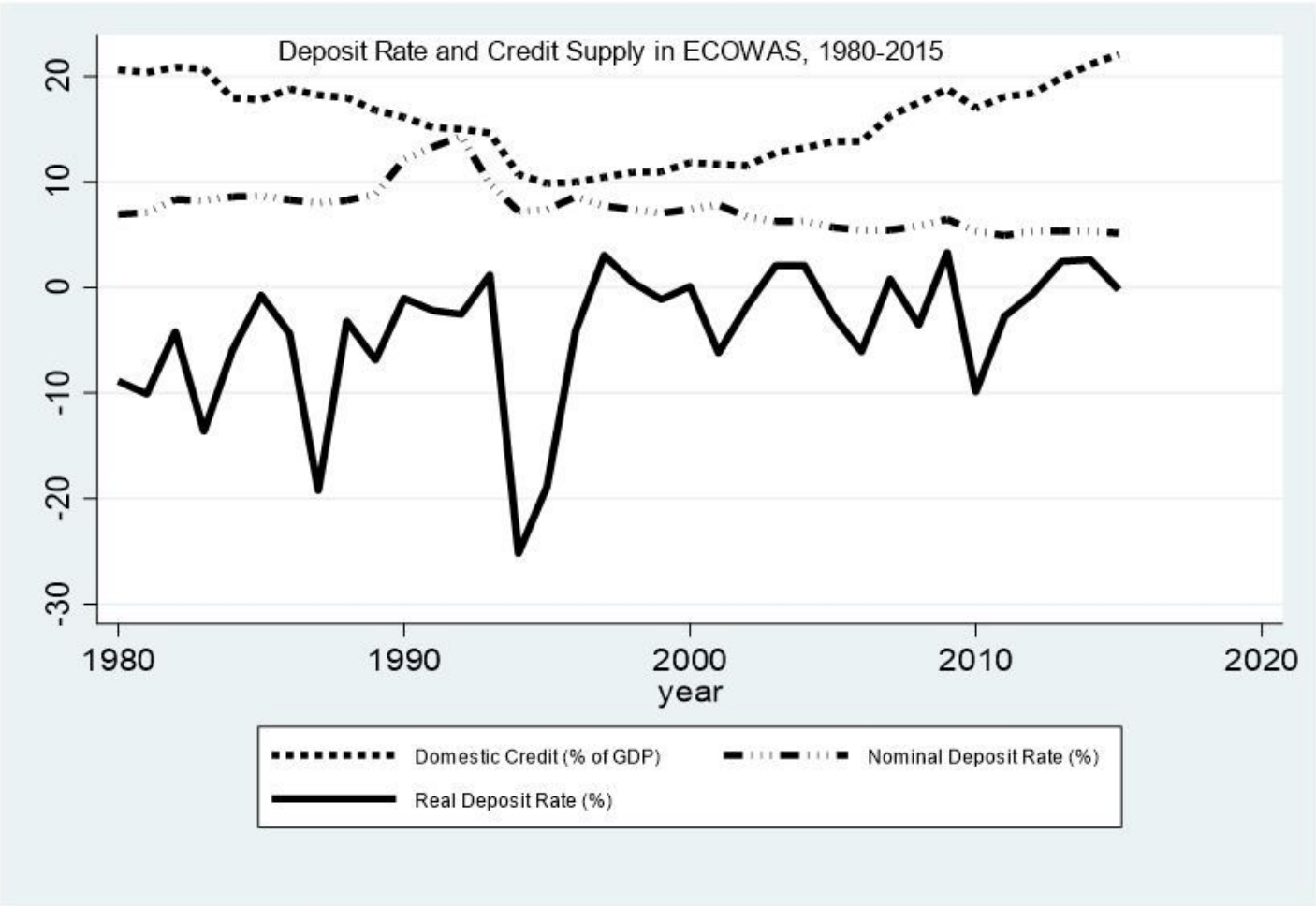

Figure 1

Trend of deposit rate and credit supply in ECOWAS, 1980-2015 Source: Authors' Computations

