



# The Effects of Foreign Direct Investment Uncertainty on Financial Development in Nigeria: An Asymmetric Approach

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## Abstract

This article investigates the dynamic effects of foreign direct investment uncertainty on financial development in Nigeria and the interacting role of financial inclusion and economic growth. We used the annual time series data of Nigeria covering the period 1970-2018. Through advanced econometric techniques, we first substantiated stationarity level and co-integration among the scrutinized variables, which is genuinely done for reliable findings. Following that, we applied Gregory and Hansen (1996) co-integration test, Non-linear ARDL as the elasticity estimator, and Diks and Panchenko (2006) causality test for the analysis. The Empirical evidence postulates the asymmetric nature of foreign direct investment uncertainty to financial development. We also found a non-linear uni-directional causality running from economic growth to financial development, foreign direct investment uncertainty to financial development, and financial inclusion to financial development. In the end, the authors proposed the needed policy recommendations to strengthen the Nigerian financial sector.

**Keywords:** Non-linear ARDL, Diks and Panchenko, Gregory Hansen, Interaction, Financial development

## Introduction

Theoretically, financial globalization promotes a legal distribution of foreign capital and enhances the spread of external threats. Meanwhile, the advantages are said to be more crucial for developing countries, and research on the matter still accommodates the debate of researchers as to the issue of which financial situation is pre-requisite to actualize the advantages of financial globalization.

Nonetheless, some scholars believe that financial globalization is a phenomenon that promotes global financial uncertainty with a significant negative impact on growth (Bhagwati, 1998; Mohd Amin & Abdul-Rahman, 2020; Rodrik, 1998; Stiglitz, 2000). On the other hand, another class of scholars also sees financial globalization as a trend that fosters financial instability that allows for the development of domestic financial system (Asongu & Tchamyou, 2015; Farouq & Sulong, 2020; Farouq, Sulong, & Sambo, 2020). This argument endorsed the notion that the uncertainty of financial integration is a camouflage advantage to the financial system of a country that made use of it in anticipation of these uncertainties.

It appears that developing countries that had witnessed rises in external capital flows at one time had to battle with a decrease in the same capital flows during the recent global financial crisis of 2007 (Claessens et al., 2011). The conflicting arguments focus on whether the advantageous effects of current financial innovation undoubtedly surpass their deficiencies

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that inundated the capital flow instability studies (Asongu, Batuo & Tchamyou, 2015). To be precise, it is still an open debate to ascertain the benefits of financial globalization for developing economies like Nigeria.

Given that a relatively satisfactory unanimity on trade globalization benefits exists (Asongu, 2014), the advantages of financial globalization still maintain some great contradictions. With a post-world financial global crisis of 2007, the dimension of research sees the disadvantages of foreign capital flows. Claessens et al. (2011) considered the adverse effects of financial globalization coupled with a weak domestic financial system. Prasad and Rajan (2008) highlighted why countries should integrate with the rest of the world given their specific features. Asongu and De Moor (2015) discussed the thresholds of financial globalization for positive results in local development.

However, finance-growth nexus got attention ever since the evolutionary research of Schumpeter (1911), in which this scholar statistically analyzed the level to which financial development enhances economic growth. It was found that the acceleration of economic growth emerges when the financial sector mobilizes savings and channels the mobilized savings to other productive sectors of the economy. Goldsmith (1969) later supported the idea. Greenwood and Jovanovic (1990), Ghirmay (2004), Agbetsiafa (2004), Abu-Bader and Abu Qarn (2008), and Levine and Zervos (1993) also were among the scholars to support the argument. These scholars are noted to support “supply leading hypothesis.”

Additionally, demand following attracted another class of scholars whose argument was that the economic growth induces financial development as a result of demand for financial services. This means that when an economy grows and the economic activities increase as well, a rise appears in the demand for financial resources that consequently triggers financial expansion and development. Odhiambo (2008) and Robinson (1952) were among the early contributors to this stance.

Moreover, the fourth category of scholars comprising Demetriades and Hussein (1996), Akinboade (1998), and Greenwood and Smith (1997) argued that the causal relationship between economic growth and financial development is bidirectional. Meanwhile, the last group of scholars argued that there might be no relationship between the variables. Lucas (1988) argued that many economists had overstated the influence of financial development on economic growth. Atindéhou et al. (2005) also agreed with the argument.

Conversely, should we look at the role financial inclusion plays in this country's financial sector, given the low turnout when it comes to financial accessibility, because, on average, not more than 20 percent of households have access to financial services in Africa (International Fund for Agriculture Development IFAD, 2011)? The reasonable part of the population uses an informal financial system that is not involved with the structure and technical needs of the financial system. Given that, it could be the rationale behind the surplus liquidity this economy seems to be fighting with, because most of their financial institutions are left with the idle resources instead of being utilized in the productive sectors of the economy, which subsequently dampen the performance of the financial institutions.

