To "ECO" or not to "ECO"? Evidence for the single currency agenda of ECOWAS

Adediran, Idris and Salisu, Afees and Ogbonna, Ahamuefula E

Centre for Econometric and Allied Research, University of Ibadan, Nigeria, Department of Economics, Obafemi Awolowo University, Ile-Ife, Nigeria, Department of Statistics, University of Ibadan, Nigeria

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Idris A. Adediran
Centre for Econometric and Allied Research, University of Ibadan, Nigeria & Department of Economics, Obafemi Awolowo University, Ile-Ife, Nigeria
Email: meetadediran@gmail.com; ia.adediran@cear.org.ng

Afees A. Salisu
Centre for Econometric and Allied Research, University of Ibadan, Nigeria
Email: adebare1@yahoo.com; aa.salisu@cear.org.ng

Ahamuefula E. Ogbonna
Centre for Econometric and Allied Research, University of Ibadan, Nigeria & Department of Statistics, University of Ibadan, Nigeria
Email: ogbonnaephraim@yahoo.com; ae.ogbonna@cear.org.ng

Abstract

In this study, we provide results to aid the ECOWAS in its final decision on the adoption of the single currency (the "ECO") for the proposed regional monetary union. We demonstrate, with the fractional integration and cointegration techniques, evidences for the proposed monetary policy mechanism in the region to deal with shocks and the single currency to serve as a stabilisation tool. Hence, the results support the adoption of the ECO, with emphasis on preferably linking it with the US dollar than the Euro.

Keywords: ECOWAS; Fractional Cointegration; Single Currency

JEL Codes: O55, C51, F36

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1 Motivation

The renewed roadmap for the adoption of ECO[1] as a regional currency started in 2009 with the ECOWAS Monetary Cooperation Programme (EMCP).[2] The EMCP is a series of time-bound action plan for the convergence of the ECOWAS countries[3] leading to the impending declaration of monetary union in the West African and ECO as its regional currency (see ECOWAS, 2019). Since the adoption of the currency name (ECO) in June 2019, the comprising countries have stalled the actual take-off of the monetary union due to political bickering and individual economic considerations. We therefore conduct extensive investigations on the collective interest of the region, to either adopt or jettison the single currency.

The underlying principle for such investigation reside in the theory of optimal currency area (hereinafter, OCA) (see Mundell, 1961; Bayoumi and Eichengreen, 1997 for theoretical expositions). In this light, the commitment to macroeconomic convergence criteria is consistently being monitored by the regional body (see ECOWAS, 2019) and therefore fall outside the purview of this study. However, a more worthwhile exercise is to study the macroeconomic stability and stable exchange rate mechanism to reap the gains of the monetary union (see Gil-Pareja et al., 2007; Andries et al. 2017).

The foregoing also has its root in the OCA where exchange rate mechanism (accompanied with pooling of countries' reserves) becomes the stabilisation tool for the monetary union (see Bayoumi and Eichengreen, 1997). Hence, we identify the ECO as a policy instrument in the proposed ECOWAS single market and evaluate the stability of the monetary policy environment. Consequently, we approach the

[1] See Tsangarides and Qureshi (2008); Coulibaly and Gnimassoun (2013); Asongu et al. (2019) for background information and literature.
[2] This is the justification for conducting the study between 2009M1 and 2019M12.
[3] The ECOWAS is a regional economic bloc of 15 West African countries which can be sub-divided into eight WAEMU countries (Benin, Burkina Faso, Côte D'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo) and the rest (Cabo Verde, Gambia, Ghana, Guinea, Liberia, Nigeria, Sierra Leone).

foregoing by evaluating real exchange rates and real interest rates of the constituent economies for convergence and ability of the exchange rate mechanism to absorb shocks (see Bergin et al., 2017; Ayres et al., 2019).

