Investigating the Threshold of Financial Development that stimulates Inclusive Growth in Nigeria

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Abstract

There is hardly a simple linear link between financial development and inclusive growth. The expansion of financial markets might not always guarantee more people will benefit from economic growth. This study uses the principal component analysis to create a comprehensive index of financial development and inclusive growth and also establishes the non-linear relationship them using the VECM and ARDL estimators. Thus, this study uses empirical samples derived from Nigerian national statistics collected between 1985 and 2020 to determine the threshold of financial development (proxied by domestic bank credit, broad money, lending-deposit spread and financial development index) that stimulates inclusive growth. The findings show that there is an optimal interval because the link between financial development index and inclusive growth has an inverted U shape, but the components of financial development have U shapes. The result showed that the minimum domestic bank credit to private sector to GDP that stimulate inclusive growth is at 18.22% and 13.49% in the short-run and long run respectively. Concerning money supply to GDP, it would stimulate inclusive growth at 17.84% in the long run. As to financial development index, it exhibits a maximum threshold of 0.697 to maintain inclusive growth in the long run. On the basis of the findings of the research study, specific recommendations for policy are provided.

Keywords: Domestic bank credit, money supply, lending rate, financial development index, inclusive growth, threshold effects.

1. Introduction

A notable shift in the Nigerian economy over time is that rising prosperity has not necessarily spread equally to all citizens. Rising income inequality has often followed periods of economic growth. The gains of economic growth are completely nullified when the rich and poor continue to live in such starkly different circumstances. Therefore, lowering inequality has been a focal point of development efforts, giving rise to the concept of inclusive growth. The concept of inclusive growth has risen to the top of the socioeconomic agendas of developing nations around the world. The goal of inclusive growth is to place equal value on social and economic achievements alongside the pursuit of economic progress. Economic growth that creates jobs and helps reduce poverty is what the existing literature calls "inclusive growth" (Klasen, 2010). Financial resources, expertise strategies, the transfer of technology, and institutional capacity are all necessary for inclusive growth, as defined by the Asian Development Bank, with a focus on bolstering food security, expanding access to public services, and building infrastructure.

While theoretical works tend to back Gross Domestic Product (GDP) as the key indicator of economic growth, development economists have begun to challenge its usefulness due to its weaknesses in tracking poverty alleviation. At first, economists thought it was easy to apply the trickle-down theory to the use of Gross Domestic Product and its fluctuations as indices of welfare and economic success. However, they learned that this concept has several limitations. Instead, they recommended a measure of prosperity that emphasizes aid to the needy. Economic growth does not automatically result in widespread prosperity. For instance, the goal of growth is to alleviate poverty, but it is not always possible to achieve this through the implementation of programs and spending instruments designed to lift the poor out of poverty.

Both developed and developing countries now have higher expectations due to the rapid creation and expansion of new economies. Various factors such as macroeconomic stability, capital, and financial development are expected to contribute to the growth of inclusive economies (Anand, Mishra and Peiris, 2013; Aoyagi and Ganelli, 2015; Tella and Alimi, 2016; Amri, 2018; Ndoricimpa, 2020). Implementing well-thought-out fiscal policies has been demonstrated in a number of studies to both encourage growth and respond to the needs of the poor.

As a bonus, it can assist raise a country's standard of living by investing in its people and its infrastructure. Financial progress is sometimes cited as a prerequisite for inclusive growth, although critics say that it is not always necessary. Financial development is a process that aims to improve the efficiency of financial institutions and the financial markets. Improving the productivity of financial institutions requires the creation of new regulations and practices. Efficient financial systems can also help boost economic growth by allocating scarce resources more efficiently (Akinci, 2018).

Pooling savings, mitigating and managing risk, lowering transaction costs, disseminating data on investment opportunities, optimizing capital allocation, and boosting investor willingness to finance new projects via corporate governance monitoring are all ways in which financial development has been shown to contribute to economic growth and make growth more equitable in the theoretical literature (Schoenmaker and Schramade, 2019). Empirical evidence also lay credence to the fact that financial development enhances economic growth, the function of financial development in promoting inclusive growth has not been properly examined (Bist, 2018). Meanwhile, previous experimental studies examining the relationship between financial development and economic growth have produced ambiguous findings and can be described as inclusive. According to economic theory, financial development would enable socially and economically excluded persons to enter the formal financial system by better integrating them into the economy and development stream. Assuring an inclusive financial system is critical to achieving a more inclusive, equal, and peaceful society. Also, financial development comprises the formation and growth of financial institutions.

