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Financial Development and Growth Nexus in West Africa: A Dumitrescu-Hurlin Panel Granger Causality Approach

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Abstract:

The relationship between financial development and economic growth has been extensively discussed in economics literature. Most of the studies on the subject are on country level or time series studies. The focus of this paper is on the West African region, inclusive of only countries with policy and currency independence. Thus we examined the causal relationship between financial development and growth in the region. The results provided no evidence of causality between growth, private sector credit, trade openness and foreign direct investment. There is however a unidirectional causality running from money supply to growth. The cointegration test results revealed that there is a long-run relationship between growth and the regressors. The result has policy implication as it is shown that broad money is critical in predicting future growth. Therefore, we recommend that fiscal and monetary policy actions should be coordinated in order to effectively meet the liquidity need of the economies of the region.

Key words: Financial Development, Economic growth, Granger Causality.

I INTRODUCTION

An efficient financial system provides an enabling environment for economic growth and development. Financial system is comprised of financial institutions and markets that play major role in promoting economic growth through various channels. This very aim is realized through the intermediary roles of both banking and non-banking financial institutions, which underlie strict policies that regulate and guide the operations of such institutions. Financial innovation and intermediation enhance financial development mechanism. Financial intermediaries acquire fund in the form of deposits, premiums, financial claims etc, and transform the funds so acquired into assets that are attractive and preferred by the public. This way, financial intermediaries perform the economic functions of (i) providing maturity transformation, (ii) reduction of risk through diversification, (iii) cutting of cost of contracting as well as information processing, and (iv) provision of payment mechanism. The above economic functions propel financial development as funds are effectively transferred from net savers to the investors. In a competitive banking sector, as explained by Carbo *et al.*, (2003), borrowing rates are higher while lending rates are lower, thus the transformation of household savings into productive capital investment is faster.

Availability of investible funds thus stimulates economic growth by increasing the level of economic activities hence real output. Schumpeter (1911) argues that financial services provided by financial institutions are critical drivers of innovation and growth.

The theoretical and empirical discourses on finance and economic growth nexus have emphasized importance of financial development as a critical factor in enhancing the amount of capital and therefore economic growth. However, the relevance of finance to growth has always been vigorously

contentious. Traditional growth models, notably the neoclassical model developed by Solow (1956), have undermined the role of financial development. Solow's growth model otherwise known as exogenous growth model was founded on the premise that technical progress is the key determinant of growth and is independent of funding or finance. In essence, technical progress is exogenous, and changes in savings and the financial system were not factored into the growth model. The fallout from the Solow's growth model has over the years prompted empirical studies on finance-growth relation to determine the responsiveness of economic growth to the financial system, and the roles of key components of financial system like the banking system and stock markets in promoting growth.

The endogenous growth model however considers technical progress as important but endogenous, and therefore recognized funding as crucial and the financial system as key to stimulating growth (Khalil, 2014). Simwaka, Munthali and Chiumia (2012) posit that the endogenous growth literature portrays the significance of financial development for long-run economic growth highlighting the impact of financial services on capital accumulation and technological innovation. Lending credence to the role of finance in engineering growth, Sahay (2015) buttress that financial development increases a country's pliability and boosts economic growth through savings mobilization, provision of information about investment, and efficient resource allocation , effective corporate control, and the facilitation of risk diversification and management.

Financial system has always played a major role in supporting economic activity. Obviously, all developed countries have one thing in common and that is a developed financial system (Nguena and Abimbola, 2013). The Central bank of Nigeria (CBN) over the years has continued to put in place action plans geared towards promoting sustainable economic

growth. Since 1986, the monetary authorities have adopted various measures with the aim of deepening the financial system and reducing the level of financial repression embedded in the system (Nzotta and Okereke, 2009).

This effort stems from monetary policies to adequate regulation and supervision of the Nigerian financial system. But, mastering the key drivers of growth is critical to understanding the mechanism and interrelationship between finance and growth. This is very important since such knowledge will have significant regulatory and policy implications. Nigeria has a long history of financial reforms which were at different staged introduced with the aim of fostering economic development. Hence this study adopts broader measures of financial development while employing various novel econometric techniques to assess both causation and nature of relationship existing between finance and growth. The study also extended the coverage to 35 years period, spanning 1981 to 2014.

