Real and Monetary Policy Convergence: EMU Crisis to the CFA Zone

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Abstract

A major lesson of the EMU crisis is that serious disequilibria result from regional monetary arrangements not designed to be robust to a variety of shocks. The purpose of this paper is to assess these disequilibria within the CEMAC, UEMOA and CFA zones. In the assessments, monetary policy targets inflation and financial dynamics of depth, efficiency, activity and size while real sector policy targets economic performance in terms of GDP growth. We also provide the speed of convergence and time required to achieve a 100% convergence. But for financial intermediary size within the CFA zone, findings for the most part support only unconditional convergence. There is no form of convergence within the CEMAC zone. The broad insignificance of conditional convergence results have substantial policy implications. Monetary and real policies which are often homogenous for member states are thwarted by heterogeneous structural and institutional characteristics which give rise to different levels and patterns of financial intermediary development. Therefore member states should work towards harmonizing cross-country differences in structural and institutional characteristics that hamper the effectiveness of monetary policies.

JEL Classification: F15; F36; F42; O55; P52

Keywords: CFA Zone; Currency Area; Convergence; Policy Coordination

1. Introduction

The European Monetary Union(EMU) crisis has sent a strong signal to other common currency regions on the goals of real and monetary policy convergence. A major lesson of the EMU crisis is that serious disequilibria result from regional monetary arrangements not designed to be robust to a variety of shocks(Willet, 2010; Willett & Srisorn, 2011). In designing the euro zone, institutions' almost exclusive concern was placed on limiting crises caused by financial sectors. The official position of the German government today appears to remain that failure of these safeguards is the predominant cause of the crisis. This position can be reasonably argued for Greece, although its loss of competitiveness has also been a major cause for worry.

In this paper we examine the nature of real and monetary policy convergence within the CFA zone. The work contributes to the discussion of financial integration in common currency unions. By dissecting elements of macroeconomic and monetary policies into financial intermediary dynamics (of depth, efficiency, activity and size), inflation and economic performance, we provide an in depth picture of real and monetary convergence analysis within the CEMAC, UEMOA and CFA zones. In a bid to provide more significant policy implications, we also calculate the speed of convergence and the time needed for full convergence.

Beside the premise of the EMU crisis, the absence of studies that focus on financial convergence in the African continent constitute another motivation for this work. Although a number of papers have investigated the dynamic co-movements of financial markets worldwide, the emphasis has often been on developed markets and the emerging economies of Latin America and Asia. According to Alagidede(2008), such neglect is far from surprising as African financial markets are viewed as too risky and less developed in operating

institutional environments. Economic instability and political strife have plagued many African countries and continue to pose a significant deterrent to foreign investments and private capital flows(Kenyan post elections crises in 2007/2008, Zimbabwe's economic meltdown, Nigeria's marred transition in 2008, the unending Egyptian revolution and resurfacing religious tensions in Nigeria). But for South Africa, no African country has yet risen as an emerging economic power. This might partly explain the relative lack of academic research on the banking sector of the continent. However, recently Africa has witnessed significant economic and financial developments. This provides some basis for assessing multidimensional financial convergence; especially in single currency areas amid pending EMU crisis.

The rest of the paper is structured in the following manner. Section 2 outlines the motivations for assessing convergence within the CFA zone. Section 3 presents data and discusses the methodology. Empirical analysis, discussion and policy implications are covered by Section 4. Section 5 concludes.

2. Motivations for financial system convergence

Financial and economic integration in the CFA zone is expected to provide gains in growth by favoring a breeding atmosphere for competition and efficiency in the banking sector. These gains emanate from price reductions in financial services leading to direct gains for consumers and indirect benefits through the reduction of loaning rate that favor investment(Weill,2009). Investigating financial intermediary convergence is therefore relevant in the African continent. More so, financial integration and convergence are crucial in assessing the outcome of deregulation policies aimed at improving the performance and efficiency of the financial intermediary sector(Casu & Girardone, 2010).

Financial theory deems integrated markets to be relatively more efficient in comparison to divergent ones. An integrated financial intermediary market improves cross-

border flow of funds, stimulates trading volume which in-turn improves stock market liquidity. Integrated banking markets provide investors with the opportunity to efficiently allocate capital to economic operators(Chen et al., 2002). The resulting effect is lower cost of capital for firms and lower transaction costs for investors(Kim et al.,2005). An integrated banking market has the positive rewards to financial stability as it diminishes the probability of asymmetric shocks(Umutlu et al., 2010). Financial intermediation stability in-turn could mitigate the risk of cross-border financial contagion(Beine et al.,2010) and improve the capacity of economies to absorb shocks(Yu et al., 2010).

The financial system exerts a significant influence on modern economic literature debates(Scholtens & Naaborg, 2005). Firstly, the monetary policy transmission mechanism's effectiveness is contingent on the financial system(Bondt,2000). Secondly, it is believed to impact channels via which financial development is linked to economic growth(Allen & Gale, 2000). The financial system interacts with the economy by producing information ex-ante about possible investments, monitoring of investments, allocation of capital, facilitating trade, diversifying and managing risks, mobilizing and pooling savings as well as easing the exchange of goods and services(Levine, 2004).

The need for convergence in the banking sector of the CFA zone draws on the tenets of arbitrage and the hypothesis proffered by the portfolio theory to devise a framework that inspires convergence in financial markets. The motivations for convergence in banking markets has premises on the literature of financial intermediary sector interdependence and portfolio diversification(Grubel,1968; Levy & Sarnat, 1970). These papers have for the most part considered short-term links of stock markets and have found the existence of short-term financial market co-movements. These results have been extended to cover co-variations of financial markets over the long-run(Bessler & Yang, 2003). Majority of these papers have

shown evidence of cointegration as well as short-term links which depict some form of convergence in financial markets.