Having highlighted that, this paper strives to relate to this increasing line of thought by empirically examining the effect of foreign direct investment uncertainty on financial development in Nigeria and the interactive role of financial inclusion and economic growth. Notably, should there be an interaction between the two factors, a causal relationship exists between them (Mokhtari & Aghagoli, 2020). The analysis considers the sample data of the Nigerian economy from 1970-2018. Among the distinguishing features of this paper is that it uses four financial development components, namely financial system depth, banking system efficiency, banking system activity, and financial size through the application of principal component analysis.

Since previous researchers mostly used financial system depth and because financial development is multidimensional, the size index alone might not give the actual picture of the financial development (Cihak et al., 2016; World Bank, 2012).

Moreover, the study considers the asymmetric relationship of foreign direct investment inflow uncertainty and the interaction of financial inclusion and economic growth, knowing clearly that this economy is increasingly integrating with other financial sectors across the globe and couples with the challenges of uncertainty in the capital flow. There are conflicting views as to whether its decrease or increase affects the Nigerian financial development positively or not. Based on the papers we have examined, there has not been a study that considers the asymmetric nature of the relationship between this uncertainty and financial development, as the past studies paid attention mostly to the linear relationship (Asongu, Moor, & Tchamyou 2015).

### *Prevailing Issues*

It is necessary to note that the present paper takes in to account the underdevelopment of the Nigerian financial system. Because even with success recorded as a result of financial sector reforms designed to strengthen the financial system, this financial sector still seems not developed even when compared to other financial sectors of the developing world (World Bank, 2017).

The average percentage of African financial development, having been analyzed via domestic credit by banks to the private sector, was 20.56%. Meanwhile, South Asia has a 46.8% share of private sector, while Nigeria has recorded 10.9% (International Monetary Fund, 2018). This is what kept the country behind other developing countries. It is also clear that Nigerian financial system development, according to the measurement, stands to be the least in the top eight leading African economies.

Taking into account the above problem and considering the following ones, the authors came up with the present study. As World Bank (2018) has shown that almost half of the Nigerian population are living under the poverty line, and as financial development is poverty curtailing (Efobi et al., 2019), the financial role seems crucial throughout the post-2015 development approach (Asongu & De Moor, 2015).

The issue of excess liquidity in the Nigerian financial institutions, which hinders financial access for individuals and businesses, is also significant in Nigeria's' financial development studies (Asongu, 2014). Recent research agrees that the access to finance in the country has been limited by liquidity surplus (Asongu et al., 2016; Fouda Owoundi, 2009; Saxegaard, 2006).

### **Literature Review**

The deliberation on which to acknowledge whether the foreign capital flow is beneficial or not for local development stands open in both decision-making and scholarly stream. Consistent with Asongu (2014), the two strands of the studies open up to debate in developing economies. Firstly, Solow (1956) records that a potential advantage could emerge as a result of the efficient allocation of resources. The neoclassical stance was precisely in line with the presumptions that deemed that the liberalization of capital flow paves the way to international risk sharing.

Furthermore, weak economies with no efficient capital resources but endowed with the labor force are given more financial resource accessibility needed for investment, growth, and rise with the advanced world. Obstfeld (1998), Fischer (1998), Rogoff (1999), Summers (2000), and Batuo et al. (2018) were among the researchers that appreciate the fact that developing economies could benefit from increased investments, decreased cost of capital,

more exceptional living standard, and sustainable growth resulting from financial globalization. These debates have been taken forward by the majority of the developing economies to substantiate the liberalization of capital flow decisions for the past decades.

Another league of the studies sees financial integration as an imaginary attempt to expand the advantages of international trade commodities to foreign trade in assets (Asongu, 2014). In line with this, the benefits of financial integration are increasingly taken into account, including instabilities, financial crisis spread, as well as a growing dependence on foreign debt. These are some of the issues that keep deteriorating business activities on. Leung (2003) argued that it promotes inequality, while Azzimonti et al. (2014) believe that it reduces productivity and efficiency.

Thus, given the recent global financial crisis, more evidence of the uncertain nature of financial integration come to reality (Asongu et al., 2015). Relevant studies concerning African financial system development were argued in 4 main classes, namely, instability in growth, financial flows (e.g., FDI, aid, and remittances), other macroeconomic outcomes, and financial development. Brambila-Macias and Massa (2010) have analyzed the data set of 15 African countries, thereby examining the linkages between foreign capital flows and economic growth. They concluded that due to capital flow instability, it becomes likely that the financial crisis would bring about negative spillovers on the performance of the economy.

Another research by Chauva and Geis (2011) highlights a comprehensive measure on some of the determinants associated with instability and crisis, notably the impacts of the crisis on economic sustainability, the significance of distribution channels, fiscal and monetary policy challenges in return, and medium- and long-run difficulties associated with viable recovery that fence against potential crises. Meanwhile, Price and Elu (2014) analyzed the extent to which macroeconomic uncertainties are propelled by regional currency integration amid uncertainty and financial crisis. While analyzing the data set of the central African Franc Zone (CFAZ), the authors concluded that growth-driven credit shortening becomes more evident in CFAZ economies.

