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FINANCIAL INTEGRATION AND FINANCIAL DEVELOPMENT IN THE CEMAC ZONE: DOES THE FRAGILITY OF THE STATE MATTERS?

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Abstract: In this paper, we started by asking an important question, does state fragility matters in the link between financial integration and financial development? We endeavor to unmasked this question by carefully specifying regression equations for estimation. We specifically implemented the Panel VAR, Feasible Generalized Least Square, and the Drisco-Kraay Standard Errors regression. The results showed that improvements in financial development enhances financial integration in the CEMAC region. Comparative results showed that state fragility reduces the potential for financial development and financial integration in the CEMAC sub region. The poorly developed financial architecture in the CEMAC region is accountable for by the fragility of the states. We concluded that state fragility matters in the relation between financial integration and financial development, and as such, macroeconomic fundamentals such as GDP growth, inflation rate, unemployment rate, and trade openness matter for state fragility and state fragility equally matters much more for macroeconomic fundamentals in the CEMAC region. We suggest taking a practical approach to resilience, such as fostering social cohesion and state formation, and enhancing security in the CEMAC region and throughout Africa. This will enhance competition in the financial markets and hence improve of financial integration and financial development in the CEMAC region as it gives the leeway for more robust domestic financial institutions to be developed.

Keywords: *Financial Integration, Financial Development, State Fragility*

1. INTRODUCTION

The relation between financial integration and financial development has remained a subject of debate in the literature across the globe. This is as a result of changes in the financial structure and financial architectures in countries across the globe. Countries have continued to seek these changes in their financial structure and financial architectures through greater financial integration and financial development. For instance, in the European Union, there has been greater financial integration and financial development. This is justified by the fact that the percentage of asset shares of foreign-owned banks relative to total bank sector assets has increased from 30% in 1997 to around 75% in 2005 (Baltzer, Lorenzo, Roberto, & Simone, 2008). These statistics reveal that money and banking markets of the European Union are becoming increasingly integrated both among themselves and vis-à-vis the euro area for rapid financial developments.

The African economies are no exception to this move towards greater financial integration and financial development. This is seen in the recent integration movement taking place in Africa now through the Africa Intercontinental Free Trade Area (AfCFTA). Wherein, the integration is for all markets – goods, labor, infrastructure, service. One of the general objectives of AfCFTA is to create an integrated Africa with a liberal market for goods, labor, infrastructure, service so as to promote regional value chain development. This is in regards to the aspiration of Agenda 2063 for a continental market with free movement of persons, capital, goods and services which are crucial for deepening financial integration and financial development (African Union, 2020).

Within the context of the Central African Economic and Monetary Community (CEMAC) zone in particular, it should be noted that there has equally been putting in place efforts towards greater financial integration and financial development. CEMAC's *Vision 2025* is to make the sub-region an emerging and integrated economic space characterized by security, solidarity and good governance in the service of human development (World Bank, 2014). This indicates that the CEMAC region has opted for greater financial integration and financial development within the ambits of a reduction in the fragile nature of CEMAC economies through increase in security, solidarity and good governance.

Several propositions in the literature have shown that financial integration is a catalyzer of financial development in every economy. This line of literature claimed that the relation between financial integration and financial development is driven be deep macroeconomic fundamentals such as the fragile nature of the states involved (Selvarajan & Ab-Rahim, 2020; Xiu, 2012; Mishkin, 2007; Pavlova-Banovaa *et al.*, 2022). A recent study by Kendo *et al.*, (2022) has shown that financial development inhibits financial integration of MFIs, and that financial development enhances financial

integration of MFIs only when the transitory aspect of financial integration is considered. With this in mind, one will begin to wonder the type of link that could exist between financial integration and financial development especially in the CEMAC region given the fragile sate of some of the economies. The fragile nature of states is related to Covid-19 conditions which have threatened countries across the globe and magnifying the fragile nature of countries. For instance, in 2021, fragile states index for Cameroon was 97.2 index. Though Cameroon fragile states index fluctuated substantially in recent years, it tended to increase through 2007 - 2021 period ending at 97.2 index in 2021 (Fund for Peace, 2021). This therefore requires new reading and adaptation at all levels. In this light, an in-depth understanding of the proneness of financial markets to shocks and risk in the role of financial integration on financial development is needed, with a vision to achieve greater financial convergence in credit markets in the CEMAC region.

On this note, the remaining parts of this paper is structured as follows; section two reviews related literature, section three presents the empirical strategy, section four presents the findings and a discussion, and section five draws up a policy conclusion from the findings.

2. LITERATURE REVIEW

The impact of financial integration on financial development in the setting of fragile states has been examined in a number of scientific articles. For instance, research by Sahay *et al.* (2000) using a new measure of financial development shows that although if financial development in emerging nations has accelerated more in the past decade, it is still significantly lower than that in advanced economies. According to nine financial development indices, emerging economies' financial institutions are at a higher level than their financial markets. This indicates that the banking sector, which represents financial institutions, continues to dominate the financial system in emerging economies. According to the IMF's (2017) forecast, emerging economies would overtake advanced nations as the global economic leaders by 2040. Despite having a significant impact on the global economy, emerging economies still lag behind developed ones in terms of financial development.

Using a sample of 34 nations from the East Asian and Pacific region, Taghizadeh-Hesary *et al.* (2019) evaluated the effect of financial integration on financial growth and established thresholds for materializing gains of financial advances from financial globalization. We assess non-linearity in the financial openness and financial development nexus using semi-parametric ordinary least-squares regression, and then create threshold dynamics models, in the manner of Kose *et al.* (2011) and Asongu & De Moor (2016). Their research shows that diverse financial inflows have a major impact on how financial

integration affects financial development. There is a strong, significant inverted U-shaped association between financial integration and financial development when considering foreign debt as a proxy for financial openness. Their empirical results also imply that the trade openness, GDP, and institutional quality all influence the relationship between financial integration and development. Their findings hold up well when accounting for endogeneity, other causes of financial development, and various measurements of financial integration and development.

In a context distinct to each nation, Aziakpono (2007) investigated the effects of financial integration on the financial development of the SACU members. Real per capita output, two metrics of financial development, four measures of financial integration, and annual time data from 1970 to 2004 are all used in the analysis. The Johansen cointegration and error correction modeling approaches were used to conduct the econometric analysis. Although there were a variety of outcomes from financial integration, it is clear that nations that are more connected than South Africa offer more observable proof of the benefits of financial integration. The study explains that the countries' inadequate institutional and structural barriers are to blame for the official integration arrangement's meager benefits.