Dynamics of financial intermediation therefore converge to reflect the level of arbitrage activity. When they converge, it means there is a common force such as arbitrage activity that brings the markets together. This implies that convergence in markets will reduce the potential for making above normal profits through international diversification(Von Furstenberg & Jeon, 1989). By the same token, if deterrents or potential barriers generating country risks and exchange rate premiums are absent, the consequence is similar yields for financial assets of similar risk and liquidity regardless of locality and nationality(Von Furstenberg & Jeon, 1989).

Within the framework of this paper, real and monetary policy convergence implies the integration of banking sector dynamics of depth, efficiency, activity and size; as well as inflation and GDP growth.

3. Data and methodology

3.1 Data

We examine a sample of 11 Central and West African countries with data from African Development Indicators(ADI) and the Financial Development and Structure Database(FDSD) of the World Bank. While openness, inflation, population growth, public investment and GDP growth indicators are obtained from the former source, financial intermediary dynamics are fetched from the later. Owing to constraints in data availability, dataset spans from 1981 to 2009. More information on summary statistics(Appendix 1), correlation analysis(Appendix 2), variable definitions(Appendix 3) and presentation of countries(Appendix 4) is available in the appendices. Concurring with Narayan et al.(2011) it is unlikely to find convergence within a very heterogeneous set of countries. Thus, we disaggregate the CFA zone into two homogenous panels based on regions(CEMAC and

UEMOA). The choice of variables is premised on two facts: (1) real economic sector policies are designed to achieve macroeconomic performance through growth in GDP; (2) monetary policies are designed to keep inflation in check and improve financial intermediary dynamics of depth(money supply and liquid liabilities), efficiency(at banking and financial levels), activity(from banking and financial perspectives) and size. For clarity in presentation, selected variables are classified into the following strands.

3.1.1 Financial variables

a) Financial depth

Borrowing from recent finance literature(Asongu, 2011abcd) and the FDSD, we measure financial depth both from overall-economic and financial system perspectives with indicators of broad money supply (*M2/GDP*) and financial system deposits (*Fdgdp*) respectively. The former represents the monetary base plus demand, saving and time deposits while the later denotes liquid liabilities. The basis for distinguishing these aspects of financial depth is that we are dealing exclusively with developing countries, where-in a significant chunk of the monetary base does not transit through the banking sector(Asongu, 2011e). Both measures are in ratios of GDP(see Appendix 3) and can robustly cross-check one another as either account for over 89% of variability in the other(see Appendix 2).

b) Financial efficiency

Financial intermediation efficiency here neither refers to the production efficiency of decision making units nor to the profitability-oriented concept in the banking industry. What this paper elicits is the ability of banks to effectively meet their fundamental role of transforming mobilized deposits into credit for economic operators. We therefore employ proxies for banking-system-efficiency and financial-system-efficiency (respectively 'bank credit on bank deposits: *Bcbd'* and 'financial system credit on financial system deposits:

Fcfd'). Like with financial depth, these two intermediation efficiency proxies can cross-check each other as either represent more than 92% of variability in the other (see Appendix 2).

c) Financial size

In line with the FDSD we measure financial intermediary size as the ratio of "deposit bank assets" to the "total assets" (deposit bank assets on central bank assets plus deposit bank assets: *Dbacba*).

d) Financial activity

The concept of financial intermediary activity here highlights the ability of banks to grant credit to economic operators. In a bid for robustness we proxy for both banking intermediary activity and financial intermediary activity with "private domestic credit by deposit banks: *Pcrb*" and "private credit by domestic banks and other financial institutions: *Pcrbof*" respectively. The later measure cross-checks the former as it accounts for more than 99% of information in the former (see Appendix 2).

3.1.2 Other variables

In accordance with the convergence literature we also measure the outcome of monetary policy with inflation(Bruno et al.,2011), account for macro economic performance with GDP growth rate and control for openness, public investment and population growth in the regressions(Pritchett, 1997; Bruno et al.,2011; Narayan et al., 2011). In the literature on convergence of per capita incomes and the root of the convergence theory, the premise is that per capita incomes of countries identical in structural characteristics such as preferences in technologies, rate of population growth and government policies have the tendency to converge to one another if the countries share similar fundamental characteristics(Prichett, 1997). In determining these structural characteristics in our analysis, we proxy for preferences in technology, population growth and government policy with openness(trade), population

growth rate and public investment respectively. As concerns common fundamental characteristics, we assume countries share similar monetary and real policies owing to common central banks.

3.2 Methodology

According to Fung(2009;3) the two equations below are the standard approaches in the literature for investigating conditional convergence if $W_{i,t}$ is taken as strictly exogenous.

$$\ln(Y_{i,t}) - \ln(Y_{i,t-\tau}) = \beta \ln(Y_{i,t-\tau}) + \delta W_{i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (1)$$

$$\ln(Y_{i,t}) = \sigma \ln(Y_{i,t-\tau}) + \delta W_{i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (2)$$

Where $\sigma = 1+ \beta$, $Y_{i,t}$ is the proxy for per capita financial or real sector development in country *i* at period *t*. $W_{i,t}$ is a vector of determinants(openness, public investment and population growth) of per capita finance(or real sector per capita), η_i is a country specific effect, ξ_t is a time specific constant and $\varepsilon_{i,t}$ an error term. In line with the neo-classical growth model, a statistically significant negative coefficient on β in Eq. (1) means that countries relatively close to their steady state of per capita growth will experience a slowdown in growth of the per capita banking(real sector) development, known as conditional convergence(Narayan et al.,2011;2). Borrowing from Fung(2009;3), if $0 < |\sigma| < 1$ in Eq.(2), then $Y_{i,t}$ is dynamically stable around the path with a trend growth rate the same as that of W_t, and with a height relative to the level of W_t. The variables contained in $W_{i,t-\tau}$ and the individual effect η_i are measures of the long-term level the market(real sector) is converging

to. Thus, the country specific effect η_i depicts the existence of other determinants of a country's steady state not captured by $W_{i,t-\tau}$.