Therefore, based on the aforementioned evidences and arguments concerning the effect of financial globalization in relation to financial development, the following hypothesis was formulated to affirm the evidence that the relationship between financial globalization uncertainty and financial development will be significant in the Nigerian economy.

**H<sub>1</sub>:** There is a significant asymmetric effect of financial globalization uncertainty on financial development in the Nigerian economy.

## **Data and Methodology**

### *Data*

This paper generated its data for the analysis from the World development indicators published by the World Bank (2019) to assess the data set of the Nigerian economy for the years 1970-2018. The reason for using Nigeria as a case study was discussed in the introduction.

The Financial Development is an index that uses different measures such as domestic credit to the private sector by banks, local credit to the private sector by other institutions (financial institutions), lending rate, and market capitalization or broad money (M2) among others, according to the works of Ndako (2010), Adjasi et al. (2012), Kutan et al. (2017), Rousseau and Wachtel (2011). In addition, many others like King and Levine (1993) and Calderon and Liu (2003) have adopted the same stance.

As such, this study adopts the strategy of Ang and McKibbin (2007), thereby applying principal component analysis, and it is comprised of four financial development components: financial system depth, banking system efficiency, banking system activity, and financial size while GDP annual growth percentage measures economic growth.

The principal component analysis (PCA) is well approved by scholars in modern empirical data analysis, and is used in various research fields (Falqi et al., 2020; Farouq, Sulong, Ahmad et al., 2020a; Staples et al., 2018). The principal component analysis is a non-parametric (Shlens, 2014) and multivariate (Abdi & Williams, 2010) approach capable of reducing the dimensionality of the given datasets and enhancing interpretability, but at the same time minimizing the information loss.

In addition, the financial globalization uncertainty is the actual residual value obtained through regressing the foreign direct investment inflows on its lagged value with time trends. The volatility in the residual values across the period shows the financial globalization uncertainty (Ahmad et al., 2018; Asongu et al., 2017; Farouq, Sulong, Ahmad, et al., 2020b).

Meanwhile, for financial inclusion, the study considers three basic dimensions of an inclusive financial system, namely banking penetration (BP), availability of the banking services (BS), and usage of the banking system (BU).

### Empirical Findings

The analysis of the present study is built on the endogenous growth model. The Cobb-Douglas model is usually applied by many academics and researchers to examine the influence of any other determinants affecting economic growth. Rateiwa and Aziakpono (2017), Sainz-fernandez et al., (2018), and Tsaourai (2018) are some of the past studies that have used the model. Nonetheless, this paper adopts the endogenous growth model of Romer (1986) due to the lack of explicit modeling in the finance theory. Below is the initial model:

$$M_t = Y_t^\delta (H_t + A_t)^{1-\delta} \quad (1)$$

where  $M_{it}$  is the GDP,  $Y_{it}$  indicates capital,  $A_{it}$  denotes labor, and  $H_t$  stands as technology. This study will expand the equation (1) stated above, thereby introducing the variables this study intends to use:

$$LNFD_t = (1-\delta)_{y1i} LNGDP_t + (1-\delta)_{y1i} LNFGU_t + (1-\delta)_{y1i} LNFI_t + u_t \quad (2)$$

where LNFD is the dependent variable which is the natural logarithm of financial development, LNGDP stands for the natural logarithm of gross domestic product (the proxy of economic growth), LNFGU represents the log of financial globalization uncertainty, LNFI denotes the log of financial inclusion, and  $u$  represents the unobserved factors affecting financial development.

### Gregory and Hansen (1996) Co-Integration

We further use a residual-based approach of Gregory and Hansen's co-integration test due to its superior advantages. The technique gives unknown structural breaks. It also provides three different types of tests that focus on level, trend shift, and regime shift. The advantage of this approach is that at a time, the author might like to test for co-integration, and in the process, a shock may emerge in which the author may not likely know the exact timing. This can be termed as an unknown break, although the technique gives the exact date.

This technique is Eagle and Granger (1987) extension analysis that includes analyzing the null hypothesis of no-co-integration. Correspondingly, an alternate hypothesis can be proposed on the existence of a long-run relationship with an unknown structural break in the formation of time series data based on ADF, Za, and Zt test. The analyzing conditions are to

reject the null hypothesis when the absolute value of ADF or Zt statistics is statistically beyond 5 percent; otherwise, the null hypothesis would not be rejected.