However, the relationship between the financial system and inclusive is not a simple linear relationship. In some cases, the development of finance may not ensure growth inclusiveness. There is a low level of financial inclusion and a lack of infrastructure in Nigeria's financial sector. In Nigeria, just 40% of adults have bank accounts, and only 4% have access to formal credit (World Bank, 2021a). Additionally, a few large banks dominate the banking industry of the country, limiting competition and perhaps leading to market inefficiencies. With over 60% of the population being under the age of 25, Nigeria has a sizable and rapidly expanding youth population. However, the unemployment rate in

the country is still quite high, especially among the young. The National Bureau of Statistics (2021) reports that in the fourth quarter of 2020, the unemployment rate in Nigeria was 33.3%, with the rate for young people being 42.5%. The World Bank (2021b) reports that the Gini index for income inequality in Nigeria is 36.8. This disparity is most pronounced between rural and urban areas, but it also exists between the country's many regions. Can Nigeria's current financial market adequately guarantee growth that is inclusive to all? What exactly is the links between the two? Is there an optimal financial development for growth inclusiveness? These issues are the focus of this study. Therefore, this research work proposes the threshold effect to analyze the nonlinear link between high and low financial development and growth inclusiveness, and discusses the optimal financial development suitable for inclusive growth in Nigeria between 1985 and 2020.

The remaining sections of this study are structured as follows. In section 2, it looks at the available literature. The data and estimation procedures are discussed in Section 3. Section 4 performs an empirical investigation. The policies are outlined, summarized, and offered in Section 5.

2. Literature review

While inclusive growth is still in its infancy, it stands in stark contrast to traditional pro-poor growth, which excludes those at the bottom of the income/wealth divide from revenue accumulation processes. Through two compelling pillars: labour-absorbing growth and rising productivity among the employed, the idea of inclusive growth suggests a more active role for the poor. Apart from the fact that the whole conceptualization and modelling framework has not yet been defined, few empirical researches have been conducted to determine the extent to which the economy's growth fluctuations are inclusive. Inclusive growth places a premium on economic growth, which is both required and critical for poverty reduction. Inclusive growth takes a long-term view and is concerned with both the rate of growth and the pattern of growth. Additionally, Kuznets's and Solow's studies have dominated growth theories, and these researches account for the fact that economic growth, inequalities, and poverty are all related (Mokyr, 2018; Inglehart, 2020). These inequities remain notwithstanding considerable growth in the economy, which culminates in individual isolation. Such income disparities foster instability and social activist groups, which have a

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detrimental influence on investment. As this was the case, and particularly since the early 1990s, arguments have concentrated on finding solutions to inequities that provide a fresh perspective on the concept of inclusive growth (World Health Organization, 2019). The concept of inclusive growth has become a primary goal for these academics and authors. According to the research, inclusive growth enables all parts of society to contribute to economic progress while also ensuring equitable opportunity, access to economic possibilities, and job creation.

A sustained rate of growth is necessary and frequently the primary determinant in poverty reduction, as demonstrated by a substantial body of literature and have argued that the poorer a country is, the more critical the growth component is in explaining poverty reduction. Sustaining high growth rates and poverty reduction, however, require expanding the sources of growth and efficiently integrating an increasing share of the labour force into the economic process. Often, the transformation is followed by a large redistribution of labour from agricultural to industrial and services, referred to as structural change and labour force enhancements. Studies have argued that growth encompasses the conditions that help the poorest (Rusca and Schwartz, 2018; Khan *et al.*, 2019). This methodology has been gaining increasing traction. Generally, two methods to inclusive growth have been used: a so-called relative strategy that aims to diminish inequities in favour of the poor. A second method, dubbed absolute, deems growth to be pro-poor when it results in an absolute decrease in the poverty incidence. Given the range of players who use the word inclusive growth, the notion remains ambiguous and lacks a consensus definition among relevant stakeholders. Inclusive growth occurs when productivity is increased and employment possibilities are provided.

There is a wide variety of empirical studies that examine the effects of financial development on growth, but few studies that focus on the components of inclusive growth such as income inequality and poverty reduction. The literature on the role of financial markets in growth has been heavily influenced by the work of Schumpeter (1942). According to the author, financial markets play a vital role in helping investors make informed decisions and reducing the risk of financial transactions. The author argues that the development of financial institutions can contribute to the growth of the economy by increasing the capital

accumulation and reducing the cost of external finance. Other authors also believe that this can boost the economic growth by making firms more profitable (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973). According to McKinnon (1973), the high reserve requirement and the interference in interest rate policies are some of the factors that contribute to the underdevelopment of financial institutions. Demetriades and Siong (2006) looked into the relationship between economic growth and financial development. The financial development has a significant impact on GDP per capita in countries with sound institutional framework. When they compared the data for different countries, they found that the financial system is more effective in middle income regions.