Conditions for convergence elucidated above are contingent on the strict exogeneity of $W_{i,t}$. Unfortunately, this is not the case in the real world because, whereas openness, public investment and population growth(components of $W_{i,t}$) influence per capita financial(real sector) development, the reverse effect cannot be ruled-out. Thus we are confronted with the issue of endogeneity where openness(trade), public investment and population growth are correlated with the error term($\varepsilon_{i,t}$). More so country and time specific effects could be correlated with other variables in the model, which is often the case when lagged dependent variables are included in the equations. A way of dealing with the problem of the correlation between the individual specific-effect and the lagged dependent variables involves getting rid of the individual effect by first differencing. Thus Eq. (2) becomes:

$$\ln(Y_{i,t}) - \ln(Y_{i,t-\tau}) = \sigma \ln(Y_{i,t-\tau} - Y_{i,t-2\tau}) + \delta (W_{i,t-\tau} - W_{i,t-2\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \quad (3)$$

Even with this individual fixed effect elimination, estimation by Ordinary Least Square(OLS) is still biased because there remains a correlation between the lagged endogenous independent variable and the disturbance term. Arellano & Bond(1991) proposed an application of the Generalized Method of Moments(GMM) that exploits all the orthogonality conditions between the dependent lagged variables and the error term. This GMM approach has been extensively used in the convergence literature and recently applied by Narayan et al.(2011). While Narayan et al.(2011) use Eq.(1) without fixed effects, this paper applies Eq.(3) instead; as defined by Fung(2009). We prefer the *second-step* GMM because it corrects the residuals for heteroscedasticity. In the *first-step* the residuals are considered to be homoscedastic. The hypothesis of no auto-correlation in residuals is crucial

as past lagged variables are to be used as instruments for the dependent variables. Also the estimation depends on the assumption that the lagged values of the outcome variable and other explaining variables are valid instruments in the regression. When the error terms of the level equation are not auto-correlated, the first-order auto-correlation of the differenced residuals should be significant while their second-order auto-correlation should not be the case. The validity of the instruments is investigated by virtue of the Sargan over-identifying restrictions test(OIR).

As emphasized by Islam (1995;14), annual time spans are too short to be convenient for studying convergence, as short run disturbances may loom substantially in such brief time spans. Therefore with respect to our data span of 28 years, we borrow from Narayan et al. (2011) in using a 4 year non-overlapping interval such that we have seven time intervals: 1982-1985; 1986-1989 and so on. This implies in the analysis, the autoregressive order τ is set to 4.

We also compute the implied rate of convergence by calculating ($\sigma/4$) which by virtue of Eqs. (1) and (2) is the equivalent of the Narayan et al.(2011) computation with $(1+\beta)/4$. Thus the paper divides the estimated coefficient of the lagged differenced endogenous variable by 4 because we have used a four year non overlapping span in a bid to absorb short term disturbances. When the absolute value of the estimated autoregressive coefficient is greater than zero but less than one($0 < |\sigma| < 1$), we conclude the presence of convergence. A broader interpretation suggests, past differences have a less proportionate impact on future differences, meaning the variation on the left hand side of Eq.(3) is diminishing overtime as the country is converging to a stable state.

4. Empirical analysis

This section addresses three main issues: (1) assessment of the presence of convergence ; (2) determination of the speed of convergence and; (3) computation of the time needed for full(100%) convergence. Table 1 presents a summary of overall findings and addresses the first two issues, while Table 2 and Table 3 respectively present results for unconditional and conditional convergence.

Unconditional(absolute) convergence is estimated with only the lagged difference of the endogenous variable as exogenous variable while conditional convergence is in respect of Eq. (3). Thus unconditional convergence is estimated without $W_{i,t}$: vector of determinants(openness, public investment and population growth) of per capita finance(or real sector per capita). To investigate the validity of the model and indeed the convergence hypothesis, we carry-out two tests, namely the Sargan test which examines the over-identification restrictions, and the Arrellano and Bond test for autocorrelation which assesses the null hypothesis of no autocorrelation. The Sargan test investigates whether the instruments are uncorrelated with the error term in the estimated equation. Its null hypothesis is the stance that the instruments as a group are strictly exogenous(do not suffer from endogeneity), which is needed for the validity of the GMM estimates. We also report the Wald statistics for the joint significance of estimated coefficients. The autocorrelation, Sargan and Wald tests statistics with associated p-values for each of the panels are reported in the tables. The Sargan test statistics often appear with a p-value greater than 0.10, hence its null hypothesis is not rejected for the most part. We only report the AR(2) test in first difference because it is more important than AR(1) as it detects autocorrelation in levels. For most estimated models we are unable to reject the AR(2) null hypothesis of no autocorrelation. There is therefore robust evidence that most of the models are free from autocorrelation at the 1% significance level.