The three models are:

$$x_{1t} = \omega_1 + \omega_2 Q_{\pi} + \alpha^1 y_{2t} + e_t \quad t = 1, \dots, n. \tag{3}$$

The preceding equation denotes the resulting pattern, but it restricts a level change in the switch.

$$x_{1t} = \omega_1 + \omega_2 Q_{\pi} + \delta_t + \alpha^1 y_{2t} + e_t \quad t = 1, \dots, n. \tag{4}$$

The following equation makes changes in the co-integration intercept and slope vector.

$$x_{1t} = \omega_1 + \omega_2 Q_{\pi} + \alpha^1 y_{1t} + \alpha^2 y_{2t} Q_{\pi} + e_t \quad t = 1, \dots, n. \tag{5}$$

The dummy variable deals with the structural break.

$$Q_{\pi} = \begin{cases} 0, & t \leq [n\pi] \\ 1, & t > [n\pi] \end{cases}$$

where  $\pi = (0,1)$  is the corresponding speck of changing the timing. The distance of this timing is typically captured as  $(0.15n, 0.85n)$ . One to three versions are calculated in sequence, with the size of the split varying the interval  $\pi = (0,1)$ .

**Table 1.** Gregory Hansen Test at Level, Trend, and Regime

Test	Statistic	Breakpoint	Date	CV 1%	CV5%	CV10%
Zt	-5.49	41	2015	-5.77	-5.28	-5.02
Zt	-5.90	19	2015	-6.05	-5.57	-5.33
Zt	-6.30	17	2015	-6.51	-6.00	-5.75

The Gregory and Hansen co-integration result reveals the existence of long-run relationships at a 5% level of significance at level, trend, and regime. This is authentic when we look at the Zt-statistics of the three tests, which shows the values are more significant than the critical values. It also confirms the unknown structural break of 2015 as given by the Zivot and Andrew unit root test.

*Long- and Short-Run Estimate*

After establishing the long-run relationship between the variables of interest, we applied a non-linear auto-regressive distributed lag (NARDL) estimate to ascertain the asymmetric relationship (if any) between financial globalization uncertainty and financial development. The NARDL approach is a non-linear version of the ARDL technique.

Pesaran et al. (2001) developed the strategy, and it was extended by Shin et al. (2009) through partial sum decomposition. The technique takes care of serial correlation and the correct endogeneity problem. It also considers the potential asymmetric variations to the motion of financial development in the value-added sector.

The method demands the value of the variable to be decomposed. The analysis, thus, breaks down FGU into negative and positive sub-components. FGU Positive and FGU Negative denote the sums of partial negative and positive changes. They are calculated as follows;

$$M_t = \alpha^+ Y_t^+ + \alpha^- Y_t^- + u_t \tag{6}$$

where  $M_t$  is the  $f \times$  one vector of financial development,  $t$  stands for the period,  $Y_t$  is the  $f \times$  one vector of multiple regressors given that  $Y_t = Y_0 + Y_t^+ + Y_t^-$  as a natural logarithm of financial globalization uncertainty,  $u_t$  denotes error term,  $\alpha^+$  and  $\alpha^-$  are the long-run relationship asymmetric variables representing financial globalization uncertainty asymmetrically responding during the increase and decrease times.

The  $Y_t^+ + Y_t^-$  are fractional sum actions of negative (-) and positive (+) dynamics in  $Y_t$  defined as:

$$Y_t^+ = \sum_{m=1}^t \Delta Y_m^+; Y_t^- = \sum_{m=1}^t \Delta Y_m^- \tag{7}$$

$$\Delta Y_m^+ = \sum_{m=1}^t \max(\Delta Y_m, 0), \Delta Y_m^- = \sum_{m=1}^t \min(\Delta Y_m, 0) \tag{8}$$

where  $\Delta Y_m$  stands for changes in economic growth variables ( $Y_t$ ) as the '+' and '-' symbols show a positive and negative mechanism around zero thresholds, demarcating the negative and positive FGU parameter shocks. This means that at first uncertainty, we are supposed to have a normal distribution of the series.

The accumulated asymmetric functional multiplier results of a switch in component  $Y_t$  on  $X_t$  would be derived through the following equation:

$$h_m^+ = \sum_{j=0}^m \frac{dX_{t+j}}{dY_t^+}, h_m^- = \sum_{j=0}^m \frac{dX_{t+j}}{dY_t^-}; m = 0, 1, 2 \tag{9}$$

where  $m \rightarrow \infty, h_m^+ \rightarrow \theta^+$  and  $h_m^- \rightarrow \theta^-$  are the dynamic adjustment patterns.