The fractional integration and cointegration techniques come in handy for the research objectives to show the stability of the exchange rate mechanism. In the event that the techniques turn out evidence of short memory and mean reversion with values of integration/cointegration parameters less than 0.5 (see Salisu et al., 2019 and Yaya et al., 2019) as demonstrated in the result section, we are able to confirm the stability of the proposed mechanism and the ECO as a plausible economic stabilisation tool.

Following the introduction, Section 2 presents the methodology; Sections 3 and 4 discuss results; and Section 5 concludes.

2 Methodology

We specify relevant models for fractional integration/cointegration to confront the research question. For the fractional integration, we define an MA process following Gil-Alana et al. (2018):

$$(1-L)^{d} y_t = c + \beta trend + \varepsilon_t \qquad (1);$$

where y_t is the real exchange rate/interest rate series, L is the lag operator, d is the fractional integration parameter, ε_t is the white noise error with stationary process. d is defined thus: $0 < d < 0.5$ (y_t has short memory and stationary); $0.5 \leq d < 1$ (y_t has long memory but mean-reverting); in both cases, $d < 1$ and shocks to y_t would only have temporary effects; while $d > 1$ indicates no mean reversion and permanent effects of shocks to y_t.

For fractional cointegration, we construct a multivariate framework (FCVAR) for the real interest rate and exchange rate series for ECOWAS countries (see Salisu et al., 2019 and Yaya et al., 2019 for specification details):

$$\Delta^d Y_t = \alpha\beta'\Delta^{d-b} L_b Y_t + \sum_{i=1}^{\rho} \Theta_i \Delta^d L_b Y_t + \varepsilon_t \qquad (2);$$

where Δ^d and L_b are the fractional differenced and lag operators, α and β are $s \times r$ matrices of long run parameters, r is the co-fractional rank. We estimate Eq. (2) as follows: (1) determine the optimal lag (ρ); (2) construct the cointegrating rank (r) given ρ; (3) Use r and ρ to estimate FCVAR; and (4) conduct Wald test, where rejection justifies FCVAR over its conventional subset, CVAR. The establishment of fractional cointegration ($d = b < 1$) indicates that shocks to the system is temporary.

We employ data[4] (2009M01 – 2019M12) on nominal exchange rates (in per US dollar, per Euro and per SDR) and monetary policy rates for WAEMU countries (Benin, Burkina Faso, Côte D'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo) and the remaining 7 ECOWAS countries (Cabo Verde, Gambia, Ghana, Guinea, Liberia, Nigeria, Sierra Leone). Consumer prices are obtained for the computation of real exchange rates (RER_{dollar}, RER_{euro} and RER_{sdr}) and real interest rates(RIR), and the real effective exchange rates($REER$) for further robustness.

3 Main results

We examine the series-specific characteristics of the four exchange rates and real interest rates, and then, the model-based analyses across the countries. The conventional integration approaches (ADF with and without structural break) differ on the integer order of integration. However, the fractional integration approach consistently put the fractional integration parameter below (although close to) 0.5 (see Tables 1-5). Note that we consistently fail to reject the hypothesis that $0 < d < 0.5$ and demonstrate the rejection of the null hypothesis that $d > 1$.[5] Evidently, the real exchange rates and real interest rates for ECOWAS exhibit short memory and are also mean-reverting. Imperatively, shocks' impacts are temporary and decay over a short period. These individual results are necessary but not sufficient for the ECOWAS

[4] The data are nominal exchange rates, prices and monetary policy rates obtained from the IFS of the IMF (https://data.imf.org/).
[5] The only exception being real interest rate for WAEMU (see Table 5).

single currency project, hence, we further explore the fractional cointegration approach.

Collectively, the fractional cointegration results (see Table 6) show that the fractional cointegration parameters are all sufficiently lower than 0.5, the statistically significant LR-statistics favouring FCVAR. Hence, there are sufficient evidences of fractional cointegration (with short memory) suggesting that shocks to the system will fizzle out within a short time. The FCVAR results are stable (see associated stability graphs in Fig.1a). These evidences strongly support the ECOWAS single currency and the set-up of an exchange rate mechanism, as well as a single monetary policy to manage it.