4.1 Synthesis of results

In Table 1 , we provide a summary of our results. This summary results is based on details presented in Tables 2-3. AC, CC, SAC, SCC; represent Absolute Convergence, Conditional Convergence, Speed of Absolute Convergence and Speed of Conditional Convergence respectively. We notice that for the three panels, with respect to all dynamics only financial size within the CFA zone reflects a conditional convergence. There is no form of convergence within the CEMAC zone. The UEMOA and CFA zones both reflect absolute convergence in liquid liabilities, banking activity, financial activity and financial size. There is the absence of any form of convergence within any zone for inflation and GDP growth regressions. On a specific note, we observe absolute convergence within the UEMOA(CFA zone) in money supply(banking and financial efficiency).

Table 1: Summary of results on convergence

Financial Depth

	Money Supply				Liquid Liabilities			
	AC	CC	SAC	SCC	AC	CC	SAC	SCC
CEMAC Zone	No	No	---	---	No	No	---	---
UEMOA Zone	Yes(5%)	No	7.87%	---	Yes(10%)	No	10.82%	---
Franc CFA Zone	No	No	---	---	Yes(10%)	No	7.5%	---

Financial Efficiency

	Banking System Efficiency				Financial System Efficiency			
	AC	CC	SAC	SCC	AC	CC	SAC	SCC
CEMAC Zone	No	No	---	---	No	No	---	---
UEMOA Zone	No	No	---	---	No	No	---	---
Franc CFA Zone	Yes(1%)	No	12.32%	---	Yes(1%)	No	14.72%	---

Financial Activity

	Banking System Activity				Financial System Activity			
	AC	CC	SAC	SCC	AC	CC	SAC	SCC
CEMAC Zone	No	No	---	---	No	No	---	---
UEMOA Zone	Yes(1%)	No	11.02%	---	Yes(1%)	No	11.02%	---
Franc CFA Zone	Yes(1%)	No	12.67%	---	Yes(1%)	No	12.75%	---

Financial Size

	AC	CC	SAC	SCC
CEMAC Zone	No	No	---	---
UEMOA Zone	Yes(5%)	No	16.75%	---
Franc CFA Zone	Yes(5%)	Yes(1%)	7.2%	18.62%

Inflation and GDP Growth

	Inflation(CPI)				GDP Growth			
	AC	CC	SAC	SCC	AC	CC	SAC	SCC
CEMAC Zone	No	No	---	---	No	No	---	---
UEMOA Zone	No	No	---	---	No	No	---	---
Franc CFA Zone	No	No	----	---	No	No	---	---

AC: Absolute Convergence. CC: Conditional Convergence. SAC : Speed of Absolute Convergence. SCC: Speed of Conditional Convergence. CEMAC: Economic and Monetary Community of Central African States. UEMOA: Economic and Monetary Community of Western African States. CFA: Franc of African French Colonies. CPI: Consumer Price Index.

4.2 Results of absolute convergence

Table 2 below reports results of absolute convergence regressions. First and foremost, we notice that for all models, the instruments are valid as the null hypotheses of the AR(2) and Sargan OIR tests are not rejected. Where the lagged endogenous estimated coefficient is significant, the Wald statistics is also significant. We expected this result for the Wald statistic because only one endogenous regressor is used in the absolute convergence regressions.

Table 2: Absolute convergence

	Financial Depth						**Financial Efficiency**					
	Money Supply			**Liquid Liabilities**			**Banking Syst. Efficiency**			**Financial Syst. Efficiency**		
	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA
Initial	0.356	**0.315****	0.248	0.623	**0.433***	**0.30***	-0.897	0.339	**0.49*****	0.353	0.489	**0.58*****
	(0.157)	**(0.035)**	(0.409)	(0.342)	**(0.063)**	**(0.09)**	(0.249)	(0.254)	**(0.001)**	(0.369)	(0.129)	**(0.000)**
2nd Auto	-0.900	0.140	-0.258	0.932	-0.915	-0.28	1.590	-0.364	0.647	0.064	0.078	0.180
	(0.367)	(0.888)	(0.795)	(0.351)	(0.359)	(0.77)	(0.111)	(0.715)	(0.517)	(0.948)	(0.937)	(0.857)
OIR	4.207	5.999	10.96	4.320	5.960	10.93	1.478	5.233	8.158	4.161	4.957	10.57
	(0.998)	(0.998)	(0.947)	(0.998)	(0.999)	(0.94)	(1.000)	(0.999)	(0.990)	(0.998)	(0.999)	(0.956)
Wald	1.998	**4.40****	0.681	0.900	**3.44***	**2.78***	1.326	1.299	**9.66*****	0.804	2.296	**13.5*****
	(0.157)	**(0.035)**	(0.409)	(0.342)	**(0.063)**	**(0.09)**	(0.249)	(0.254)	**(0.001)**	(0.369)	(0.129)	**(0.000)**
Countries	5	6	11	5	6	11	5	6	11	5	6	11
Obser	23	34	57	23	34	57	29	36	65	23	34	57

	Financial Activity						**Financial Size**		
	Banking Syst. Activity			**Financial Syst. Activity**					
	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA
Initial	0.043	**0.44*****	**0.50*****	0.040	**0.44*****	**0.51*****	0.203	**0.670****	**0.288****
	(0.933)	**(0.001)**	**(0.000)**	(0.937)	**(0.000)**	**(0.000)**	(0.169)	**(0.012)**	**(0.031)**
2nd Auto	0.329	-0.687	0.180	0.272	-0.560	0.165	-1.078	-1.148	-1.127
	(0.741)	(0.491)	(0.856)	(0.785)	(0.575)	(0.868)	(0.280)	(0.250)	(0.259)
OIR	3.611	5.628	10.84	3.488	5.651	10.844	4.798	5.946	10.999
	(0.999)	(0.999)	(0.950)	(0.999)	(0.999)	(0.950)	(0.999)	(0.999)	(0.946)
Wald	0.006	**10.2*****	**35.1*****	0.006	**11.1*****	**37.0*****	1.889	**6.210****	**4.645****
	(0.933)	**(0.001)**	**(0.000)**	(0.937)	**(0.000)**	**(0.000)**	(0.169)	**(0.012)**	**(0.031)**
Countries	5	6	11	5	6	6	5	6	11
Obser	23	34	57	23	34	57	26	36	62