The relationship between financial integration, as measured by the makeup of capital inflows, and financial development in emerging nations was examined by Fiskara (2022). The three main types of capital inflows are foreign direct investment (FDI), external debt, and portfolio equity inflows. In contrast, the IMF has created nine new indices to gauge the depth, accessibility, and efficiency of the stock and debt markets as well as financial development. The estimation results show that the composition of capital inflow has a favorable and statistically significant impact on improving all aspects of financial development in emerging economies using dynamic panel data GMM estimation from 79 countries in emerging economies. Particularly, FDI influx is highly related to financial institutions' depth, access, and efficiency as well as financial markets' depth and accessibility as the largest component of capital inflow in emerging economies. External debt inflow has a favorable impact on the depth and effectiveness of financial markets as well as financial institution efficiency. Additionally, the depth, availability, and efficiency of financial institutions as well as the depth and accessibility of the financial markets are all directly tied to portfolio equity inflow, which accounts for the smallest fraction of all inflow. In general, all three types of capital inflows greatly speed up the growth of financial markets and institutions, which deepens the financial system in developing nations.

Law (2009) finds that financial openness, as measured by trade openness and capital flows, is considerably more strongly associated with banking sector development in emerging nations than it is with overall financial development, which includes stock

market development. He employs the interaction between trade openness, which is approximated by the total of all exports and imports over GDP, and capital flows, which are approximated by the total of all capital inflows and outflows over GDP. Huang (2016), on the other hand, finds that the growth of the stock market is positively correlated with gross private capital flows, which are the total absolute value of direct, portfolio, and other investment inflows and outflows.

The incorporation of short-term debt increases the synchronization of the business cycle, as demonstrated by Kim & Pyun (2021). Additionally, during crises, the market integration of long-term debt instruments reduces the global transmission of economic cycle phases. In a study on how foreign debt and financial integration can affect the impact of external interest rate shocks on a small open economy, Demirel (2009) found similar results. Similarly, it has been argued in the literature that the financial sector serves as the primary medium for the transmission of monetary policy (Baele *et al.* 2004), and that the fragmentation of the financial sector presents significant obstacles to the growth of the financial system and the economy (Inklaar *et al.* 2012). The dual relationship between financial integration and foreign and internal macroeconomic shocks demonstrates the state's fragility.

Demyanyk (2008) predicts that deepening financial integration in Europe will increase prosperity by reducing consumption disparity, with bigger benefits for the nations that joined after 2004. This demonstrates that financial integration, by definition, contributes to reducing the gaps that economic and financial crises established across nations, as integration makes economies more susceptible to foreign crises and promotes the spread of such shocks. As stated by Gill, Sugawara, & Zalduendo (2014), Antonakakis & Vergos (2013), and Castiglionesi *et al.*, financial integration, on the other hand, is a condition of harmony across markets for financial assets and services that is disrupted by systematic shocks (2019). Due to the observation of weak states, their research draw the conclusion that financial integration has been interrupted. Regarding the Covid - 19 crises, Borgioli *et al.* (2020) underline this in particular. The EU's more aggressive response to fiscal and monetary measures is to blame. Depending on the type of integration that occurs, there are big variances (Vinhas de Souza, 2021).

According to Garliska-Bielawska et al (2018) investigation into whether and how a fragile state's membership in an economic community affects the occurrence of dynamic integration effects, the mere fact that a country is a member of one of these communities is not a crucial driver of FDI within the internal market, even for capital-poor fragile states. In a related study, Chuku and Onye (2019) sought to determine whether poor macroeconomic outcomes in sub-Saharan Africa were primarily caused by economic policies or by more fundamental state fragility issues. Their finding suggests that state fragility conditions, rather than necessarily macroeconomic policies, are of first-order

importance in explaining the differences in macroeconomic performance for African countries.

According to studies, the primary goal of financial integration is to include the new Corona bonds and to coordinate monetary and fiscal policies (Herzog, 2020); (Ehigiamusoe & Lean, 2013). In light of this, Corneli, (2021) have demonstrated that financial integration has sizeable short- and medium-term consequences, even in the absence of aggregate risks, in a two-country model where the two countries differ in their level of financial market development. Despite the fact that there have been many research examining the relationship between financial integration and financial development, it is highlighted that Africa is underrepresented in the literature. It is concerning that there is a major underrepresentation of finance literature in Africa and the CEMAC region in particular. Additionally, the incoherence of the theories developed in the literature necessitates fresh readings on financial development and integration. From a methodological standpoint, this study will use regression models that take into account cross sectional dependence and panel causality methodologies to examine the relationship between financial integration and financial development in the CEMAC region.

3. EMPIRICAL STRATEGY

The current paper examines the relation between financial integration and financial development, and to provide answer to the probing question of whether the fragile nature of the state matters in the role of financial integration on financial development in the CEMAC zone. The Central African Economic and Monetary Community (CEMAC), which consists of six independent states including, the Central African Republic, Chad, The Republic of Congo, Equatorial Guinea and Gabon. The paper uses an unbalanced panel data ranging from the 2000 to 2020 inclusive. The research design used in this study is the ex-post research design since its data are collected from previous years and econometric techniques is employed. In this paper, we follow the approach of Ekpo, A., & Chuku C., (2017) to measure financial integration as the quadratic distance of a country's excess return from an equally weighted market excess return for the region. This has its foundation from the capital Asset Pricing Model (CAPM). This implies that, for country i at time t and a population of N countries in the zone, this measure, denoted by *FI*, is given as;

$$FI_{it} = \left(R_t^i - \frac{1}{N} \sum_{i=1}^{N} R_t^j \right)^2 \quad (1)$$

FI measures the position of the market excess return of a country relative to an equally weighted market excess return of the distribution of countries. we apply equation (1) to interest rate spreads (lending rate minus deposit rate), which we then use as a proxy to measure the extent of financial integration in credit market among countries. The argument is that since bank interest rates represent macroeconomic and microeconomic opportunities and dangers, they can be viewed as the risk's price. In that situation, the gradual convergence of these spreads to a central trend or benchmark can be seen as a sign of the zone's increasing financial integration, whilst divergence can be seen as a symptom of the zone's growing market segmentation.