**Table 2.** Estimation Result of NRADL Short-Run Estimate

Variable		Coefficient	Std. Error	t-Statistic	Prob.
C		0.367	0.164	2.237	0.031**
LFDV (-1)		0.176	0.086	2.046	0.0483**
LFGU_POS (-1)		0.205	0.038	5.395	0.000*
LFGU_NEG (-1)		1.314	0.629	2.090	0.045**
FI					
GDP					
interpretation		0.179	0.267	0.670	0.508
TB		0.81	0.188	4.345	0.000*
		1.022	0.308	3.318	0.000*
F-Statistics	2.264**	-0.102	0.025	-4.080	0.000*
R-squared	0.564				
Adjusted R-squared	0.314				

Note: \* and \*\* represents a 1 and 5 percent significance level. FDV= financial development, GDP= gross domestic product, FDI= foreign direct investment, INT= interaction of FDI and GDP

Long-Run Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LFD (-1)	1.066	0.360	2.959	0.006*
LFGU_POS (-1)	0.317	1.341	2.362	0.025**
LFGU_NEG (-1)	0.330	1.400	2.362	0.025**
FI	0.542	0.124	4.370	0.000*
GDP	0.354	0.085	4.354	0.000*
INT	0.128	0.038	3.368	0.000*
TB	-0.201	0.055	-3.654	0.000*

Note: \* and \*\* represents a 1 and 5 percent significance level. FDV= financial development, GDP= gross domestic product, FDI= foreign direct investment, INT= interaction of FDI and GDP

Studying the result given above through the NARDL estimate coupled with the excellent interpretation of asymmetric relationship results by Aftab et al. (2018), the asymmetric relationship between FGU and FD seems to exist. Looking at the long-run effect where we see a 1-unit increase in FGU, we can conclude that it will lead to a 31% increment in the Nigerian financial sector development.

This result is consistent with the findings of Asongu et al. (2017), which reveal that some of the African countries take the advantages of this uncertainty in developing their financial

sectors, thereby allocating the available surplus resources to other productive sectors of the economy. In contrast, the 1-unit decline in FGU would result in a 33% percent decrease in Nigeria's financial system development.

Logically, a decrease in financial globalization uncertainty implies an increase in foreign capital flow, which the growth might appreciate the local currency and subsequently affect the country's international market competition that may reduce its exports. This will adversely affect its financial sector as a result of lower loan patronage and even can result in bad loans. However, as Asongu (2012) puts it, a logical explanation for this negativity is that with financial globalization, foreign banks have a comparative advantage in the service sector, thus decreasing the proportion of private credit from domestic banks. Meanwhile, Auzairy et al., (2020) argued that foreign investors tend to serve as a threat to the local firms since it generates stiffer competition.

Considering the value of coefficients concerning both the positive and negative composition of financial globalization uncertainty in relation to the response of financial development, we can see that while the positive dimension has a 31% rate, the negative form records the 33% rate. Moreover, based on these values, we can say that the negative response about the shocks is more pronounced than the positive one.

However, an increase in financial inclusion enhances their development of the financial sector at a 1% level of significance, which means that a unit increase in FI brings about a 54% increase in FD. Likewise, a statistically positive relationship exists between GDP and FD. A unit increase in GDP results in a 35% rise in FD. Moreover, for the interaction term, an increase in financial inclusion coupled with the presence of economic growth brings about a 12% improvement in the Nigerian financial sector development.

Conversely, the global financial crises based on the dummy result highlighted in the estimation above reveals that a negative relationship exists between the crises and financial development. Meaning, a unit increase in the crises pulls down the Nigerian financial sector by 20 percent in the long-run, while this negative effect is 10% in the short-run.

*Diks-Panchenko Nonparametric Granger Causality Test*

The modification of the non-linear Granger causality test pioneered by Hiemstra and Jones (1994) was done by Diks and Panchenko (2006). The modified version argues that the Hiemstra-Jones test over-rejects no causality null hypothesis while increasing the sample size. The paper uses the Diks-Panchenko test for the non-linear causality between the parameters. To accept the existence of a causal relationship, the null hypothesis must be rejected:  $H_0: [X_t]$  cannot Granger cause  $[Y_t]$ , given as:

$$Y_{t+1} | \{X_t^{ix}, Y_t^{iy}\} - Y_{t+1} | Y_t^{iy} \tag{10}$$

meanwhile,  $\tau_x$  and  $\tau_y$  denotes lags, and

$$X_t^{ix} = (X_{t-\tau_x+1}, \dots, X_t) \text{ and } Y_t^{iy} = (Y_{t-\tau_y+1}, \dots, Y_t)$$

System (3) is a hypothesis about the invariant distribution of the time series for a purely stationary bivariate  $[\tau_x + \tau_y + 1]$  dimensional vector

$$w_t = (X_t^{ix}, Y_t^{iy}, Z_t) \text{ while } Z_t = Y_{t+1} \tag{11}$$

This equation clearly states that for each fixed value of y, x and z are conditionally independent on  $Y = y$ .