II LITERATURE REVIEW

Financial development is defined as a combination of depth (size and liquidity of financial markets), access (ability of individuals to access financial services), and efficiency (ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets). Financial development promotes financial stability, and enables deep and liquid financial systems with diverse instruments cushion the impact of shocks. Like the law of diminishing return, there is a point beyond which the benefits of financial development begin to decline and costs start to rise (Sahay *et al.*, 2015).

The quest to ascertain the nature of relation between finance and growth has been on the front burner of economic debate. Some studies establish a *supply-leading hypothesis* where finance is believed to drive economic growth, whereas some other empirical investigations suggested a *demand-following hypothesis*, in which case economic growth precedes finance. Some studies have argued that there is a feedback response (or bidirectional causality) from growth to finance, and from finance to growth hence rejecting the postulations of a unidirectional causation between finance and growth. Also contended in the literature is whether the association between finance and economic growth is long-run or short-run. An overriding consensus thus far seems unrealistic as the characteristic that define the natures of such linkage is both country and region specific. Atemnkeng, Njong and Neba (2011) explain that financial sector development and efficiency determine the direction of causality. They argue that growth is most likely causal for finance in the developed countries whereas the reverse becomes the case for developing countries. Unlike the developed countries, information asymmetry, poor risk diversification and management, and high cost of contracting characterize the financial system in developing countries. If this argument should stand then one can explicitly infer that economic growth promotes financial development in developed countries while the reverse is the case for developing countries like Nigeria. According to Ardic and Damar (2006), evidence suggests that the connection between financial development and economic growth may vary under adverse financial sector conditions compared to well-functioning financial intermediaries. Arestis (2005) maintains that in a more complicated financial sector, finance is usually endogenous and responds to demand.

We may well have the need now to review existing empirical literatures and explore their lines of argument. Caporale *et al.,* (2009) examined the relationship between financial development and economic growth in ten new EU members by estimating a dynamic panel model over the period 1994-2007. The evidence suggests that the stock and credit markets are still underdeveloped in these economies, and that their contribution to economic growth is limited owing to a lack of financial depth. Granger causality test indicate that causality runs from financial development to economic growth, but not in the opposite direction.

Adu, Marbuah and Mensah (2013) investigated the long-run growth effects of financial development in Ghana and found that both the credit to the private sector as ratios to GDP and total domestic credit have positive effect on growth, while growth appears to be insensitive to broad money supply to GDP ratio.

Kang and Liu (2008) explored the relationship between financial development indicators and economic growth in India and Taiwan over the period 1997–2005. The study respectively discussed and compares the determinants of economic growth in India and Taiwan as well as the effect of financial development on economic growth in both countries. The results of the multiple regression indicate that broad money stock and stock market value have positive effects on growth in India and Taiwan.

Ngongang (2015) applied the dynamic panel GMM technique in assessing the linkage between financial development and economic growth in Sub-Saharan Africa. The dynamic analysis revealed the existence of positive link between financial sector development and economic growth in the region.

Highlighting the importance of intermediary role of the Nigerian financial system, Onwumere, Onodugo and Ibe (2013) used the ordinary least squares to determine the impact of financial structure on economic growth in Nigeria. The results show that financial structure exerts positive and significant impact on economic growth.

Aye (2015) used the bootstrap rolling window estimation to relation between financial development on economic growth in Nigeria within the period 1961 and 2012. The study highlighted the influence of structural break in the coverage period and revealed that direction of causality was not same over the period. It can be inferred that time variation and structural break effects might undermine the granger causality outcome.

Using a province-level data set for 1996-2001 on Turkey, Ardic and Damar (2006) analyzed the effects of financial sector deepening on economic growth. The results of both OLS and GMM estimation indicate that financial deepening has direct and robust effect on economic growth. Similarly, Khalil (2014) employed the Generalized Method of Moments dynamic panel to re-examine the empirical relationship between financial development and economic growth using data set from 1973-2012. The results showed that financial development have significant positive impact on economic growth.