The term "financial development" (FD) in this study refers to a comprehensive IMF indicator of financial development that considers the depth, accessibility, and efficiency of financial development in both financial institutions (FI) and financial markets (FM). Principal Component Analysis (PCA) yields the FI, FM, and FD indices, which are standardized to have a range between 0 and 1.

$$FI = \sum_{i=1}^{n} \omega_i FI_j \tag{2}$$

$$FM = \sum_{i=1}^{n} \omega_i FM_j \tag{3}$$

$$FD = \omega_{FI} FI + \omega_{FM} FM \tag{4}$$

The FD index measures financial development and includes data on a variety of financial development parameters for a variety of financial agents (see Svirydzenka, K., 2016; Sahay, R., *et al,* 2017).

The economy's growth rate is measured by the Gross Domestic Product Growth Rate (Annual%), which is consistent with research by Beck and Levine (2004) and Sahay and others (2015). The information on the rate of GDP growth is sourced from World Development Indicators. According to Ekpo, A., & Chuku, C., (2017) financial integration (FI) is defined as the quadratic difference between a country's interest rate spread and an equally weighted average spread across countries in the region. The International Financial Statistics of the IMF is where we get our information on interest rate spreads. Financial development (FD) is a broad-based IMF indicator of financial development that considers financial development in terms of depth, access, and efficiency in both financial institutions and financial markets (see Svirydzenka, K., 2016; Sahay, R., *et al,* 2017). The information is sourced from the IMF Financial Development data set, which includes information from the World Bank FinStats, the IMF's Financial

Access Survey, the Dealogic corporate debt database, and the Bank for International Settlement (BIS) debt securities database.

Trade openness (OPEN) is calculated as exports + imports divided by GDP, inflation (INFL) is calculated as consumer price index (annual%), and unemployment (Un) is calculated as the percentage of the labor force as a whole. These variables' data points come from the World Development Indicators. The institutional quality (IQ) variable is based on the governance performance, which ranges from around -2.5 (poor) to 2.5 (strong). The World Governance Indicators are used to collect the data. The measures for these variables are consistent with a recent study by Diva Singh, Bennett Sutton, and Luc Eyraud (2017).

Economic theory suggests numerous channels by which financial integration could promote a more complex financial system with regard to the relationship between financial integration and financial development. Increasing access to international money, encouraging the development of the local banking supervisory and legislative framework, encouraging enhanced competition, and boosting the stability of the domestic financial system are a few of these (Agenor, 2003; Giannetti, *et al,* 2002; Caprio and Honohan, 1999; World Bank, 1997 and Levine, 1996). The Holtz-Eakin, Newey, and Rosen, (1988, 1989) technique is the one that is most frequently employed in the literature to test for panel causation between financial integration and financial progress. Their time stationary panel VAR model that follows:

$$FD_{it} = \alpha_0 + \sum_{j=1}^{m} \alpha_j FD_{it-j} + \sum_{j=1}^{m} \beta_i FI_{it-j} + p_i + \varepsilon_{it} \quad (5)$$

$$FI_{it} = \rho_0 + \sum_{j=1}^{m} \rho_j FI_{it-j} + \sum_{j=1}^{m} \pi_i FD_{it-j} + q_i + \mu_{it} \quad (6)$$

Where; are the error terms, are individual fixed effects. The inclusion of the lagged dependent variables that are linked with the error terms as well as the fixed effects causes biased estimation, as demonstrated by Nickell (1981). The first difference operator that eliminates the individual fixed effects is advised by Anderson and Hsiao (1981). Δ indicates the first difference operator, the resulting model is as follows;

$$\Delta FD_{it} = \alpha_0 + \sum_{j=1}^{m} \alpha_j \Delta FD_{it-j} + \sum_{j=1}^{m} \beta_i \Delta FI_{it-j} + \Delta\varepsilon_{it} \quad (7)$$

$$\Delta FI_{it} = \rho_0 + \sum_{j=1}^{m} \rho_j \Delta FI_{it-j} + \sum_{j=1}^{m} \pi_i \Delta FD_{it-j} + \Delta\mu_{it} \quad (8)$$

In order to obtain a consistent estimation of the parameters, Anderson and Hsiao (1981) recommend utilizing some instrumental variables. If the errors move by an average of the order k in the model at all levels equations, they will move by an average of the order k+1 at the first difference equations. The level equations (5 and 6) and the differenced equations (7 and 8) are combined in a system using the panel VAR GMM style estimator. In the difference regressions, this estimator employs the lagged levels as an instrument, while in the level regressions, it uses the most recent difference. The

panel VAR GMM estimator is predicated on the presumption that the initial differenced residuals do not exhibit second-order autocorrelation.

Using the Driscoll and Kraay model, we then examine the implications of financial integration on financial development (1998). With the use of Large-T asymptotic, Driscoll and Kraay (1998) show how the nonparametric time-series covariance matrix estimator may be changed to be resistant to various types of cross-sectional and temporal dependence. Looking at the linear regression where financial development is dependent on financial integration;

$$FD_{ti} = \lambda_0 + \lambda_1 FI_{ti}{}' + \delta(FI_{it} * \mathrm{Z}) + \varphi_i X_{ti} + {}_i + \zeta_{ti} \tag{9}$$

Where the dependent variable FD_{ti} is a scalar, FI_{ti} is a $(K + 1) \times 1$ vector of independent variables of financial integration whose first element is 1, and λ_1 is a $(K + 1) \times 1$ vector of unknown coefficients. By stacking all observations as follows is common:

$$FD = [FD1_{t11} \ldots\ldots FD1_{T1}, FD2_{t21} \ldots\ldots FDN_{TN},]' \tag{10}$$ and

$$FI = [FI1_{t11} \ldots\ldots FI1_{T1}, FI2_{t21} \ldots\ldots FIN_{TN},]' \tag{11}$$

This formula allows the panel data in this paper to be unbalanced since for individual i only a subset $ti1, \ldots Ti$, with $1 \le ti \le Ti \le T$ of all T observations may be available. It is assumed that the regressors FI_{ti} are uncorrelated with the scalar disturbance term ζ_{is} for all s, t (this implies strong exogeneity). However, the disturbances ζ_{ti} themselves are allowed to be autocorrelated, heteroskedastic, and cross-sectionally dependent. Under these presumptions λ_1 can consistently be estimated by OLS regression, which yields;

$$\widehat{\lambda_1} = (FI * FI')^{-1} FI' * FD \tag{12}$$

In the context of this study, Driscoll and Kraay standard errors for the coefficient estimates are calculated as the square roots of the diagonal elements of the asymptotic (robust) covariance matrix.

