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Joint Effects of Systemic Risks and Regional Financial Contagion on Economic Growth in Middle Africa

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ABSTRACT
This study seeks to examine the joint effects of credit financial contagion and systemic risks arising from continental financial integration on Economic growth, and the likelihood of spill-over effects resulted from regional financial connections which are products of the rapid increase in monetary aggregates such as the volume of private sector credit within the middle African Sub-region. The study utilizes secondary data on Real Gross Domestic Product (RGDP) as a dependent variable, Volume of private sector credit ratio of GDP, Credit expansion which is measured as financial Volatility and trade openness as a control variable. Analysis was made based on panel unit-root test conducted on Levin, Lin and Chu frame-work, Fully Modified Ordinary Least Squares, Pedroni Panel cointegration test, Panel Granger Causality test and Cross-sectional dependence analysis. Results from these test revealed a serious contagious effect of Macroeconomic shocks transmitted across the Middle African Sub-region. It is therefore suggested that increase in monetary aggregates in one Economy within the Middle African Sub-region should be intensively monitored to mitigate the likelihood of spill-over effects of Macroeconomic shock which is detected to be easily transmitted across the middle African Sub-region.
Keywords: Systemic Risks, Regional Financial Contagion, Macroeconomic Shocks, Economic Growth. Middle-Africa.

INTRODUCTION

It has been widely acknowledged in the financial economics literature that the availability of credit to the productive private sector has a positive and significant impact on the growth of both developed and developing economies, theoretical and empirical proves to the notion on the credit growth nexus include Ranciere (2002). The argument on rapid expansion of credit is theoretically and empirically verified to be a potential source of vulnerability of financial sector to shocks which can be transmitted to other Economies and which adversely affect Economic growth.

It is pertinent to note that while increase in the availability of credit to the productive private sector is a key to Economic growth, financial economics literature holds that increase in the supply of private sector credit always precede the episode of financial vulnerability which lead to financial crises and Economic growth slow-down (See Yilderim, Ozdemir and Dogan, 2013). Other scholars lend to this argument and justified the assertion that rapid increase in financial aggregates always increases the vulnerabilities of financial system to Macroeconomic shock which culminates into financial instability and crises. It is against this background that this study seeks to explore the dynamic connection between the expansion of

private sector credit and economic growth as a potential source of Macroeconomic vulnerability and the extent to which shocks can be transmitted within the middle African Sub-region.

LITERATURE REVIEW

Various studies were conducted on the connection between expansion of private sector credit and economic growth while considering the adverse effect of credit expansion and the shocks arising from increase in the volume of private sector credit and the vulnerability of the financial sector to shocks which lead to financial instability and economic growth slow-downs.

Ranciere & Tornell (2004) investigates the effects of financial volatility on economic growth in countries that experience occasional financial crisis and economies with stable financial conditions within a sum of eighty-three (83) developed and emerging economies for the periods 1960-2000. Estimating the impact of systemic crisis on economic growth using pooled generalized least squares and a dynamic general method of moment procedure. This research work indicates that typical crisis is preceded by lending booms as demonstrated by the boom-burst cycle which generates low economic growth.

Studying the decomposing effects of financial development on financial fragility, Ranciere, Tornell & Westremann (2006) analyses the relationship between financial development and financial fragility. Their empirical estimates revealed that even though financial development has led to faster long-run growth, financial development also lead to financial fragility and a greater incidence of financial crisis. Jeanneney & Kpodar (2011) also lend to this findings as they added that financial development which always accompanies financial instability detrimental to economic growth.

Providing a cross-country and cross-bank analysis of the determinants of financial crisis, Caprio et-al (2014) studies the Macro-financial determinants of the great financial crisis using data on eighty-three (83) countries from 1998 to 2006. Dividing their analysis into two broad phases, first; across country conducted by running cross-country regression on the determinants of the probability that economies experience financial crisis in 2008 based on several porbit model estimates and, second; cross bank analysis based on a standard porbit model to ascertain the probability of bank crisis in the 83 economies. Results from cross country analysis revealed the probability of suffering the great 2008 financial crisis was larger for countries having higher level of credit ratio and lower for countries characterized by higher level of net interest margin, higher concentration in the banking sector and higher level of restrictions to banking activities.