Table 1: Univariate analysis of real exchange rate per US dollar

Series	Mean	ADF	ADF_SB	d	Wald Statistic	
					$d = 0.5$	$d = 1$
Cabo Verde	90.719	-11.251*** (0, 1)	-11.611*** (0, 1) {2010M05}	0.498*** [0.014]	-0.172	-36.059***
WAEMU	530.498	-12.502*** (0, 1)	-13.174*** (0, 1) {2011M04}	0.497*** [0.011]	-0.257	-46.534***
Gambia	32.632	-12.913*** (0, 1)	-6.1787*** (0, 0) {2015M04}	0.495*** [0.023]	-0.192	-21.574***
Ghana	1.869	-16.736*** (0, 1)	-17.639*** (0, 1) {2015M07}	0.498*** [0.027]	-0.090	-18.896***
Guinea	4889.482	-11.651*** (0, 1)	-13.524*** (0, 1) {2010M03}	0.497*** [0.012]	-0.166	-42.930***
Liberia	71.282	-9.680*** (0, 1)	-4.620* (0, 0) {2019M03}	0.498*** [0.009]	-0.236	-53.256***
Nigeria	142.289	-9.443*** (0, 1)	-6.180*** (1, 0) {2016M05}	0.497*** [0.021]	-0.149	-24.270***
Sierra Leone	4198.647	-7.694*** (0, 1)	-8.893*** (0, 1) {2016M10}	0.497*** [0.020]	-0.098	-24.866***

Note: ***, ** & * represent 1, 5 & 10% significance levels, respectively. Values in "()" are the optimal lags and integer order of integration, respectively; "{}" are the break dates; "[]" are the standard error of estimates and d the fractional order of integration. These apply across similar tables.

Table 2: Univariate analysis of real exchange rate per Euro

Series	**Mean**	**ADF**	**ADF_SB**	d	**Wald Statistic**	
					$d = 0.5$	$d = 1$
Cabo Verde	102.650	-4.367*** (0, 0)	-6.186*** (0, 0) {2010M07}	0.480*** [0.024]	-0.816	-22.216***
WAEMU	600.768	-3.191* (0, 0)	-4.864** (0, 0) {2018M02}	0.491*** [0.024]	-0.366	-21.110***
Gambia	37.076	-14.488*** (0, 1)	-4.879** (0, 0) {2015M04}	0.495*** [0.017]	-0.291	-29.533***
Ghana	2.094	-10.546*** (0, 1)	-11.265*** (0, 1) {2015M08}	0.496*** [0.019]	-0.181	-25.953***
Guinea	5626.548	-9.094*** (1, 1)	-11.359*** (0, 1) {2010M04}	0.498*** [0.011]	-0.150	-45.601***
Liberia	80.903	-8.521*** (0, 1)	-9.004*** (0, 1) {2019M10}	0.498*** [0.007]	-0.360	-74.750***
Nigeria	162.366	-8.083*** (0, 1)	-7.431*** (1, 0) {2016M05}	0.497*** [0.022]	-0.106	-23.185***
Sierra Leone	4748.003	-4.209*** (1, 0)	-4.902** (1, 0) {2016M01}	0.496*** [0.021]	-0.168	-23.816***