$$V\widehat{\lambda_1} = (FI * FI')^{-1} \widehat{S_T} (FI * FI')^{-1} \tag{13}$$

Where $\widehat{S_T}$ is defined as in Newey and West (1987):

$$\widehat{S_T} = \widehat{\Omega_0} + \sum_{j=1}^{m(T)} \omega(j,m)[\widehat{\Omega_j} + \widehat{\Omega_j}'] \tag{14}$$

In equation 15, m(T) denotes the lag length up to which the residuals may be auto correlated and the modified Bartlett weights,

$$\omega(j,m) = 1 - j/\{m(T) + 1\} \tag{15}$$

This ensure positive semi definiteness of $\widehat{S_T}$ and smooth the sample autocovariance function such that higher-order lags receive less weight. The $(K + 1) \times (K + 1)$ matrix $\widehat{\Omega_J}$ is defined as;

$$\widehat{\Omega_J} = \sum_{t=j+1}^{T} h_t(\widehat{\lambda_1}) h_{t-j}(\widehat{\lambda_1})' \tag{16}$$

with

$$h_t(\widehat{\lambda_1}) = \sum_{i=1}^{N(t)} h_{ti}(\widehat{\lambda_1}) \tag{17}$$

The total of the individual time t moment conditions in equation 17 (hti1) ranges from 1 to N(t), where N is allowed to change as t does. With just this minor modification, Driscoll and Kraay's (1998) original estimator can now be used with data from unbalanced panels. For pooled OLS estimation, the individual orthogonality conditions $h_{ti}(\widehat{\lambda_1})$ are the $(K + 1) \times 1$ dimensional moment conditions of the linear regression model; i.e.,

$$h_{ti}(\widehat{\lambda_1}) = FI_{it} * \widehat{\zeta_{ti}} = FI_{it}(FD_{it} - FI_{it}' * \widehat{\lambda_1} \tag{18}$$

It follows that Driscoll and Kraay's covariance matrix estimator equals the heteroskedasticity- and autocorrelation-consistent covariance matrix estimator of Newey and West (1987) applied to the time series of cross-sectional averages of the. Estimating the covariance matrix with this approach yields standard errors that are robust to general forms of cross-sectional dependence and temporal dependence.

Therefore, when applied to the time series of cross-sectional averages of the $h_{ti}(\widehat{\lambda_1})$, Driscoll and Kraay's covariance matrix estimator is equal to the heteroskedasticity- and autocorrelation-consistent covariance matrix estimate of Newey and West (1987). This method of covariance matrix estimation produces standard errors that are resistant to common types of temporal and cross-sectional dependency.

4. FINDINGS AND DISCUSSIONS

4.1. Descriptive Statistics

The findings indicate that financial development in the CEMAC zone on the average is 0.0789 with and overall deviation from this average of 0.0231. Financial development is also significantly different among the countries of the CEMAC zone, given a between-sample variability of 0.0147 compared to a within-sample variability of 0.0186, there are significant differences in the level of financial development among CEMAC economies.

Table 1: Descriptive Statistics

Variables	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Financial Development	120	.0789578	.0230578	.0291346	.1390182
Credit Market Integration	120	50.2705	72.4533	.0007377	327.4848
Capital Market Integration	126	.0635623	.1056416	-.1223096	.643841
Aggregate Financial Integration Index	120	7.92e-10	1.041646	-4.625187	4.138842
Inflation rate	125	2.971417	3.156713	-8.97474	14.89868
External balance	121	5.145069	21.63502	-100.9709	49.76069
GDP growth rate	126	3.987772	9.537953	-36.39198	63.37988
Gross domestic fixed capital formation	121	25.97113	12.69274	5.400697	81.05174
Trade openness	126	.7744984	.3530007	0	1.568618
Population growth	126	2.918424	.9177369	.2596475	4.654917
Public educational expenditure	126	21.22203	34.73283	.9426302	114.1059

Source: Computed by Author(s) Using Stata 14, 2022

The average of credit market integration in the CEMAC zone is 50.2705 with an average deviation of 72.4533. The average of capital market integration in the CEMAC zone is 0.0635 with an average deviation of 0.106. The average of the aggregated financial integration index obtained by principal component analysis is 7.92e-10 with an average deviation of 1.0416. The control variables included in the study conform to the known stylized facts about CEMAC economies.

The pairwise correlation matrix presented above suggests that the aggregated financial integration index presents and expected positive link with financial development

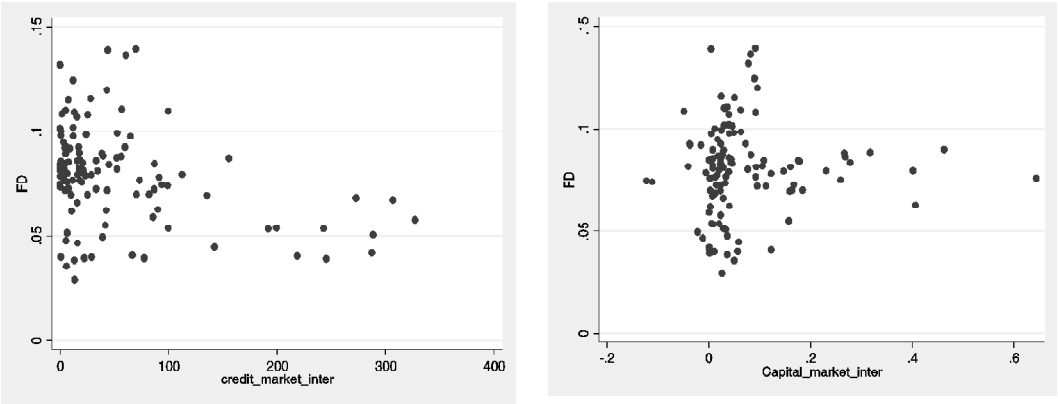

Figure 1: Fitted Scatter Plot on the Relationship Between Financial Integration and Financial Development in the CEMAC zone