Then the null hypothesis of no non-linear causality is

$$\beta g \equiv \varepsilon \{f_x, y, z(x, y, z) \cdot f_y(y) - f_{xy}(x, y) \cdot f_{y,z}(y, z)\} = 0 \tag{12}$$

**Table 3.** Diks-Panchenko Nonparametric Granger Causality Test

Direction of Causality	t-statistics	P-value
LFD does not cause LGDP	0.870	0.190
LGDP does not cause LFD	1.991	0.023**
LFD does not cause LFGU	0.974	0.165
LFGU does not cause LFD	1.813	0.0349**
LFD does not cause LFI	0.631	0.736
LFI does not cause FD	2.119	0.035**

The above result of asymmetric causality reveals the presence of non-linear uni-directional causality between economic growth running and financial development. This result supports the demand push hypothesis of Odhiambo (2008) and Robinson (1952), among others. This is very true because Nigeria is one of the essential oil-producing countries in OPEC and is putting increasing effort to diversify its economy; as such, other productive activities within the economy do not always come from their financial sector, preferably from the public sector.

This improvement in other productive sectors within the economy might be translated into and trigger the increasing demand for financial services, which subsequently affects the sector positively. It also displays a one-way causality between foreign direct investment uncertainty that leads to financial development through the use of public sector funds to develop the sector as the government mostly dominates it. Likewise, it shows a one-way causality of financial inclusion leading to financial development, which means that through people's participation and increasing access to the teaming population to the financial services, the Nigerian financial sector will develop.

### Descriptive Statistics and Correlation Analysis

Tables 4 and 5 below show the descriptive summary and correlation analysis of the Nigerian economy. It can be seen that the mean values are more significant than the standard deviation, which means the data is usually collected. Jarque-Bera statistics variables' coefficients show the mean distribution of frequencies.

**Table 4.** Descriptive Statistics

Variables	Mean	Standard deviation	Skewness	Kurtosis	Jarque-Bera
LFD	4.086	1.757	-0.116	2.195	1.431 (0.488)
LFGU	0.577	0.112	-0.336	2.455	1.531 (0.465)
LGDP	1.487	0.994	-2.089	9.156	113.051 (0.000)
LFI	0.451	0.413	-1.457	5.556	30.695 (0.000)

**Table 5.** Correlational Analysis

Probability	Correlation			
	LFD	LFGU	LGDP	LFI
LFD	1.000000 -----			
LFGU	0.176 0.226	1.000000 -----		
LGDP	0.370 0.008	0.071 0.625	1.000000 -----	
LFI	0.310 0.029	-0.108 0.459	0.288 0.000	1.000000 -----

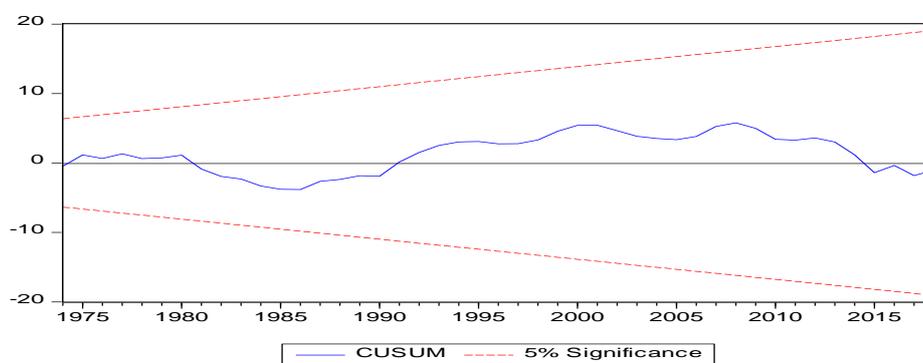
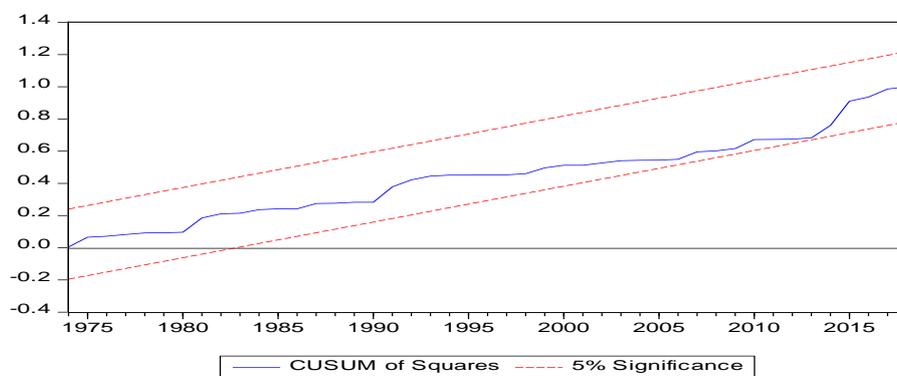
**Table 6.** Diagnostic tests

Tests	Normality Test	Serial Correlation	Heteroscedasticity
FD=F(EG, FDI)	0.562 (0.6935)	0.928 (0.573)	2.713097 (0.2575)

All the above diagnostic tests reveal that we cannot accept the alternate hypothesis, because the p-values are not significant, even at the 5% level of significance. With that, we accept the null hypothesis, which means that the model is free from heteroscedasticity and serial correlation. Meanwhile, the normality test shows that the data is standard.