Studying the dynamic effects of financial structure on banking fragility, Parros (2009) used panel data regression and principal component indicators for two-hundred and eleven (211) countries between the periods 1990-2003. Findings from this study posit that fragility enhancing effect is found only when financial structure is taken into account. It further suggests that financial structure and economic growth jointly matters for assessing banking fragility.

Jaramillo et-al (2010) studies the dynamic risk, financial contagion and financial fragility. To capture the essential element needed to analyze systemic risks into two components namely; initial shock and systemic distress, they employed Counterfactual Simulation Model (CSM) which allows the investigation of different aspects of systemic risk. This research work revealed that a random shock weakens few financial institutions which probably exert contagious negative effect on the rest of financial institutions within the system. Financial fragility according to Bhadura (2010) develops in a modern financial system as a result of the strive for short term profits by financial institutions. He added that financial fragility has its root from economic prosperity evidenced by the presence of a developed financial sector which subsequently paved ways for financial crises and financial meltdown. The findings of Fudaka & Dahalan (2011) also examine finance-growth-crisis nexus in three economies (India, Indonesia and Mexico) through the system based analysis of cointegration and Lagrange multiplier endogenous break tests. Their result suggested that while the direction of causality between finance and economic growth remains country specific, the increasing level of financial development was reported to have significantly caused financial crisis, they further reported that financial development is the strongest factor leading to financial fragility.

DATA AND METHODOLOGY

This study utilizes secondary data in the form of annual series data sourced from Global Financial Development (GFD) compared with data from World Development Indicators (WDI) for reliability and objectivity. It covers five (5) Middle African Countries for a period of thirty-one years (1987-2018) which is in conformity with central limit theorem.

Variables Measured include Real Gross Domestic Product (RGDP) as a dependent variable, volume of private sector credit ratio of GDP, Financial Volatility as a proxy for credit expansion which is measured as the standard deviation of the growth rate of the volume of private sector credit and trade openness as a control variable.

The following model is specified to capture the connections between credit Expansion financial vulnerability and economic growth in Middle Africa

$RGDP_t=\beta 1PSEL_t+\beta 2CREX_t+\beta 3TOPS_t+\mu_t$……..…….(1)

Where RGDP is Real Gross Domestic Product, a proxy for economic growth, PSEL is the volume of private sector credit, CREX is the proxy for credit expansion and TOPS is trade openness, β1,β2 and β3 are the coefficients of the estimated parameters of the variables in equation (1) and μ is the stochastic disturbance term and t_s represents time trend.

To satisfy stationarity of series data unit root test is conducted based on the Levin, Lin and Chu frame-work as presented in the next section of the paper, it is followed by a Fully Modified Ordinary Least Squares (FMOLS), Pedroni Panel Cointegration Analysis to examine the presence or otherwise of a long-run association between the variables of interest, Panel Granger Causality and Cross-Sectional Dependence Analysis to explore the extent to which Macroeconomic shocks can be transmitted across the middle African Sub-region.

Results and Discussion

This section presents the result of analysis conducted, it began with the conventional unit-root analysis which is reported in table 1

Table 1: Unit Root Test (Middle Africa)

Variables	Level Value	Diff. Value	Prob.	Conclusion
LRGDP	1.08545	-4.67377***	0.0000	**I(1)**
LPSEC	**-0.66074**	**-11.1016*** **	**0.0000**	**I(1)**
LCREX	**-0.58200**	**-11.4123*** **	**0.0000**	**I(1)**
LTOPS	**-2.29919**	**-10.8158*** **	**0.0000**	**I(1)**

Source: Author's Computation using EVIEWS 9.

***,**,*, Indicates level of significance at 1%,5% and 10% respectively.

Table 1 presents the results of Levin, Lin and Chu Panel Unit-root test of the panel of middle African for the variables LRGDP, LPSEC, LCREX and LTOPS for the period of analysis (1987-2018). Panel unit-root test for this Panel revealed a level value of 1.08545, -0.66074, 0.58200 and -2.29919 for LRGDP, LPSEC, LCREX and LTOPS respectively. This shows that the variables are not stationary at levels and that the variables have unit-root. these variables became stationary after taking their first difference as DLRGDP, DLPSEC, DLCREX and DLTOPS have the coefficients of -4.67377, -11.1016 , -11.4123 and -10.8158 respectively, with a corresponding probability values of 0.0000 statistically significant at 1% and the variables are concluded to be integrated of order one I(1).