Olusegun, Ganiyu and Oluseyi (2013) examined the impact of financial sector development on economic growth in Nigeria using the OLS estimation technique. The results indicate that financial development influences growth but the influence exerted is weak and non-significant.

Akinguola *et al.,* (2013) examined the relationship between financial liberalization and economic growth in Nigeria using the vector error correction model (VECM). It was shown that while financial liberalization proxies do not significantly explain economic growth, financial deepening indicators were

confirmed to have significant positive effect on economic growth.

Sackey and Nkrumah (2012) examined the effects of Financial Sector Development on Economic Growth in Ghana using the Johansen Co-integration analysis. The paper aimed at empirically determining the causal link between financial sector development and economic growth in Ghana. The Johansen Co-integration techniques within a bivariate vector auto-regressive framework were employed for the regression with data set from 2000 to 2009. Using a quarterly time series set of data on Ghana over a ten year period (2000 – 2009), the result of the study showed that there exist a statistically significant positive relationship between the Financial Sector Development and Economic Growth in Ghana.

Rashti, Araghi and Shayeste (2014) studied the influence of financial development on economic growth during the period 1990-2010, with special emphasis on the recent financial crisis. The study utilizes the generalized methods of Moment (GMM). The results revealed that the financial crisis had greater influence on developing countries and much less of influence on developed countries. Moreover, it was shown that financial development indexes relating to banking sector have had negative effect on economic growth, whereas capital market demonstrated a positive effect on economic growth during the period.

Atemnkeng, Njong and Cletus (2011) investigated the relationship between financial development and economic growth in Cameroon using time series data for the period 1970-2005. It was found that financial development has a positive effect on economic growth in the long run, while a long term causal relationship running from financial development to economic growth without a feedback system.

Simwaka *et al.,* (2012) assessed the causal relationship between financial development and economic growth in Malawi using the autoregressive distributed lag (ARDL) approach. Results show that there is positive and significant relationship between financial development and economic growth in the long-run. Granger causality tests show that economic growth drives financial development with no feedback effects as financial development has no causal effects on economic growth.

Bakay (2014) drew evidence from regional panel data in examining the causality between financial deepening and economic growth. the results suggest that credits alone do significantly explain the amount of export and import of a particular province, and amount of deposits is negatively associated with the level of imports. Selected measure for provision of financial services (sum of loans and deposits) statistically explains foreign trade (sum of exports and imports). Granger causality test revealed that there is bi-directional causality between financial deepening and international trade.

Kargbo, Ding and Kabia (2014) analyzed financial deepening in low, middle and high income countries using the Ordinary Least Squares and Multiple Regression model econometrics technique. The empirical results suggest that financial sector development and economic growth are positively co-integrated. The results support the view that, financial deepening is a necessary causal factor of economic growth, although the strength of the evidence varies across countries.

Mirdala (2011) used the vector error correction model (VECM) and the Granger causality test in evaluating the main aspects of the financial deepening in the ten European transition economies (ETE) within the period 2000-2010. The outcome revealed that countries with lower GDP per capita appear to benefit from financial deepening as the financial

deepening indicators influence real economic activity with greater intensity in the short-run and Granger causal for real output in the long-run.

III METHODOLOGY AND DATA

Data was collated from the World development Indicators from 1985 to 2016. The study employed the Dumitrescu Hurlin Panel Causality Tests to ascertain the causal link between the panel series. This methodology is chosen over the stacked pairwise approach because it observes the heteregoneity of the cross-sections. Panel unit root tests and the Kao panel cointegration test will be run on the variables. The later is to determine if there is a long-run relationship among the variables while the former is to ascertain the stationarity of our panel series.