### Stability Test

The following CUSUM and CUSUM Square tests show the stability nature of the data to the long and short run at a 5% level of significance.

**Figure 1.** CUSUM Test**Figure 2.** CUSUM Square Test

### Unit Root Test

For the unit root tests, this paper applied Zivot and Andrew, Dicky Fuller, and Phillips Peron to have a robust result. Given the results below, all the variables reveal to be stationary, though ADF and PP show mixed stationarity, and the Zivot and Andrew result shows the stationarity of the series at first deference.

**Table 7.** Zivot and Andrew Test

	t stat - 1st diff.	P value - 1st diff.	Brk Date - 1st diff.
LFD	-10.75356	< 0.01	Break Date: 2015
LFI	-10.59838	< 0.01	Break Date: 2016
LGDP	-12.47363	< 0.01	Break Date: 1988
LFGU	-19.42235	< 0.01	Break Date: 1974

**Table 8.** ADF and PP Unity Root Tests

Variables	ADF		PP	
	At level	At first different	At level	At the first diff
LFD <sub>it</sub>	-1.464 (0.542)	-5.869* (0.000)	-1.607 (0.775)	-4.189* (0.009)
LFGU <sub>it</sub>	-1.434 (0.898)	-3.994* (0.003)	-1.511 (0.811)	-3.967* (0.016)
LGDP <sub>it</sub>	-1.304 (0.198)	-6.467* (0.000)	-4.572 (0.003)	-19.639* (0.000)
LFI <sub>it</sub>	-0.369* (-3.806)	0.698* (4.179)	1.399** (2.091)	0.557* (3.115)

Notes: \*\* and \* denotes in 5% and 1% levels. the *p*-values are in the brackets

**Table 9.** Lag Selection Criterion

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-82.99937	NA	0.009174	3.822194	3.942638	3.867095
1	-20.75131	113.4298*	0.000862	1.455614	1.937390*	1.635215*
2	-11.35263	15.87332	0.000852*	1.437895*	2.281004	1.752197
3	-6.153762	8.087135	0.001024	1.606834	2.811276	2.055838
4	5.005819	15.87140	0.000957	1.510853	3.076627	2.094557

\* indicates lag order selected by the criterion

As the study uses asymmetric econometric techniques such as Gregory Hansen co-integration test and Diks and Pachenko causality tests, the paper uses optimal lag selection criteria in choosing the correct lag. Five selection criteria for lags are considered in the above table. The lowest-value test gives us the optimal lag.

### BDS Independence Test

**Table 10.** BDS Test for LFD

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.162	0.013	12.461	0.000
3	0.263	0.022	11.955	0.000
4	0.319	0.026	12.269	0.000
5	0.345	0.027	12.777	0.000
6	0.347	0.027	12.851	0.000

**Table 11.** BDS Test for LFT

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.070	0.015	4.662	0.000
3	0.086	0.024	3.507	0.000
4	0.059	0.030	1.966	0.049
5	0.040	0.032	1.263	0.206
6	0.059	0.031	1.887	0.059

**Table 12.** BDS Test for LGDP

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.038	0.012	3.166	0.000
3	0.056	0.019	2.947	0.004
4	0.074	0.023	3.217	0.000
5	0.081	0.025	3.238	0.001
6	0.077	0.024	3.153	0.001

**Table 13.** BDS Test for LFGU

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.066	0.011	5.847	0.000
3	0.134	0.018	7.303	0.000
4	0.172	0.022	7.690	0.000
5	0.192	0.023	8.107	0.000
6	0.197	0.023	8.456	0.000

## TSLINE

This research analyzed the asymmetric role of financial globalization uncertainty, the interacting role of financial inclusion, and economic growth in the Nigerian economy. The study used the Gregory Hansen co-integration technique, thereby giving us the actual breakpoint concerning the country's financial sector. Figure 3 below shows the TSLINE test, which confirms the presence of a break in the data.

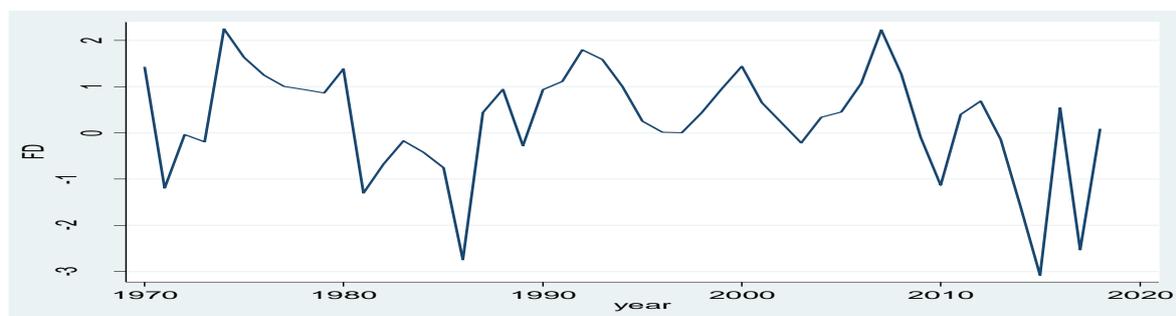


Figure 3. TSLINE

## Conclusions

This study analyzed the asymmetric nature of the relationship between financial globalization uncertainty and financial development and examined the interacting role of financial inclusion and economic growth on financial development. The paper used the data set of the Nigerian economy covering the years 1970 to 2018.