	Inflation and GDP Growth					
	Inflation(CPI)			**GDP Growth**		
	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA
Initial	-0.317	-0.055	-0.215	-0.762	0.032	-0.081
	(0.210)	(0.922)	(0.198)	(0.330)	(0.740)	(0.563)
2nd Auto	0.163	-1.415	-0.571	0.162	-1.362	0.529
	(0.870)	(0.156)	(0.567)	(0.870)	(0.173)	(0.596)
OIR	4.015	5.953	10.636	4.095	4.156	8.956
	(0.997)	(0.980)	(0.955)	(0.994)	(0.998)	(0.983)
Wald	1.569	0.009	1.651	0.945	0.109	0.333
	(0.210)	(0.922)	(0.198)	(0.330)	(0.740)	(0.563)
Countries	5	6	11	5	6	11
Obser	17	18	35	16	23	39

*,**,***: significance levels of 10%, 5% and 1% respectively . CEMAC: Economic and Monetary Community of Central African States. UEMOA: Economic and Monetary Community of Western African States. CFA: Franc of African French Colonies. Syst: System. Initial: lagged autoregressive estimated coefficient. 2nd Auto: Second Order Autocorrelation test. OIR: Overidentifying Restrictions Sargan Test. Wald: statistics for joint significance of estimates. Obser: Observations. CPI: Consumer Price Index. GDP: Gross Domestic Product.

For financial depth, with respect to money supply we notice convergence only within the UEMOA zone (at a 5% significance level) with a speed of 7.78% per annum(p.a). This implies that a 100% convergence will be achieved in about 51.41 years(yrs). With regard to the liquid liability dimension of financial depth, there is evidence of convergence within the UEMOA and CFA zones at a 10% significance level, with speeds(time) of(for full) convergence: 10.82% p.a (36.96 yrs) and 7.5% p.a (53.33 yrs) respectively.

Looking at results for financial efficiency, only those of the CFA zone are significant at the 1% level from both banking and financial system perspectives. Banking(financial) system efficiency has a convergence rate of 12.32% (14.72%) p.a and a 100% convergence time of 32.46(27.17) years.

We also notice evidence of AC in banking(financial) system activity within the UEMOA and CFA zones at a 1% significance level. For UEMOA, the speeds(time) of(for full) convergence in banking and financial system activity are(is) equal at(in) 11.02% p.a (36.29 yrs). With regard to the CFA zone the speeds(time) of(for full) convergence in banking and financial system activity are respectively 12.67% p.a (31.57yrs) and 12.75% p.a (31.37yrs).

In the convergence analysis of financial size we also find evidence of AC within the UEMOA and CFA zones at a 5 % significance level with speeds(time) of(for full) convergence: 16.75% p.a (23.88yrs) and 7.2% p.a (55.55yrs) respectively.

We find no support for convergence in inflation and GDP growth. The highest and lowest rates of AC are found in the financial size analysis. While the highest rate of AC convergence is within UEMOA (23.88yrs at a convergence rate of 16.75% p.a), the lowest rate is within the CFA zone(55.55 yrs at a convergence rate of 7.2% p.a).

4.3 Results of conditional convergence

Table 3 below reports results of conditional convergence. First and foremost, we notice that but for the CFA zone(in financial system efficiency and financial size: with respect to AR(2) at a 10% level) in all models the instruments are valid at 5% and 1% significance levels as the null hypotheses of the AR(2) and Sargan OIR tests are not rejected. Of all combinations of panels with elements of real and monetary policy, we find the presence of conditional convergence only in financial size within the CFA zone with a speed of 18.62% p.a and a time for 100% convergence of 21.48 years.

Table 3: Conditional convergence

	Financial Depth						Financial Efficiency					
	Money Supply			Liquid Liabilities			Banking Syst. Efficiency			Financial Syst. Efficiency		
	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA
Initial	1.489	-0.324	-0.30	-1.024	-0.008	0.15	-1.179	0.034	0.22	-2.223	-0.676	0.163
	(0.422)	(0.780)	(0.58)	(0.743)	(0.989)	(0.51)	(0.302)	(0.914)	(0.44)	(0.448)	(0.278)	(0.50)
Intercept	0.091	0.018	-0.01	0.328	0.018	-0.01	**-0.51***	-0.070	-0.06	-0.385	**-0.12****	-0.06
	(0.559)	(0.735)	(0.75)	(0.816)	(0.754)	(0.56)	**(0.078)**	(0.189)	(0.38)	(0.571)	**(0.019)**	(0.15)
Trade	0.004	-0.006	-0.00	-0.007	-0.005	-0.00	-0.004	-0.0001	0.00	-0.001	-0.001	**-0.0*****
	(0.553)	(0.154)	(0.17)	(0.328)	(0.383)	(0.20)	(0.352)	(0.966)	(0.63)	(0.220)	(0.493)	**(0.000)**
Pub. Invt	---	**0.04****	0.037	-0.017	0.037	**0.04***	-0.027	**-0.039***	**-0.03***	-0.021	-0.029	**-0.03***
		(0.039)	(0.18)	(0.758)	(0.479)	**(0.06)**	(0.309)	**(0.063)**	**(0.064)**	(0.581)	(0.216)	**(0.071)**
Popg	---	0.146	-0.07	-0.226	0.118	-0.21	-1.190	-0.044	-0.026	0.543	**0.20****	0.091
		(0.784)	(0.78)	(0.959)	(0.816)	(0.33)	(0.210)	(0.758)	(0.779)	(0.644)	**(0.015)**	(0.278)
2nd Auto	-1.049	-1.004	-1.13	0.375	-1.384	-0.79	-0.277	-0.205	0.096	0.776	-0.668	**-1.86***
	(0.293)	(0.315)	(0.25)	(0.707)	(0.166)	(0.42)	(0.781)	(0.837)	(0.922)	(0.437)	(0.504)	**(0.061)**
OIR	2.656	2.133	8.78	0.000	3.469	9.044	0.000	1.621	8.813	---	0.375	8.10
	(0.999)	(1.000)	(0.96)	(1.000)	(0.999)	(0.95)	(1.000)	(1.000)	(0.985)		(1.000)	(0.977)
Wald	**19.7*****	**26.3*****	3.89	**13.7*****	6.946	**19*****	**43.5*****	**14.5*****	**8.440***	**58.0*****	**19.0*****	**49.1*****
	(0.000)	**(0.000)**	(0.41)	**(0.008)**	(0.138)	**(0.000)**	**(0.000)**	**(0.005)**	**(0.076)**	**(0.000)**	**(0.000)**	**(0.000)**
Countries	5	6	11	5	6	11	5	6	11	5	6	11
Obser	23	30	52	22	30	52	27	32	59	22	30	52