Source: Computed by Author(s), 2022 Using Stata Version 14.0

Table 2: Correlation Analysis

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Financial Development(1)	1.0000										
Aggregate Financial Integration Index(2)	0.1201	1.0000									
Credit Market Integration(3)	-0.113	-0.736	1.0000								
Capital Market Integration(4)	0.0631	0.7366	-0.085	1.0000							
Inflation rate(5)	-0.142	0.1108	0.0358	0.2006	1.0000						
External balance(6)	0.1737	0.2007	-0.190	0.1037	0.0342	1.0000					
GDP growth rate(7)	0.0600	0.3755	-0.218	0.3470	0.1007	0.1522	1.0000				
Gross domestic fixed capital formation(8)	0.4049	0.2482	-0.270	0.0906	-0.013	-0.131	0.1736	1.0000			
Trade openness(9)	0.0982	0.0442	0.0560	0.1230	-0.119	0.1945	-0.219	0.3800	1.0000		
Population growth (10)	0.2962	0.2201	-0.126	0.2039	-0.001	0.3937	0.2372	0.3810	0.4984	1.0000	
Public educational expenditure(11)	0.1709	0.1862	-0.022	0.2472	0.2330	0.5044	0.3130	0.0123	0.1135	0.5520	1.0000

Source: Computed by Author(s) Using Stata 14, 2022

in the CEMAC zone. Credit market integration presents an expected negative with financial development in the CEMAC zone. Capital market integration presents an expected positive link with financial development in the CEMAC zone. The pairwise correlation matrix of the variables show that the leading diagonal correlation coefficients stands at 1.0000 implying each of the variables has a 1 by 1 relationship with itself. We note that none of the correlation coefficients is up to 0.75 indicating the absence of collinearity problems among the variables.

The fitted scatter plots on the relation between financial integration in terms of credit market integration and capital market integration suggests that credit market integration which showed signals of credit market segmentation has an apparent negative link with financial development in the CEMAC zone. We find again that capital market integration reveals a positive link with financial development in the CEMAC zone. We therefore ascertain the quantitative extent of these relationships in regression models.

4.2. Empirical Results

4.1.1. Full Sample Aggregate and Disaggregated Analysis on the Effects of Financial Integration on Financial Development

Table 3: Pooled OLS, The FE and the RE Regression Results

	(FE)	*(RE)*	*(Pooled OLS)*	*(FE)*
Variables	Financial Development			
Credit market integration			-4.06e-05	2.35e-05
			(3.08e-05)	(3.04e-05)
Capital market integration			0.0413*	0.0103
			(0.0238)	(0.0211)
Aggregated financial integration index	-0.000479	0.00507**		
	(0.00226)	(0.00234)		
Inflation rate	-0.000615	-0.00116*	-0.00120*	-0.000648
	(0.000532)	(0.000614)	(0.000623)	(0.000533)
External balance	-0.000122	0.000112	0.000115	-0.000146
	(0.000162)	(0.000115)	(0.000116)	(0.000164)
GDP growth	0.000203	-0.000204	-0.000191	0.000247
	(0.000266)	(0.000276)	(0.000279)	(0.000271)
Gross domestics fixed capital formation	0.000536**	0.000784***	0.000798***	0.000514**
	(0.000239)	(0.000179)	(0.000182)	(0.000240)
Trade openness	-0.0614***	-0.0272***	-0.0288***	-0.0604***
	(0.0146)	(0.00918)	(0.00998)	(0.0147)

contd. table 3

	(FE)	*(RE)*	*(Pooled OLS)*	*(FE)*
Population growth	-0.0104**	0.00564	0.00613	-0.0100**
	(0.00443)	(0.00353)	(0.00372)	(0.00445)
Public educational expenditure	-6.80e-05	9.66e-05	9.84e-05	-8.78e-05
	(0.000131)	(7.77e-05)	(7.81e-05)	(0.000133)
Constant	0.148***	0.0659***	0.0649***	0.145***
	(0.0157)	(0.00782)	(0.00846)	(0.0160)
Observations	115	115	115	115
R-squared	0.311		0.315	0.317
Number of id	6	6		6
	Post Diagnostic Tests			

Hausman chi2(8) =96.02 Prob>chi2 =0.0000; Breusch-Pagan LM test of independence: chi2(15) =31.744, Pr = 0.0070; Modified Wald test for groupwise heteroscedasticity chi2 (6) = 301.03 Prob>chi2 = 0.0000; Pesaran's test of cross sectional independence = -1.009, Pr = 1.6869 Average absolute value of the off-diagonal elements = 0.273

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Computed by Author(s) Using Stata 14, 2022

We note from the tests reported at the bottom of the table that the hausman test statistics is significant at the 1 percent level. This invalidates the reliability of the random effect model in favor of the fixed effect model results for inference. Further tests such as the Breusch-Pagan LM test of independence and the Modified Wald test for groupwise heteroscedasticity with significant tests statistics at the 1 percent levels invalidates the fixed effects model for inference.

In this study, we adopt the Pesaran (2004) and Pesaran (2015) cross sectional dependence test to check for the econometric problem of cross-sectional dependence within the panel. Chudik. *et al.* (2013) had explained that the presence of the problem of cross-sectional dependence is due to the interactions among the countries, and other unobserved factors. Therefore, failure to address the problem of cross-sectional dependence (CD) produce biased and inconsistent parameter estimates.

From our results, the CD test strongly rejects the null hypothesis of no cross-sectional dependence in our regression model. Although it is not the case here, a possible drawback of the CD test is that adding up positive and negative correlations may result in failing to reject the null hypothesis even if there is evidence of cross-sectional dependence in the errors. Including the abs, we get the average absolute correlation of the residuals. Here the average absolute correlation is 0.273, which is a very high value. Hence, there is enough evidence suggesting the presence of cross-sectional dependence

under a FE specification. We therefore properly estimate reliable parameter estimates based on the Panel VAR GMM, Feasible Generalized Least Squares (FGLS) and the Drisco/Kraay standard errors estimators that have the ability to eliminate such problems in econometric analysis.

Panel VAR analysis is established after choosing the optimal lag order in both panel VAR specification and the moment condition. Andrews and Lu (2001) had proposed consistent moment and model selection criteria (MMSC) for GMM models based on Hansen's (1982) J statistic of over-identifying restrictions as presented below.