Baseline model for this study fashioned after the work of Soltani et al. (2014), and modified by Ngongang (2015). The model is of the form;

$$TGDP_{j,t} = \alpha_0 + \alpha_1 CBBSP_{j,t} + \alpha_2 CBPH_{j,t} + \alpha_3 IC_{j,t} + \alpha_4 LF_{j,t} + \alpha_5 TOXM_{j,t} + \alpha_6 + \alpha_7 IP_{j,t} + \varepsilon_{j,t} \text{ - } (1)$$

Where, TGDP is the growth rate of real GDP per capita; CBBSP is private sector credit relative to GDP, CBPH is stock market capitalization relative to GDP per capita; IC is dummy variable which representing corruption; LF is dummy variable, representing financial liberalization; TOXM is openness rate measured by total exports and imports relative to GDP; INF is inflation rate; IP is dummy variable, representing political instability; ε is random variables; t & j denote time and counties respectively.

For the Nigerian case, we modified the model above to accommodate financial development indices as follows;

$$GDPgr_{it} = \beta_0 + \beta_1 PSC_{it} + \beta_2 TOPN_{it} + \beta_3 M2_{it} + \beta_4 FDI_{it} + \varepsilon_{it} - - - - - -(2)$$

Where, i and t denote time and country respectively. *GDPgr* = growth rate of real GDP. *PSC* = credit to the private sector as a percentage of GDP; *TOPN* = trade openness, measured as sum of imports and exports relative to real GDP; *FDI*= Foreign direct investment as a percentage of GDP; *M2* = broad money as a percentage of GDP, ε = error term.

CAUSALITY TEST

Granger (1969) defines causality between two variables Y and X as follows; Y causes X if Y increases the predictability of X. the directional influence can be one-way (unidirectional causality) or two-way (bidirectional causality) in which case there exist a feedback effect. A non-panel bivariate linear prediction models for X(t) and Y(t) in AR can be represented as follows:

$$X(t) = b_1 + \sum_{j=1}^{\bar{\upsilon}} b_{11,j} X(t-j) + \sum_{j=1}^{\bar{\upsilon}} b_{12,j} Y(t-j) + \varepsilon_1$$

$$\vdots\ 2(t) - - - - - - - - - - - - (3)$$

$$Y(t) = b_2 + \sum_{j=1}^{\bar{\upsilon}} b_{21,j} X(t-j) + \sum_{j=1}^{\bar{\upsilon}} b_{22,j} Y(t-j) + \varepsilon_2$$

$$\vdots\ 1(t) - - - - - - - - - - - (4)$$

If past values of $X(t)$ help to predict$Y(t)$, we say $X(t)$ Granger causes$Y(t)$. The test of H_o: $b_{12} = 0$; H_o: $b_{21} = 0$ can be carried out with the F test.

- **Dumitrescu-Hurlin (DH) Test:** With respect to this study, we are adopting the panel Granger causality model proposed by Dumitrescu & Hurlin (2012). They suggest an extended test that is designed to determine causality in panel data where cases are not treated as being homogenous (as in the common stacked pairwise causality test), rather the heterogeneity across individuals or cross-sections is taken into account. DH approach to causality appears more realistic since

respective countries or cases in a panel study cannot be treated as the same thereby disregarding the peculiar cross-section effects. The underlying model is represented as follows:

$$y_{i,t} = \alpha_i \sum_{k=1}^{K} \beta_{ik} y_{i,t-k} + \sum_{k=1}^{K} \gamma_{ik} x_{i,t-k} + \varepsilon_{i,t} \quad ----------(5)$$

The basic idea in *Equation (5)* is that if past values of x are essential in forecasting the current value of y, even without the exclusion of past values of y in the model, then x has a causal influence on y (Lopez & Weber, 2017).

IV RESULTS AND ANALYSIS

(ii) Stationarity Test

Table 1. Unit Root Test Results

Variable	Levin, Lin & Chu t	Im, Pesaran and Shin W-stat	ADF - Fisher	PP - Fisher	Inference
D(GDPgr)	-7.89939**(0.0000)	-11.8875**(0.0000)	124.179**(0.0000)	155.263**(0.0000)	I(1)
D(PSC)	-3.95294**(0.0000)	-7.08772**(0.0000)	69.7568**(0.000)	146.796**(0.0000)	I(1)
D(TOPN)	-5.79683**(0.0000)	-5.99916**(0.0000)	60.5949**(0.0000)	109.535**(0.0000)	I(1)
D(M2)	-6.45634**(0.0000)	-7.77585**(0.0000)	77.6790**(0.0000)	110.566**(0.0000)	1(1)
D(FDI)	-3.80737**(0.0000)	-8.11759**(0.0000)	81.9643**(0.0000)	128.977**(0.0000)	I(1)

***signifies stationary*

The summary of the panel unit root test results for our series as presented in Table 1 shows that the variables are all stationary at first difference based under the four criteria with p-value less than 5% significant level.