Table 3: Univariate analysis of real exchange rate per SDR

Series	Mean	ADF	ADF_SB	d	Wald Statistic	
					$d=0.5$	$d=1$
Cabo Verde	130.963	-12.250*** (0, 1)	-12.727*** (0, 1) {2015M01}	0.496*** [0.017]	-0.238	-29.873***
WAEMU	778.414	-12.296*** (0, 1)	-12.984*** (0, 1) {2010M05}	0.496*** [0.009]	-0.418	-59.201***
Gambia	56.387	-3.6187** (0, 0)	-7.838*** (0, 0) {2015M04}	0.497*** [0.029]	-0.079	-17.355***
Ghana	4.313	-16.064*** (0, 1)	-19.244*** (0, 1) {2015M08}	0.499*** [0.036]	-0.036	-13.890***
Guinea	10887.020	-12.214*** (0, 1)	-14.427*** (0, 1) {2016M01}	0.498*** [0.020]	-0.079	-24.950***
Liberia	142.192	-9.394*** (0, 1)	-12.417*** (0, 1) {2019M10}	0.499*** [0.027]	-0.053	-18.766***
Nigeria	303.152	-9.030*** (0, 1)	-19.049*** (1, 0) {2016M06}	0.498*** [0.026]	-0.065	-19.639***
Sierra Leone	8031.94	-8.574*** (0, 1)	-9.904*** (0, 1) {2009M11}	0.499*** [0.024]	-0.052	-20.781***

Table 4: Univariate analysis of real effective exchange rate

Series	Mean	ADF	ADF_SB	d	Wald Statistic	
					$d=0.5$	$d=1$
WAEMU	98.633	-10.438*** (0, 1)	-11.731*** (0, 1) {2011M04}	0.497*** [0.030]	-0.105	-16.878***
Gambia	88.590	-14.015*** (0, 1)	-4.6167* (0, 0) {2016M02}	0.497*** [0.023]	-0.137	-22.234***
Ghana	80.677	-12.218*** (0, 1)	-13.286*** (0, 1) {2015M06}	0.498*** [0.020]	-0.106	-24.952***
Nigeria	109.757	-7.8024*** (0, 1)	-7.9535*** (1, 0) {2016M05}	0.497*** [0.025]	-0.117	-20.031***
Sierra Leone	115.752	-9.3812*** (0, 1)	-14.528*** (0, 1) {2017M07}	0.498*** [0.005]	-0.474	-99.695***

Note: this analysis is limited to the data availability.

Table 5: Univariate analysis of real interest rate

Series	Mean	ADF	ADF_SB	d	Wald Statistic	
					$d=0.5$	$d=1$
WAEMU	2.695	-10.539*** (0, 0)	-12.607*** (0, 0) {2011M04}	0.144*** [0.044]	-8.119***	-19.514***
Gambia	16.357	-10.317*** (0, 1)	-4.766* (0, 0) {2013M04}	0.498*** [0.005]	-0.479	-110.174***
Ghana	17.763	-9.566*** (1, 1)	-15.266*** (0, 1) {2009M11}	0.496*** [0.011]	-0.401	-46.834***
Nigeria	10.501	-15.070*** (0, 1)	-6.677*** (0, 0) {2011M09}	0.496*** [0.008]	-0.437	-60.521***

Note: this analysis is limited to the data availability.

Table 6: FCVAR results

	ρ	r	d	Log-Likelihood		LR-Statistics
				Unrestricted	Restricted	
RER_{dollar}	3	7	0.010[0.00]	-2589.96	-2787.07	394.22***
RER_{euro}	3	6	0.010[0.00]	-2512.99	-2706.98	387.98***
RER_{sdr}	3	7	0.010[0.00]	-3151.14	-3351.82	401.36***
$REER$	3	3	0.010[0.00]	-1362.80	-1437.99	150.38***
RIR	2	2	0.010[0.00]	-646.29	-660.981	29.38***

Note: *** represents 1% significance level. Values in "[]"are standard errors. These are valid across similar tables.