	Financial Activity						Financial Size		
	Banking Syst. Activity			Financial Syst. Activity					
	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA
Initial	-0.315	-0.843	0.32	-2.749	-0.868	0.315	-0.348	1.316	**0.745*****
	(0.829)	(0.322)	(0.10)	(0.420)	(0.318)	(0.103)	(0.835)	(0.476)	**(0.003)**
Intercept	-0.038	**-0.09****	-0.05	0.632	**-0.089****	-0.063	0.026	0.053	0.009
	(0.906)	**(0.031)**	(0.31)	(0.758)	**(0.029)**	(0.22)	(0.522)	(0.259)	(0.726)
Trade	-0.007	-0.010	**-0.0*****	-0.009	-0.010	**-0.0****	0.001	0.000	**0.007****
	(0.229)	(0.100)	**(0.009)**	(0.153)	(0.100)	**(0.021)**	(0.916)	(0.851)	**(0.031)**
Pub. Invt	-0.022	0.017	0.018	-0.017	0.020	0.018	0.028	0.004	-0.005
	(0.822)	(0.721)	(0.494)	(0.850)	(0.696)	(0.498)	(0.371)	(0.766)	(0.731)
Popg	---	-0.259	-0.276	4.029	-0.279	-0.282	---	-0.039	-0.100
		(0.646)	(0.263)	(0.711)	(0.628)	(0.262)		(0.683)	(0.319)
2nd Auto	-0.286	-0.716	-0.157	-0.092	-0.700	-0.241	0.184	-1.626	**-1.792***
	(0.774)	(0.473)	(0.874)	(0.926)	(0.483)	(0.80)	(0.853)	(0.103)	**(0.073)**
OIR	2.972	1.783	8.618	0.000	1.722	8.617	2.143	4.177	9.847
	(0.999)	(1.000)	(0.967)	(1.000)	(1.000)	(0.96)	(1.000)	(0.998)	(0.970)
Wald	**10.7****	**8.334***	**11.88****	**30.7*****	**8.413***	**11.1****	**29.54*****	4.149	**9.371***
	(0.013)	**(0.080)**	**(0.018)**	**(0.000)**	**(0.077)**	**(0.024)**	**(0.000)**	(0.386)	**(0.052)**
Countries	5	6	11	5	6	11	5	6	11
Obser	22	30	52	22	30	52	24	32	56

	Inflation and GDP Growth					
	Inflation(CPI)			GDP Growth		
	CEMAC	UEMOA	CFA	CEMAC	UEMOA	CFA
Initial	-0.841	-0.357	-0.184	-0.456	0.207	0.008
	(0.481)	(0.722)	(0.665)	(0.482)	(0.806)	(0.986)
Intercept	-1.679	-0.038	-0.182	-0.207	0.044	-0.048
	(0.109)	(0.938)	(0.734)	(0.415)	(0.799)	(0.604)
Trade	-0.028	0.043	-0.001	0.035	0.046	**0.025*****
	(0.596)	(0.352)	(0.721)	(0.308)	(0.246)	**(0.001)**
Pub. Invt	0.387	-0.080	0.040	0.115	-0.035	0.033
	(0.473)	(0.731)	(0.739)	(0.654)	(0.761)	(0.182)
Popg	**-7.31***	---	-0.662	---	---	0.192
	(0.087)		(0.635)			(0.572)
2nd Auto	-0.668	-0.464	0.044	0.339	0.280	0.781
	(0.503)	(0.642)	(0.964)	(0.734)	(0.779)	(0.434)
OIR	0.000	3.379	7.862	1.830	1.467	3.840
	(1.000)	(0.971)	(0.980)	(0.999)	(1.000)	(0.999)
Wald	5.969	1.021	1.295	4.473	4.587	**481.4*****
	(0.201)	(0.796)	(0.862)	(0.214)	(0.204)	**(0.000)**
Countries	5	5	10	5	5	10
Obser	16	14	30	15	19	34

*,**,***: significance levels of 10%, 5% and 1% respectively . CEMAC: Economic and Monetary Community of Central African States. UEMOA: Economic and Monetary Community of Western African States. CFA: Franc of African French Colonies. Syst: System. Initial: lagged autoregressive estimated coefficient. Pub. Invt: Public Investment. Popg: Population growth. 2nd Auto: Second Order Autocorrelation test. OIR: Overidentifying Restrictions Sargan Test. Wald: statistics for joint significance of estimates. Obser: Observations. CPI: Consumer Price Index. GDP: Gross Domestic Product.