Table 4: Panel VAR Lag Length Selection Criteria

lag	*CD*	*Hansen's J statistic*	*J pvalue*	*MBIC*	*MAIC*	*MQIC*
1	.941565	18.41912	.42838	-63.73914	-17.58088	-36.2388
2	.9527623	9.390803	.4020091	-31.68833	-8.609197	-17.93816
3	.9290157					

Source: Computed by Author(s), 2022

Based on the three model selection criteria proposed by Andrews & Lu, (2001), the smallest MBIC, MAIC and MQIC are at the first lag. Therefore, the first-order panel VAR model is preferred in this paper. The over-all coefficient of determination (CD) which captures the proportion of variation explained by the panel VAR model shows that 94.15 percent of variation is explained by the first-order panel VAR model. While we also want to minimize Hansen's J statistic, it does not correct for the degrees of freedom in the model like the model and moment selection criteria by Andrews and Lu (2001). Based on the selection criteria, we fit our first-order panel VAR model with the same specification of instruments being the lags of variables using GMM style as follows:

The panel VAR GMM estimates show that financial segmentation in the credit market of the previous year enhances financial segmentation in the credit market for the current year. This shows the importance of initial economic conditions for current financial integration. This is as it has been demonstrated earlier by Bolt (2010) as he argued the importance of initial conditions for the development process of emerging economies such as CEMAC countries as supported by the coefficient of GDP growth. In this respect, it is necessary to keep financial segmentation in the CEMAC credit markets at a minimum level, as an increase in financial segmentation in a given period will affect the level of financial integration in the next period negatively.

The results reveal that financial segmentation in the credit market of the previous year paradoxically enhances financial development for the current period. Looking at

Table 5: Panel VAR Estimates

	(1)	*(2)*	*(3)*	*(4)*
Variables	*A*	*B*	*C*	*D*
L. Financial Integration (A)	0.299*	-2.86e-05	4.46e-06	0.000105
	(0.172)	(1.83e-05)	(2.01e-05)	(0.000134)
L. Financial Openness (B)	-3,046***	0.524***	-0.202***	0.246
	(429.4)	(0.0655)	(0.0388)	(0.276)
L. Financial Development (C)	-4,893***	0.896***	0.167	4.104***
	(1,398)	(0.248)	(0.149)	(0.991)
L. GDP Growth (D)	425.4***	-0.00130	0.0379***	0.466***
	(110.8)	(0.0186)	(0.0104)	(0.0334)
Observations	90	90	90	90
Final GMM Criterion Q(b) = .482				
Initial weight matrix: Identity				
GMM weight matrix: Robust				
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Source: Computed by Author(s), 2022

the coefficient of financial development, it is negative showing that financial development is has negative implications on financial market segmentation. Therefore, improvements in financial development will enhances financial integration in the CEMAC region. These results agree with the recent study by Kendo *et al.*, (2022) who claimed that financial development slows the financial integration of MFIs, but for the transitory aspect of financial integration that financial development positively impacts financial integration of MFIs. The findings therefore suggest that, the CEMAC region will need to improve on the level of financial development to effectively integrate its credit markets. Global financial openness has the ability to decrease financial market segmentation in the CEMAC region but paradoxically decrease financial development. This therefore suggest that there is still greater need for CEMAC adopt global financial openness to effectively integrate its financial markets. This can be done through the attraction of foreign banks that will stir competition in the credit markets of the CEMAC region. This is as stated in the European Union financial action Plan for effective integration. This is also as noted by Ekpo, A., and C. Chuku (2017) in their AERC paper on financial integration and economic activity in Africa.

Table 6: The Feasible Generalised Least Squares and the Drisco-Kraay Results

	Aggregate Results		*Disaggregated Results*	
	(FGLS)	*(Drisco-Kraay)*	*(FGLS)*	*(Drisco-Kraay)*
Variables	**Financial Development**			
Credit market integration			-4.06e-05	-4.06e-05**
			(2.94e-05)	(1.31e-05)
Capital market integration			0.0413*	0.0413**
			(0.0227)	(0.0149)
Aggregated financial integration index	0.00507**	0.00507***		
	(0.00224)	(0.00119)		
Inflation rate	-0.00116**	-0.00116*	-0.00120**	-0.00120*
	(0.000590)	(0.000571)	(0.000595)	(0.000564)
External balance	0.000112	0.000112	0.000115	0.000115
	(0.000111)	(0.000159)	(0.000111)	(0.000159)
GDP growth	-0.000204	-0.000204	-0.000191	-0.000191
	(0.000265)	(0.000446)	(0.000266)	(0.000430)
Gross domestics fixed capital formation	0.000784***	0.000784**	0.000798***	0.000798**
	(0.000172)	(0.000290)	(0.000174)	(0.000291)
Trade openness	-0.0272***	-0.0272**	-0.0288***	-0.0288**
	(0.00882)	(0.00936)	(0.00953)	(0.0104)
Population growth	0.00564*	0.00564	0.00613*	0.00613
	(0.00339)	(0.00307)	(0.00355)	(0.00339)
Public educational expenditure	9.66e-05	9.66e-05	9.84e-05	9.84e-05
	(7.46e-05)	(9.42e-05)	(7.47e-05)	(9.33e-05)
Constant	0.0659***	0.0659***	0.0649***	0.0649***
	(0.00751)	(0.00580)	(0.00808)	(0.00690)
Observations	115	115	115	115
R-squared		0.288		0.315
Number of id	6		6	
Number of groups		6		6

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Computed by Author(s) Using Stata 14, 2022

The results are validated by adjusted R squares of 0.315 suggests that 31.5 percent of changes in the level of financial development in the CEMAC zone is due to joint variations in the financial integration and the other control variables included in the model of this study. The results are further validated by the F statistics of 24.72 with p

value of 0.0013 indicates that the Drisco-Kraay model is significant at the 1 percent level and thus, the model coefficients estimated is 99 percent reliable for policy inference. We therefore proceed to interpret the regression coefficients in the lines that follows.

The results presented indicates that the aggregated financial integration index positively and significantly enhance financial development in the CEMAC zone. The results on a quantitative extent suggests that a percentage increase in financial integration will enhance financial development in the CEMAC zone by 0.00507 percent, significant at 1 percent. The disaggregated components of financial markets integration in terms of credit market integration and capital market integration indicates that credit market integration variable which showed signs of credit market segmentation has a negative and significant effect on financial development in the CEMAC zone. On a quantitative point of view, we note that a 1 standard deviation decline in credit market segmentation will enhance financial development in the CEMAC zone by 0.00294 percentage points (4.06e-05*72.4533), that is coefficient multiplied by its standard deviation. This is significant at the 5 percent level. Therefore, the more the credit markets of the CEMAC zone are segmented, the lower will be the level of financial development. The coefficients are in agreement with theoretical expectations.