The asymmetric estimation result revealed that the coefficients' values concerning both the positive and negative composition of financial globalization uncertainty about the response of financial development record 31% in terms of the positive dimension and 33% in terms of the negative composition. Moreover, based on these values, we can conclude that the negative response concerning the shocks is more pronounced than the positive.

The asymmetric result aligns with the findings of Asongu et al. (2017), such that an increase in the financial globalization uncertainty brings about a corresponding rise in this country's financial development because the economy will take advantage of this uncertainty in developing its financial sector, thereby allocating the available surplus resources to other productive sectors of the economy.

In the same vein, Asongu (2014) supported the argument that the concept of financial globalization is a hidden agenda for extending the benefits of foreign investments. The inference of international capital flows is mainly in line with the existing literature on foreign aid. Appropriately, the hypothesis indicates that governments of beneficiary countries are more publicly accountable in the absence of international assistance; this is proposed by Eubank (2012) on Somaliland, and empirically tested in Africa by Asongu and Tchamyou (2015).

This implies that when recipient countries are faced with uncertainty in foreign capital flows, they are much likely to improve internal institutions to mitigate risks involved with the embedded uncertainty. Such changes are often not limited to the linkage between foreign aid and political structures but – as already identified – stretch well to the relationship between foreign capital inflows and financial institutions.

It is worth noting that the non-linear relationship is best described using a volatile variable, as in the case of Bahmani-Oskooee and Aftab (2017), where the asymmetric effects of exchange rate fluctuations were examined.

However, an increase in financial inclusion enhances the development of the financial sector, which means that a unit increase in FI brings about an increase in FD. Likewise, a statistically positive relationship exists between GDP and FD, that is to say, an increase in GDP results in an increase in FD. Furthermore, for the interaction term, an increase in financial inclusion coupled with the presence of economic growth brings about a 12% improvement in the Nigerian financial sector development.

Conversely, the global financial crises based on the dummy result highlighted in the estimation show that a negative relationship exists between crises and financial development. This means that a unit increase in the crises pulls down the Nigerian financial sector by 20 percent in the long-run, while 10% in the short-run.

Notably, the effect of the global financial crisis on the Nigerian financial system is a direct hit. Fluctuations in the stock market have risen since the onset of the downturn, and the loss of wealth has happened in major markets of the African stock exchange. In Nigeria, for instance, the indices of the stock market had declined to around 57 percent between from March 2008 to March 2009 (Ashamu & Abiola, 2012).

Likewise, as Soludo and Governor (2009) puts it, the global financial crisis has also affected the foreign exchange markets of Nigeria. There was considerable currency devaluation against the dollar. Many of these economies have large external debts, such that the anticipated depreciation has put severe debt service pressures on the countries. The stock exchange has been shrinking, significant foreign hedge funds were withdrawn, and the international credit line has disappeared from loadable funds for the local industry.

However, we have seen how the causality results revealed a one-way causality running from economic growth, financial globalization uncertainty, and financial inclusion to financial development. The uni-directional causality between economic growth and financial development supports the demand following the hypothesis that the argued financial development emerged as a result of the expansion in the economic activities and subsequent demand for financial services, as a result of which the financial sector expands to meet up with the demands (Robinson 1952).

## **Recommendations**

All said, this paper recommends the Nigerian policymakers to look outside the box and come up with reforms and policies that will help its local financial sector and protect the domestic investors from being able to compete extensively even when more foreign capital flows gain its way into the economy, thereby regulating the flows and making sure that the resources are not only concentrated in one primary sector, but rather, it should be diversified to other productive sectors to increase the real sector activities.

Moreover, the issue of global financial shocks should be handled with caution in the case of any future occurrence, and this is because having seen how it affected the financial sector negatively, that calls for preparation towards any future occurrence. As such, there should be proper regulations that will help in averting such an impact.

Furthermore, the financial sector should do more in creating awareness concerning the need to engage the use of financial services as well as embarking on the formal system of finance and not the other way. In addition, there should be a relaxation in the interest rate to encourage small-scale investors that are willing to take credit for investments. Meanwhile, policymakers should make the business atmosphere conducive for the investors in terms of tax incentives and suchlike issues so that after accessing the loans, they can freely invest and be productive.

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