4.4 Discussion and policy implications

Before we delve into the discussion of results, it is important at the outset to understand the economic intuition motivating absolute and conditional convergence in real and monetary policies within the Franc CFA zone. The European Monetary Union(EMU) crisis has sent a strong signal to other common currency regions on the goals of real and monetary convergence. A major lesson of the EMU crisis is that serious disequilibria result from regional monetary arrangements not designed to be robust to a variety of shocks(Willet, 2010; Willett & Srisorn, 2011). In designing the euro zone, institutions' almost exclusive concern was placed on limiting crises caused by financial sectors. The official position of the German government today appears to maintain that failure of these safeguards is the predominant cause of the crisis. The present analysis has been based on two hypotheses: (1) real economic sector policies are designed to achieve macroeconomic performance through growth in GDP; (2) monetary policies are designed to keep inflation in check and improve financial intermediary dynamics of depth(money supply and liquid liabilities), efficiency(at banking and financial levels), activity(from banking and financial perspectives) and size.

4.4.1 Absolute convergence

Absolute convergence is the result from factors such as monetary unions and the adoption of a single currency, among others(Nayaran et al., 2011). Absolute convergence in real and monetary policy implies countries share the same fundamental characteristics with respect to the financial intermediary market(or monetary policy) such that the only difference across countries is in initial levels of financial intermediary market development. In the CFA zone, the CEMAC and UEMOA regions that constitute it have distinct central banks which have independent monetary policies. This explains the large disparity in significance between their absolute and conditional convergence estimates.

Since the mid 1980s countries of the CFA Franc zone have undertaken structural reform programs engineered by the International Monetary Fund(IMF)which include financial liberalization for the most part. The vested objective has been to reduce barriers to trade and increase foreign investment. Unlike other African countries without a single currency, CFA member states are expected to benefit more in the reforms by virtue of reduced risk and low cross-border currency conversion costs in the flows of trade and investment among member countries. Holding all other things constant(such as political instability, market isolation and macroeconomic conditions), financial liberalization reduces barriers to trade and improves investment as it obviates the need for investor preference for one over the other. Owing to this financial liberalization, capital controls and control on exchange rate transactions have been substantially eased in the CFA zone; together with advances in computer and communication technologies which have rendered the banking industry increasingly synchronized. This synchronization has also increased the speed of shock adjustment; implying the rate at which one bank in the monetary zone adjusts when there is a shock in the other has increased. All these factors have resulted in absolute convergence.

4.4.2 Conditional convergence

According to the economic growth literature(Barro, 1991), conditional convergence depicts convergence whereby one's own long-term steady state(equilibrium) is contingent on the different structural characteristics or fundamentals of each economy or market(Nayaran et al.,2011). Borrowing from Narayan et al.(2011) still, when financial intermediary markets across countries differ in terms of factors relating to the performance of their markets, there could be conditional convergence. The convergence in dynamics of the banking sector is contingent on variables which we observe and empirically test. Our results are thus conditional on the macroeconomic variables we have used. Note should be taken of the fact that, owing to constraints in data availability and degrees of freedom required for the OIR test,

we conditioned our analysis on three macroeconomic variables : consistent with the convergence literature(Prichett,1997; Bruno et al.,2011; Narayan et al., 2011). But for the case of financial size within the CFA zone, our results do not find convergence in other dimensions of monetary and real policy for the UEMOA and CEMAC zones. It follows that small-sized financial intermediary countries within the CFA zone are catching up with the large financial sized markets. If evidence is considered based on both absolute and conditional convergence, then we find strong backing for convergence only in financial size within the CFA zone. This broadly confirms the position of Benassy-Quere & Coupet(2005) that CEMAC and UEMOA countries do not share macroeconomic similarities and hence the CFA zone cannot be viewed as an optimal currency area.

4.4.3 Policy implications

In spite of homogenous monetary policies for countries in the CEMAC, UEMOA and CFA zones, we have only found strong evidence of some unconditional convergence. The absence of evidence for this form of convergence(AC) in certain dynamics could be understood from dissimilar initial conditions of financial development(among member states) and poor implementation of monetary policies(by member states). But for financial size in the CFA zone analysis, similar fundamental characteristics(policies) in member states exhibited for unconditional convergence fail to play, in fine-tuning conditional convergence. It follows that despite homogenous fundamental conditions, structural characteristics and institutional differences (including varying levels of democracy, political strife and quality of government) are playing a crucial role in deterring convergence in real and monetary policies.

As a policy implication monetary policies which are often homogenous for all member states are thwarted by heterogeneous structural and institutional characteristics which give rise to different levels and patterns of financial intermediary development. Therefore member

states should work towards harmonizing cross-country differences in structural and institutional characteristics that hamper the effectiveness of monetary policies.

5. Conclusion

The purpose of this paper has been to assess convergence within the CFA zone. It is motivated by major lessons from the EMU crisis which suggest that the serious disequilibria among EMU member states has resulted from regional monetary arrangements not designed to be robust to a variety of shocks. In the investigations we have distinguished the CEMAC from the UEMOA region, before assessing their combined effect in the CFA zone. In the examinations we have assumed monetary policy targets inflation and financial dynamics of depth, efficiency, activity and size, while real sector policy targets economic performance in terms of GDP growth. We have also provided the speed(time) of(for full) convergence.