The financial integration variable in terms of capital market integration shows that improvements in capital market integration significantly improves on the level of financial development in the CEMAC zone. A percentage increase in capital market integration has the ability to enhance financial development in the CEMAC zone by 0.0413 percentage points. This coefficient is statistically significant at the 5 percent level of significance. On the bases of this, we reject the null hypothesis and conclude that financial integration has a significant role to play on the level of financial development in the CEMAC zone.

The control covariates such as the inflation rate, the GDP growth rate, and trade openness have negative implications on the level of financial development in the CEMAC zone. The coefficients for the inflation rate and trade openness are significant at the 1 percent and 5 percent levels of statistical significance. This result suggests that increase in the inflation rate and increase in trade openness have the ability to significantly deteriorates the level of financial development in the CEMAC zone. This is in line with theoretical expectations.

The findings for the other control variables such as external balance on goods and services traded, gross domestic fixed capital formation, population growth and public educational expenditure have positive effects on the level of financial development in the CEMAC zone. The coefficients for gross domestic fixed capital formation and population growth rate are statistically significant at the 1 percent and 5 percent levels of significance respectively. These results show that percentage improvements in

domestic investments and increase in the rate of growth of population in the CEMAC zone will significantly improve on the level of financial development in the CEMAC zone by 0.000784 and 0.00564 percentage points respectively.

As earlier mentioned in the methodology section, the financial development index is constructed from financial development in both financial institutions and financial markets in terms of depth, access and efficiency. Therefore, the effects of financial integration on financial development in the CEMAC zone can be disaggregated as presented below.

Table 7: Disaggregated Financial Development Results

Variables	*(FD) Institutions*	*(FD) Markets*	*(FD) Institutions*	*(FD) Markets*
Aggregated financial integration index	0.00969***	0.000299		
	(0.00229)	(0.00153)		
Credit market integration			-8.38e-05**	3.82e-06
			(2.64e-05)	(3.58e-06)
Capital market integration			0.0734*	0.00789
			(0.0347)	(0.0226)
Inflation rate	-0.00175	-0.000527***	-0.00180	-0.000557***
	(0.00109)	(0.000106)	(0.00103)	(0.000134)
External balance	0.000197	2.42e-05	0.000201	2.68e-05
	(0.000331)	(4.96e-05)	(0.000325)	(4.90e-05)
GDP growth	-0.000167	-0.000235	-0.000151	-0.000225*
	(0.000761)	(0.000126)	(0.000750)	(0.000109)
Gross domestics fixed capital formation	0.00124*	0.000299**	0.00126*	0.000310**
	(0.000519)	(8.82e-05)	(0.000510)	(0.000101)
Trade openness	-0.0696**	0.0160**	-0.0716**	0.0148*
	(0.0205)	(0.00465)	(0.0220)	(0.00632)
Population growth	0.0123*	-0.00117*	0.0129*	-0.000805
	(0.00596)	(0.000545)	(0.00625)	(0.000809)
Public educational expenditure	0.000343	-0.000153**	0.000345	-0.000151**
	(0.000197)	(4.06e-05)	(0.000199)	(4.14e-05)
Constant	0.134***	-0.00392	0.133***	-0.00490
	(0.00917)	(0.00300)	(0.0115)	(0.00307)
Observations	115	115	115	115
R-squared	0.281	0.496	0.309	0.496
Number of groups	6	6	6	6

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Computed by Author(s) Using Stata 14, 2022

The findings on table 7 are the disaggregated financial development dependent variable results. The findings show that, when we use the sub-indices of financial development such as financial development in institutions and financial development in markets in terms of depth, access, and efficiency, the coefficient of the aggregated financial integration index which measures the quantitative extent of financial integration in both credit markets and capital markets remains positive in influencing the level of financial development both in institutions and financial markets. Worth noting is the fact that the results are not significant on financial development in financial markets. At the same time, the coefficient of capital market integration also remains positive in influencing the level of financial development both in institutions and financial markets but not significant on financial development in financial markets. The results confirm that financial integration is a leeway to enhancing financial development in the CEMAC zone.

The results of the credit market segmentation show that credit market segmentation has an inhibiting effect on financial development in financial institutions but paradoxically has a positive effect on financial development in financial institutions, but credit market segmentation is negative and not significant in influencing financial development in financial markets. This study can therefore claim that segmented credit markets are responsible for the low levels of financial development in the CEMAC zone. We ascertain the quantitative extent to which enhancement in credit market integration will enhance financial development. As such, we use the standard deviation by multiplying it with this coefficient and indicate that, a one standard deviation decline in credit market segmentation in the CEMAC zone will enhance financial development in financial institutions by 0.00607 (8.38e-05*72.4533) percentage points. A fundamental conclusion here is that financial integration significantly affects financial development in financial institutions but has no significant effect on financial development in financial markets of the CEMAC zone.

4.3. Sub Sample Results on the Effects of Financial Integration on Financial Development

The Fragile State Index (FSI) focuses on the indicators of risk to measures fragility, such as demographic pressures, refugees and IDPs. Base on the Ohio Rapid Prototyping Consortium (ORPC, 2021), CEMAC member countries classified as fragile (risky) include Central Africa Republic, Congo, and Guinea. Therefore, Cameroon, Chad, and Gabon are less fragile (risky) countries in the CEMAC zone. Based on this classification, we obtain the following regression results.