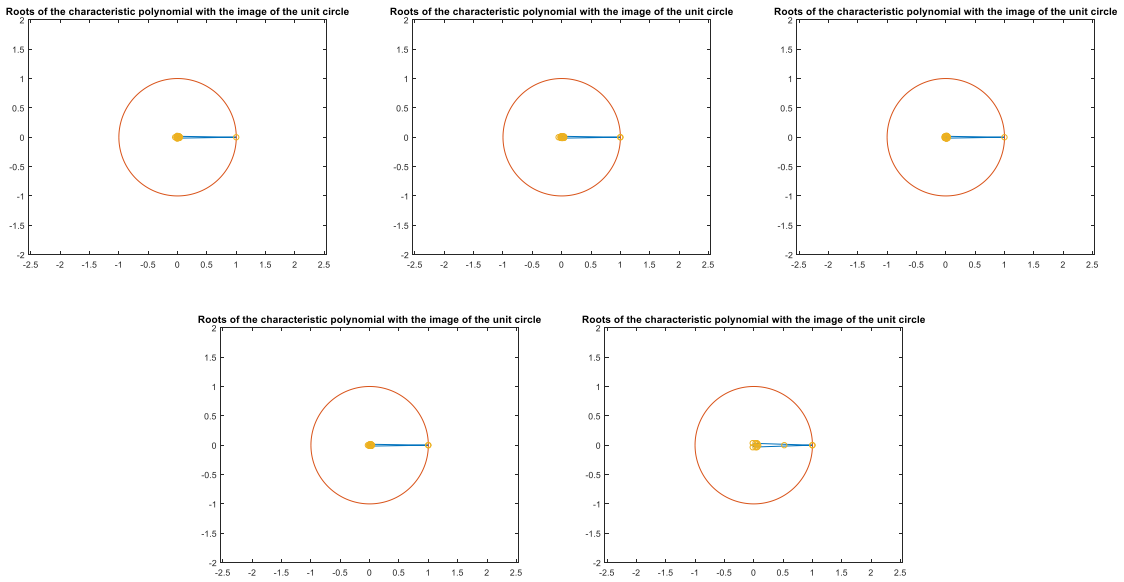

Fig.1a: FCVAR Stability Graphs

4 Robustness

With quarterly data frequency, we show that the results do not change markedly. Evidences of fractional integration are still widely established with evidences of short memory in the individual series (see Tables 7-11). Likewise, the finding of fractional cointegration is still widely supported (except in RER_{euro} case). Looking at the results wholly, we reinforce the call for the single currency. In addition, the ECO would be preferably linked with the US dollar (given stronger cointegration) than the Euro for sturdier exchange rate mechanism to support the stabilisation role of the single regional currency.

Table 7: Univariate analysis of real exchange rate per US dollar

Series	**Mean**	**ADF**	**ADF_SB**	d	**Wald Statistic**	
					$d = 0.5$	$d = 1$
Cabo Verde	90.978	-7.248*** (0, 1)	-5.106** (0, 0) {2014Q4}	0.487*** [0.033]	-0.381	-15.530***
WAEMU	531.528	-6.785*** (0, 1)	-7.382*** (0, 1) {2015Q1}	0.486*** [0.045]	-0.302	-11.481***
Gambia	32.730	-8.158*** (0, 1)	-5.520*** (0, 0) {2015Q1}	0.480*** [0.059]	-0.344	-8.877***
Ghana	1.882	-5.143*** (0, 1)	-4.743* (0, 1) {2013Q4}	0.492*** [0.058]	-0.145	-8.817***
Guinea	4887.910	-4.961*** (0, 1)	-6.063*** (3, 0) {2015Q4}	0.492*** [0.038]	-0.216	-13.472***
Liberia	71.438	-11.283*** (2, 2)	-10.576*** (2, 1) {2019Q1}	0.488*** [0.026]	-0.462	-19.491***
Nigeria	142.262	-5.375*** (0, 1)	-6.635*** (5, 0) {2016Q3}	0.485*** [0.068]	-0.229	-7.607***
Sierra Leone	4213.830	-3.806** (0, 1)	-4.888** (1, 0) {2015Q2}	0.490*** [0.043]	-0.229	-11.886***