From the findings we notice that for the three panels(with respect all dynamics) only financial size within the CFA zone reflects conditional convergence. There is no form of convergence within the CEMAC zone. The UEMOA and CFA zones both reflect absolute convergence in liquid liabilities, banking activity, financial activity and financial size. There is absence of any form of convergence within any zone for inflation and GDP growth. On a specific note, we observe absolute convergence within the UEMOA(CFA zone) for money supply(banking and financial efficiency).

As a policy implication monetary policies which are often homogenous for all member states are thwarted by heterogeneous structural and institutional characteristics which give rise to different levels and patterns of financial intermediary development. Therefore member states should work towards harmonizing cross-country differences in structural and institutional characteristics that hamper the effectiveness of monetary policies.

Appendices

Appendix 1: Summary statistics

		Mean	S.D	Minimum	Maximum	Observations
Financial Depth	Money Supply	0.205	0.074	0.047	0.433	79
	Liquid Liabilities	0.133	0.067	0.029	0.315	79
Financial Efficiency	Banking Efficiency	1.192	0.565	0.417	3.671	87
	Financial Efficiency	1.144	0.443	0.412	2.338	79
Financial Activity	Banking Activity	0.149	0.087	0.026	0.405	79
	Financial Activity	0.149	0.086	0.026	0.405	79
Financial Size	Financial Size	0.731	0.168	0.169	1.091	85
Other Variables	Openness(Trade)	66.73	33.47	29.62	224.19	83
	Inflation	3.791	4.808	-8.42	22.91	82
	Public Investment	6.554	3.540	1.853	20.59	77
	GDP growth	4.788	11.16	-15.71	71.18	86
	Population growth	2.855	0.734	1.740	6.398	88

S.D: Standard Deviation. GDP: Gross Domestic Product.

Appendix 2: Correlation analysis

Fin. Depth		**Fin. Efficiency**		**Fin. Activity**		**F. Size**	**Other Variables**					
M2	Fdgdp	BcBd	FcFd	Pcrb	Pcrbof	Dbacba	Trade	Infl.	Pub. I	GDPg	Popg	
1.000	0.893	0.053	-0.022	0.668	0.665	0.457	-0.033	-0.155	0.016	-0.389	-0.056	M2
	1.000	-0.070	-0.127	0.714	0.710	0.545	0.073	-0.152	-0.002	-0.304	-0.016	Fdgdp
		1.000	0.928	0.554	0.553	0.033	-0.167	0.165	-0.141	-0.090	0.083	BcBd
			1.000	0.533	0.537	0.015	-0.142	0.203	-0.050	-0.056	0.280	FcFd
				1.000	0.999	0.479	0.005	0.064	-0.060	-0.251	0.243	Pcrb
					1.000	0.476	0.002	0.066	-0.062	-0.250	0.254	Pcrbof
						1.000	0.151	0.086	0.112	0.007	-0.143	Dbacba
							1.000	0.260	0.129	0.588	0.121	Trade
								1.000	0.280	0.196	0.179	Infl.
									1.000	-0.040	0.128	Pub.I
										1.000	0.168	GDPg
											1.000	Popg

M2 :Money Supply. Fdgdp : Liquid liabilities. BcBd : Bank credit on Bank deposit. FcFd: Financial credit on Financial deposit. Prcb:Private domestic credit by deposit banks. Prcbof: Private domestic credit by deposit banks and other financial institutions. Dbacba: Deposit bank assets on deposit bank assets plus central bank assets. Pub.I: Public Investment. GDPg: GDP growth. Popg: Population growth. Fin: Financial.

Appendix 3: Variable definitions

Variables	Signs	Variable definitions	Sources
Inflation	Infl.	Consumer Prices (Annual %)	World Bank(WDI)
Openness	Trade	Imports(of goods and services) plus Exports(of goods and services) on GDP	World Bank(WDI)
Public Investment	PubI	Gross Public Investment(% of GDP)	World Bank(WDI)
GDP Growth	GDPg	Average annual GDP growth rate	World Bank(WDI)
Population Growth	Popg	Annual population growth rate	World Bank(WDI)
Economic financial depth(Money Supply)	M2	Monetary Base plus demand, saving and time deposits(% of GDP)	World Bank(FDSD)
Financial system depth(Liquid liabilities)	Fdgdp	Financial system deposits(% of GDP)	World Bank(FDSD)
Banking system allocation efficiency	BcBd	Bank credit on Bank deposits	World Bank(FDSD)
Financial system allocation efficiency	FcFd	Financial system credit on Financial system deposits	World Bank(FDSD)
Banking system activity	Pcrb	Private credit by deposit banks (% of GDP)	World Bank(FDSD)
Financial system activity	Pcrbof	Private credit by deposit banks and other financial institutions(% of GDP)	World Bank(FDSD)
Financial size	Dbacba	Deposit bank assets on Central banks assets plus deposit bank assets	World Bank(FDSD)

M2: Money Supply. Fdgdp: Liquid liabilities. BcBd: Bank credit on Bank deposits. FcFd: Financial system credit on Financial system deposits. Pcrb: Private domestic credit by deposit banks. Pcrbof: Private domestic credit by deposit banks and other financial institutions. Dbacba: Deposit bank assets on Central bank assets plus deposit bank assets. WDI: World Development Indicators. FDSD: Financial Development and Structure Database.

Appendix 4: Presentation of countries

Zones	Definitions	Countries	Number
CEMAC	Economic and Monetary Community of Central African States	Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon.	5
UEMOA	Economic and Monetary Community of West African States	Burkina Faso, Ivory Coast, Mali, Niger, Senegal, Togo.	6
Franc CFA	Franc of African French Colonies	Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon, Burkina Faso, Ivory Coast, Mali, Niger, Senegal, Togo.	11

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