Table 8: Sub Sample Results on the Effects of Financial Integration on Financial Development

	Less Fragile States		*More Fragile States*	
	(1)	*(2)*	*(1)*	*(2)*
Variables	Financial Development			
Aggregated financial integration index	0.00642			-0.00122
	(0.00741)			(0.00100)
Credit market integration		-2.04e-05		-3.43e-05
		(4.45e-05)		(2.87e-05)
Capital market integration		0.173		-0.00321
		(0.128)		(0.00522)
Inflation rate	-0.000230	-0.000240	-0.00254*	-0.00294*
	(0.000290)	(0.000294)	(0.000669)	(0.000756)
External balance	0.000431**	0.000424**	0.000536	0.000462
	(9.22e-05)	(9.45e-05)	(0.000323)	(0.000266)
GDP growth	-0.000333	-0.000334	-0.000422	-0.000336
	(0.000268)	(0.000265)	(0.000542)	(0.000508)
Gross domestics fixed capital formation	0.00114*	0.00114*	0.00151**	0.00140***
	(0.000272)	(0.000275)	(0.000204)	(0.000138)
Trade openness	-0.00981	-0.0103	-0.0838	-0.0784
	(0.00457)	(0.00426)	(0.0506)	(0.0443)
Population growth	-0.00478	-0.00421	-0.00356	-0.00414
	(0.00474)	(0.00490)	(0.00550)	(0.00566)
Public educational expenditure	-8.96e-05	-9.17e-05	0.000546	0.000559*
	(6.23e-05)	(6.14e-05)	(0.000203)	(0.000167)
Constant	0.0790**	0.0793**	0.0986*	0.0941**
	(0.0122)	(0.0117)	(0.0249)	(0.0212)
Observations	60	60	55	55
R-squared	0.461	0.463	0.440	0.485
Number of groups	3	3	3	3

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Source: Computed by Author(s) Using Stata 14, 2022

We note from the regression coefficients that the aggregated financial integration index has positive role on the level of financial development for less fragile states in the CEMAC zone but exerts a negative influence on the level of financial development for more fragile states in the CEMAC zone. This result leads this study to claim therefore

that, financially integrating economies that are subject to risk such as demographic pressures, refugees and IDPs will inhibit the level of financial development.

We note from the coefficient of credit market segmentation that credit market segmentation inhibits financial development both in fragile and less fragile states of the CEMAC zone within the study period. Comparing the coefficients, we can note specifically that the magnitude of the coefficient is stronger in more fragile states compared to less fragile states of the CEMAC zone. This shows that the financial development inhibiting effect of credit market segmentation is stronger for more fragile states of the CEMAC zone. therefore, a reduction in states fragility in the CEMAC zone will reduce credit market segmentation and hence, financial development.

The coefficient of capital market integration is positive for less fragile states but negative for more fragile states in the CEMAC zone. This particular result leads this study to claim that capital market integration is a tenable leeway to improve on financial development in less fragile states of the CEMAC zone as compared to more fragile states. Though, statistical and economic significance do not always coincide, we ascertain the economic and quantitative extent of the positive effect of financial integration on financial development in the CEMAC zone. Despite the statistical insignificance of the coefficients for the financial integration variables, there are differences in coefficients of the financial integration variables across fragile and less fragile states of the CEMAC zone. As such, we claim that state fragility matters in the relation between financial integration and financial development in the CEMAC zone.

On the effects of financial integration on financial development, this study has highlighted that the aggregated financial integration variable and the sub index for capital market integration positively affects financial development, while credit market segmentation is seen to paradoxically enhances financial development in the CEMAC zone. These results agree with the recent study by Kendo *et al.* (2022) who claimed that financial development slows the financial integration of MFIs, but for the transitory aspect of financial integration that financial development positively impacts financial integration of MFIs. The findings therefore suggest that, the CEMAC region will need to improve on the level of financial development to effectively integrate its credit markets.

Also, the fact that financial integration inhibits financial development could be argued by the fact that financial integration has its cost given that cross-border financial activity also brings risks, including adverse spillovers if there is insufficient official absorptive capacity necessary to overshadow the costs. This is especially true in the CEMAC zone with fragile economies and weak institutions which less absorptive to the shocks that come from financial integration. Therefore, for CEMAC member countries to actually benefit from the positive results from financial integration, necessary preconditions such as high levels of economic development, institutional quality, financial

development, low levels of unemployment, and or price stability are required. Therefore, the costs of financial integration can bring negative consequences on the level of financial development in the CEMAC zone.

The finding that aggregated financial integration variable and the sub index for capital market integration enhances financial development in the CEMAC zone is in line with those of Luc *et al.* (2017). This can be argued by the fact that increasing financial openness which will attract foreign banks, enhance cross-border information sharing, and macro-prudential policies, without which, the risks of financial integration can outweigh the benefits by undermining the resilience and stability of financial systems in the CEMAC zone (Ekpo & Chuku, 2017). Also, financial integration is likely to increase the depth of financial markets leading to greater market liquidity which enhances the possibilities to buy and sell securities which increases with the arrival of new players and new instruments.

This result leads this study to claim that, financially integrating economies that are subject to risk such as demographic pressures, refugees and IDPs, will inhibit the level of financial development. This may be so because fragile states have received less aid, relative to their needs and absorptive capacity, than most developing countries in the African region. Also, interest rate spread is higher in fragile states than in less fragile states, as such market segmentation is higher in fragile economies than in less fragile economies, as a result, the volatility/instability in the level of financial integration is greater in fragile states (AfDB, 2021). By enforcing competition in the CEMAC region, tighter interest rates can be achieved, this has the ability to enhance the process of financial development and subsequently, financial integration.

5. CONCLUSION AND POLICY SUGGESTION

In this paper, we started by asking an important question, does state fragility matters in the link between financial integration and financial development? We endeavor to answer this question by carefully specifying regression equations for estimation. We specifically implemented the Panel VAR GMM, Feasible Generalised Least Square, and the Drisco-Kraay Standard Errors regression models to unmasked the question if state fragility matters in the link between financial integration and financial development.

The results showed that improvements in financial development enhances financial integration in the CEMAC region. Again, state fragility reduces the potential for financial development and financial integration in the CEMAC sub region. The poorly developed financial architecture in the CEMAC region is accountable for by the fragility of the states. We noted that after controlling for macroeconomic fundamentals such as GDP growth, trade openness, inflation rate, unemployment rate, the relation still remains valid and significant. Global financial openness appeared to inhibit financial development

in less fragile states but enhances financial development in fragile states. We implied that less fragile states will need a reduction in fragility, measured in terms of a reduction in demographic pressures, refugees and IDPs, to enhance financial development.

We concluded that state fragility matters in the relation between financial integration and financial development, and as such, macroeconomic fundamentals such as GDP growth, inflation rate, unemployment rate, and trade openness matter for state fragility and state fragility equally matters much more for macroeconomic fundamentals in the CEMAC region. Given that the extent to which the financial system could act as a stabilizer to absorb shocks depends on the degree of financial integration and financial development, we suggest taking a practical approach to resilience, such as fostering social cohesion and state formation, and enhancing security in the CEMAC region and throughout Africa. This will enhance competition in the financial markets and hence improve of financial integration and financial development in the CEMAC region as it gives the leeway for more robust domestic financial institutions to be developed.

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