Table 8: Univariate analysis of real exchange rate per Euro

Series	**Mean**	**ADF**	**ADF_SB**	d	**Wald Statistic**	
					$d = 0.5$	$d = 1$
Cabo Verde	102.960	-5.935*** (0, 1)	-5.290*** (1, 0) {2015Q4}	0.465*** [0.055]	-0.632	-9.729***
WAEMU	602.584	-8.778*** (0, 1)	-9.177*** (0, 1) {2010Q1}	0.464*** [0.060]	-0.603	-8.894***
Gambia	37.0622	-7.291*** (0, 1)	-8.486*** (0, 1) {2015Q2}	0.477*** [0.064]	-0.360	-8.151***
Ghana	2.1098	-5.666*** (0, 1)	-6.591*** (2, 1) {2015Q3}	0.476*** [0.065]	-0.363	-8.057***
Guinea	5606.083	-6.092*** (0, 1)	-7.579*** (0, 1) {2015Q1}	0.494*** [0.043]	-0.149	-11.885***
Liberia	80.9507	-5.643*** (1, 1)	-6.698*** (1, 1) {2018Q4}	0.486*** [0.035]	-0.387	-14.515***
Nigeria	162.000	-5.425*** (0, 1)	-5.194** (0, 0) {2016Q2}	0.489*** [0.054]	-0.210	-9.440***
Sierra Leone	4763.34	-5.448** (0, 1)	-6.170*** (0, 1) {2015Q1}	0.456*** [0.079]	-0.551	-6.853***

Table 9: Univariate analysis of exchange rate per SDR

Series	Mean	ADF	ADF_SB	d	Wald Statistic	
					$d = 0.5$	$d = 1$
Cabo Verde	131.189	-7.537*** (0, 1)	-8.389*** (0, 1) {2010Q2}	0.474*** [0.048]	-0.546	-10.901***
WAEMU	778.367	-7.140*** (0, 1)	-7.953*** (0, 1) {2015Q1}	0.480*** [0.057]	-0.357	-9.201***
Gambia	56.644	-7.970*** (0, 1)	-6.135*** (0, 0) {2015Q1}	0.492*** [0.068]	-0.124	-7.504***
Ghana	4.364	-5.686*** (1, 1)	-7.382*** (1, 1) {2015Q2}	0.495*** [0.073]	-0.070	-6.891***
Guinea	10942.480	-6.020*** (0, 1)	-7.819*** (0, 1) {2016Q1}	0.493*** [0.054]	-0.129	-9.324***
Liberia	143.323	-8.403*** (2, 2)	-8.172*** (1, 1) {2017Q1}	0.493*** [0.070]	-0.095	-7.285***
Nigeria	305.508	-5.255*** (0, 1)	-13.175*** (1, 0) {2016Q1}	0.493*** [0.066]	-0.101	-7.638***
Sierra Leone	8089.890	-5.451*** (0, 1)	-6.709*** (1, 0) {2015Q3}	0.494*** [0.063]	-0.089	-8.031***

Table 10: Univariate analysis of real effective exchange rate

Series	Mean	ADF	ADF_SB	d	Wald Statistic	
					$d = 0.5$	$d = 1$
WAEMU	98.548	-5.442*** (0, 1)	-5.067** (3, 0) {2015Q3}	0.482*** [0.079]	-0.222	-6.552***
Gambia	88.679	-8.514*** (0, 1)	-4.706* (0, 0) {2015Q4}	0.485*** [0.050]	-0.304	-10.375***
Ghana	80.348	-5.569*** (0, 1)	-6.992*** (5, 1) {2015Q2}	0.489*** [0.049]	-0.222	-10.436***
Nigeria	109.961	-5.335*** (1, 1)	-6.305*** (1, 0) {2016Q1}	0.484*** [0.076]	-0.207	-6.782***
Sierra Leone	116.129	-5.673*** (0, 1)	-4.791* (0, 0) {2017Q2}	0.487*** [0.026]	-0.489	-19.410***