Next is the result of Fully Modified Panel cointegration analysis which is performed to explore the presence of a long-run association between credit expansion, macroeconomic shocks and Economic growth in Middle Africa as reported in table 2.

Table 2: FMOLS Panel Cointegration Regression Results for Middle Africa

Variables	Coefficients	Statistics	P-Values
Dependent Variable: Log of Real GDP (LRGDP)			
LPSEC	1.06E+09	1.023176*	**0.0079**
LCREX	9.85E+08	0.973301	**0.0351**
LTOPS	59741053	1.877493	**0.0624**
R^2	0.573901		
Adjusted R^2	0.553610		
L/Run Variance	**4.30E+19**		

Source: Author's Computation using E-Views 9.

***,**,*, Indicates level of significance at 1%,5% and 10% respectively.

The results of Fully Modified Least Squares (FMOLS) panel cointegration regression in table 2 Indicates that the Log of RGDP is the dependent variable, the Log of Private Sector Credit (LPSEC) as a proxy for financial development has a positive and statistically significant coefficient of 1.06 with a corresponding probability value of 0.0079 which is significant at 10%. Log of financial fragility (LCREX) has a positive and not statistically significant coefficient of 9.85 which is not statistically significant. LTOPS has a coefficient of 5.97 which is also not significant. However, the joint effects of the explanatory variables (LPSEC, LCREX and LTOPS) on the dependent variable (LRGDP) as shown by the computed R^2 are 0.573 with an adjusted R^2 value of 0.553.

Result of Pedroni Panel Cointegration analysis is presented in table 3

Table 3: Results of Pedroni Panel Cointegration Middle Africa

Functions	Statistics	Weighted Statistics	P-Values
Panel ADF	0.16081	0.53039**	**0.0072**
Panel PP	0.12151	0.41034*	**0.0081**
Panel V	-0.0419	-0.36835*	**0.0064**
Panel rho	0.8520	1.02141**	**0.0028**

Source: Author's Computation using E-Views 9.

***,**,*, Indicates level of significance at 1%,5% and 10% respectively.

Table 3 presents the result of Pedroni residual cointegration test for the panel Middle Africa. The result indicates the values of Panel ADF of 0.16801, Panel PP value of 0.12151, the function of the Panel V is -0.0419 and Panel Rho statistics is 0.8520 and their weighted statistics is 0.53039, 0.41034, -0.36835 and 1.02141 respectively, with the corresponding p-values of 0.0072 for panel ADF which is significant at 10%, panel PP has a corresponding P-Value of 0.0081 significant at 10%, the weighted t-statistics for Panel V also correspond to a P-Value of 0.0064 significant at 10% and Rho Weighted statistics has 0.0028 as its P-Value which is statistically significant at 5%.
Table 4 present the results of panel granger causality analysis as shown below.

Table 4: Results of Panel Granger Causality test Middle Africa

Null Hypothesis	Lags	Obs.	F-statistics	P-Value
PSEC does not Granger Cause RGDP	2	150	0.76190	**0.4686**
RGDP does not Granger Cause PSEC	2	150	11.1846	**3.E-05**
CREX does not Granger Cause RGDP	2	150	0.71926	**0.4888**
RGDP does not Granger Cause CREX	2	150	14.2103	**2.E-06**
TOPS does not Granger Cause RGDP	2	150	0.43561	**0.6477**
RGDP does not Granger Cause TOPS	2	150	0.24048	**0.7866**
CREX does not Granger Cause PSEC	2	150	5.23568*	**0.0064**
PSEC does not Granger Cause CREX	2	150	2.48417	**0.0869**
TOPS does not Granger Cause PSEC	2	150	0.29151	**0.7476**
PSEC does not Granger Cause TOPS	2	150	2.59889	**0.0778**
TOPS does not Granger Cause CREX	2	150	0.36509	**0.6948**
CREX does not Granger Cause TOPS	**2**	**150**	**1.95772**	**0.1449**

Source: Author's Computation using E-Views 9.
***,**,*, Indicates level of significance at 1%,5% and 10% respectively.