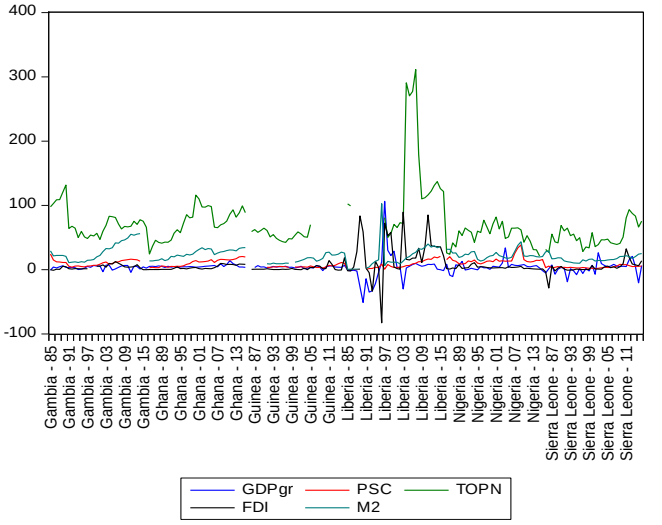

Figure 1. Graphical representation of variables.

- **Test For Long Run Relationship: Kao Cointegration Test**

Table 2. Kao Residual Cointegration Test

Series: GDPGR PSC TOPN FDI M2

	t-Statistic	Prob.
ADF	-5.949165	0.0000
RESID(-1)*	-8.686797	0.0000
Residual variance	105.1242	
HAC variance	71.78008	

*generated from Augmented Dickey-Fuller test Equation

Table 3 presents the Kao panel test for long-run relationship. From the results, the null hypothesis of no cointegrating equation is rejected. This implies that our variables are cointegrated. In other words, our estimated variables have long-run relationship, and move together in the long run.

Table 4.5 DH Granger Causality Test

Pairwise Dumitrescu Hurlin Panel Causality Tests
Lags: 2

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
PSC does not homogeneously cause GDPGR	2.81870	0.63544	0.5251
GDPGR does not homogeneously cause PSC	1.56280	-0.63821	0.5233
TOPN does not homogeneously cause GDPGR	1.15229	-1.04727	0.2950
GDPGR does not homogeneously cause TOPN	1.58242	-0.63130	0.5278
FDI does not homogeneously cause GDPGR	2.61844	0.45093	0.6520
GDPGR does not homogeneously cause FDI	2.78991	0.62706	0.5306
M2 does not homogeneously cause GDPGR	11.0418	8.97468	0.0000
GDPGR does not homogeneously cause M2	2.25320	0.06195	0.9506

The results of the DH Granger causality test in table 3 indicate that there is no evidence of causality economic growth, private sector credit, trade openness and foreign direct investment. However, a unidirectional causality runs from broad money supply to economic growth. This shows that past information in broad money is significant in predicting economic growth in the West African region.

V CONCLUSION AND RECOMMENDATIONS

The relationship between financial development and economic growth has been extensively discussed in economics literature. Most of the studies on the subject are on country level or time series studies. The focus of this paper is on the West African region, inclusive of only countries with policy and currency independence. Thus we examined the causal relationship between financial development and growth in the region. The

results provided no evidence of causality between growth, private sector credit, trade openness and foreign direct investment. There is however a unidirectional causality running from money supply to growth. The cointegration test results revealed that there is a long-run relationship between growth and the regressors. The result has policy implication as it is shown that broad money is critical in predicting future growth. Therefore, we recommend that fiscal and monetary policy actions should be coordinated in order to effectively meet the liquidity need of the economies of the region.

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