Table 11: Univariate analysis of real interest rate

Series	Mean	ADF	ADF_SB	d	Wald Statistic	
					$d=0.5$	$d=1$
WAEMU	2.736	-6.840*** (0, 0)	-7.155*** (0, 0) {2015Q2}	0.204*** [0.127]	-2.325**	-6.252***
Gambia	16.276	-4.551*** (0, 0)	-4.656* (0, 0) {2013Q1}	0.489*** [0.021]	-0.495	-23.898***
Ghana	18.003	-3.296* (4, 0)	-8.766*** (0)[1] {2011Q2}	0.486*** [0.030]	-0.458	-17.278***
Nigeria	10.420	-8.965*** (0, 1)	-7.010*** (0, 0) {2011M03}	0.487*** [0.025]	-0.513	-20.918***

Table 12: FCVAR results

	ρ	r	d	Log-Likelihood		LR-Statistics
				Unrestricted	Restricted	
RER_{dollar}	3	8	0.010[0.00]	-358.257	-364.982	13.45***
RER_{euro}	3	8	0.010[0.00]	-519.989	-466.230	-107.52
RER_{sdr}	3	1	0.010[0.00]	-783.305	-820.285	73.96***
$REER$	3	4	0.010[0.00]	-435.340	-530.240	189.80***
RIR	3	3	0.010[0.00]	-176.701	-230.648	107.89***

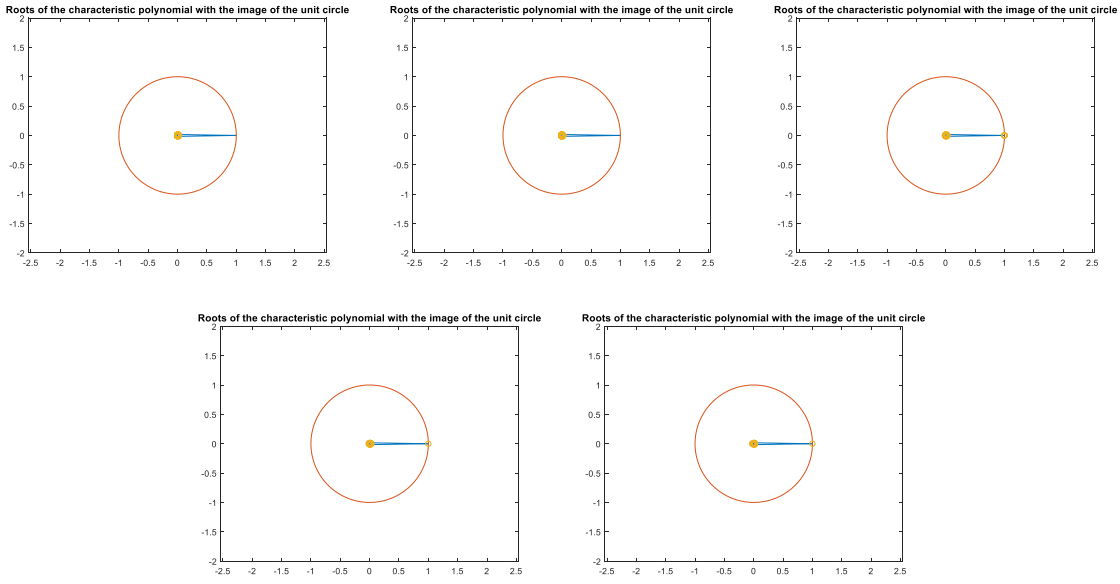

Fig.1b: FCVAR Stability Graphs

5 Concluding remarks

We apply the fractional integration/cointegration techniques to the real exchange rates and real interest rates of ECOWAS to either decide, in favour or against, the adoption of the ECO. We find that individually, the series exhibit short memory and mean reversion although the fractional integration parameters are close to 0.5. Collectively, we find that they are fractionally cointegrated with sufficiently low fractional cointegration parameters that are closer to zero than to 0.5, indicating that the impacts of shocks to the system will be temporary. This suggest that shocks to the exchange rate mechanism (for the ECOWAS) will fizzle out more quickly compared with the individual countries. This result supports the adoption of the ECO (and by implication, the birth of the regional monetary union), with emphasis on preferably linking the ECO with the US dollar than the Euro.

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