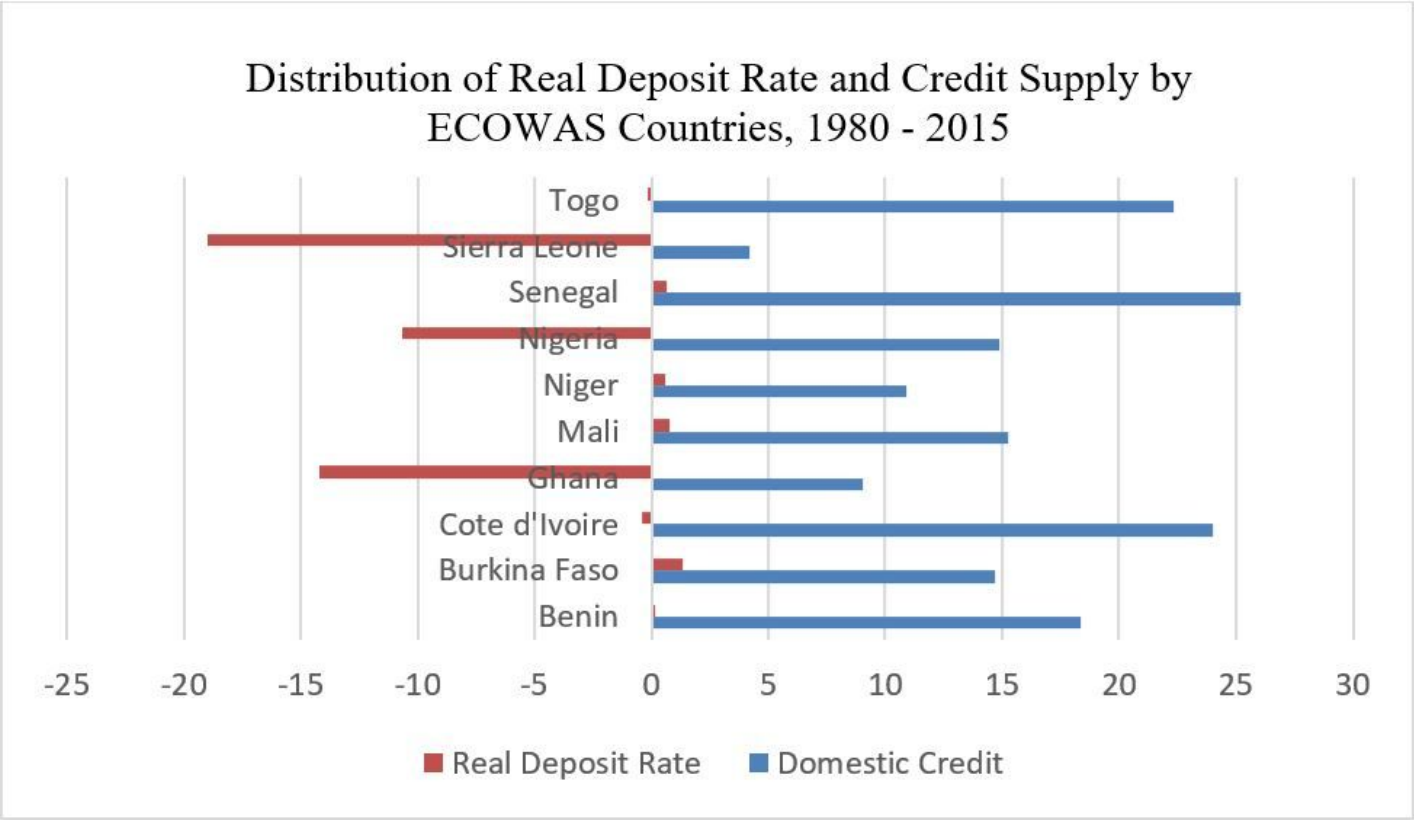

Figure 2

Real deposit rate and credit supply by ECOWAS Countries, 1980-2015 Source: Authors' Computations