Table 4 shows the results of Pairwise panel granger causality test for the Middle African sub-region which includes 150 observations within the 5 cross-sections over the period of analysis (1985-2016). The results indicate that there is no causal relationship between PSEC and RGDP with F-Statistics 0.76190 and a probability value of 0.4686 which is not statistically significant even at the weakest 10% level. CREX does not Cause RGDP with an F-Statistics of 0.71926 and a corresponding P-Value of 0.4888. The null hypothesis of RGDP does not Cause CREX is accepted as the relationship has an F-Statistics of 0.43561 and a corresponding P-Value of 0.6477 which is not statistically significant. The null hypothesis of RGDP not causing TOPS is accepted as the F-Statistics is 0.24048 with corresponding probability value of 0.7866 which is not significant. The Causal relationship between CREX and PSEC indicates an F-Statistics of 5.23568 and 2.48417 with corresponding P-Values of 0.0064 and 0.0869 suggesting that there is one-way causal relationship between CREX and PSEC. Moreover, the causal relationship between TOPS and PSEC has F-Statistics of 0.29151 and 2.59889 on the other way with corresponding P-Values of 0.7476 and 0.0778 which are not statistically significant. The null hypothesis of no causation between TOPS and CREX is accepted as the F-Statistics is 0.36509 and 1.95772 with corresponding P-values of 0.6948 and 0.1449 which are not statistically significant.

Cross-Sectional dependence test is conducted to appreciate the extent to which effects of credit expansion can be transmitted across the middle African Sub-region as reported in table 5

Table 5: Cross-Sectional Dependence Test (Middle Africa)

Variables	Breusch-Pagan	Pesaran scaled	P-value
LRGDP	274.7160***	59.19230***	**0.0000**
LPSEC	154.2297***	32.25073***	**0.0000**
LCREX	150.2217***	31.35453***	**0.0000**
LTOPS	**40.81224*** **	**6.889825*** **	**0.0000**

Source: Author's Computation using E-Views 9.

***,**,*, Indicates level of significance at 1%,5% and 10% respectively.

Table 5 presents the result of Cross-sectional dependence test for the panel of Middle Africa which is indicated based on comparism of Breusch-Pagan and Pesaran Scaled tests of cross-sectional dependence. It indicates that LRGDP has a coefficient of 274.7160 and 59.19230 based on Breusch-Pagan and Pesaran Scaled and all are significant at 1%. PSEC also indicates statistically significant coefficients of 154.2297 and 32.25073 which are also significant at 1%. FIVOL has a coefficient of 150.2217 and 31.35453 based on Breusch-Pagan and Pesaran Scaled which are also significant at 1%. Results of cross-sectional dependence test on TOPS revealed a coefficient of 40.81224 and 6.88983 also significant at 1%. Results from these tests revealed the contagious effect of shocks within the Middle African sub-region.

CONCLUSIONS

The study intends to explore the connections between credit Expansion, Macroeconomic Vulnerabilities and Economic Growth in Middle Africa, Based on panel unit-root test conducted on Levin, Lin and Chu frame-work it was found that the variables are integrated of the first order I(1), Fully Modified Ordinary Least Squares, Pedroni Panel cointegration test indicates that there is a long-run association between credit expansion macroeconomic vulnerabilities and Economic growth in Middle Africa which is significant at 5%, Panel Granger Causality reveal no causation between the variables of interest while Cross-sectional dependence analysis revealed that macroeconomic shocks are transmitted across the middle African region at a statistical significance of 1%. In conclusion, Results from these tests revealed a

serious contagious effect of Macroeconomic shocks transmitted across the Middle African Sub-region. It is therefore suggested that increase in monetary aggregates in one Economy within the Middle African Sub-region should be intensively monitored to mitigate the likelihood of spill-over effects of Macroeconomic shock which is detected to be easily transmitted across the middle African Sub-region.

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