Through a series of studies, the World Bank and Global Findex examined the link between financial inclusion and economic development in emerging and developed countries. Cabeza-Garcíaa, Del Briob, and Oscanoa-Victorio (2019) found that women's access to credit cards and bank accounts has a positive effect on development. Recuero and González (2019) conducted on middle-income countries revealed that the relationship between economic growth and financial development was strong. They used a panel-vector autoregressive model to analyze the relationship between the two. It was also found that the quality of institutions was positively related to economic growth, but the causality depended on the type of institutional quality. Through a study conducted on global Findex Data, Erlando, Riyanto and Masakazu (2020) researchers were able to identify the factors that influence the quality of institutions in different countries. They found that political stability, control of corruption, and transparency are some of the factors that influence financial inclusion in a study conducted on Eastern Indonesian, researchers explored the link between economic growth and financial inclusion. They found that the positive impact of economic growth on the level of financial inclusion was outweighed by the negative impact of poverty. They used a dynamic panel auto-regression model to analyse the data. Ali *et al.* (2022) conducted on the link between financial inclusion and institutional quality in 45 OIC countries revealed that the relationship between the two is strong. This study also noted that institutional quality can have a positive impact on financial inclusion. Interestingly, the study also found that institutional quality moderates

financial inclusion and has a significant positive impact on financial development.

Rousseau and Wachtel (2011) conducted using the structural model for investment revealed how financing constraints and financial sector development affect the growth of firms. The authors used this method to analyse how different factors such as firm level data and financing constraints can affect the efficiency of firms' investment. The results of the study revealed a negative link between financial market development and firms' responsiveness to investment. Other factors such as the size of firms and the legal environment were also studied to find possible explanations. Greenwood, Sanchez and Wang (2013) conducted in the U.S. indicated that technological advancements can help boost the country's economic growth by increasing the efficiency of financial intermediation. They also believed that the country's financial system can be more effective in allocating capital and credit. According to the studies, the technological advancements in the financial sector contributed to over 29% of the country's GDP growth during the period 1997 to 2004. Mehrara and Ghamati (2014) conducted on the effects of financial sector development on the country's economy revealed that other factors such as the size of firms and the legal environment can also affect the country's growth. They also noted that financial sector development is a vital factor that can guide the country's long-run economic growth. Demetriades and Rousseau (2016) argued that financial depth does not play a significant role in the long-run growth of the economy. Instead, it is influenced by the regulation and supervision of banks. The authors also stated that higher levels of financial sector development may not be beneficial for the economy.

A study conducted in Pakistan by Jalil and Feridun (2011) revealed that the country's economic growth is linked to the development of financial institutions. This helps in reducing the risk and ensuring the stability of the market. Through a combination of the ordinary least square method and the generalized moment method, Compton and Giedeman (2011) investigated the relationship between economic growth, financial development, and institutional quality. They found that the link between these factors is a substitution for bank-based financial development. Although the evidence supporting the link between financial development and economic growth was found in stock market indicators, it was not found in a study conducted by Al-Malkawi,

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Marashdeh and Abdullah (2012). They found that there was a negative relationship between financial sector development and economic growth in the United Arab Emirates. Law, Azman-Saini and Ibrahim (2013) focused on the relationship between the quality of financial institutions and the development of financial sectors in developing and developed countries. It revealed that high-income countries have a stronger financial sector than low-income countries. Using the Toda-Yomamoto asymmetric causality technique, Yıldırım, Özdemir and Doğan (2013) noted that there was a direct causal relationship between financial sector development and economic growth in selected European countries.

Through a linear method, Gazdar and Cherif (2015) were able to analyse the effects of financial development and institutional quality on the growth of selected countries in the Middle East and North Africa (MENA). They found that these factors significantly affect the country's economic growth. The findings of the study revealed that the quality of financial institutions can help mitigate the effects of financial development on the country's economic growth. Estrada, Park and Ramayandi (2010) carried out on the effects of financial development on the growth of the 125 developing Asia countries. It revealed that the efficiency of financial systems will be the key factor that will determine the success of the region's economy. The study found that financial development has a positive effect on the growth of developing Asia countries. It also noted that the impact of the Asian financial crisis has weakened since it started. The study also noted that financial development can help sustain the growth of developing Asia's economies during the post-crisis period. Ahmed *et al.* (2022) examined the role of financial development and institutional quality in green growth in South Asian economies. This study aims to analyse the long-run co-integration between these factors. It shows that financial developments and green growth have a significant effect on the country's overall economic growth. The findings of the fully modified ordinary least squares (FMOLS) and dynamic ordinary least squares (DOLS) suggest that the quality of financial and institutional development is a vital factor that can help boost the green economy's long-term growth.

For Nigeria, Manasseh, Asogwa and Agu (2012) examined the direction of causality between financial sector development and economic growth in Nigeria. The findings from the study revealed that financial sector development granger causes economic growth in Nigeria. Nevertheless,

some authors explored bound testing technique to ascertain the long-run relationship between financial sector development and economic growth for Nigeria. The outcome from the study by Ali *et al.* (2022) revealed short-run gains at the expense of long-run growth coupled with various exogenous factors could have precipitated economic fluctuations in Nigeria. Yinusa, Aworinde, and Odusanya (2020) employed asymmetric co-integration technique to ascertain that there is a long-run relationship among institutional quality, financial development and inclusive growth in Nigeria. The findings from the study also found that adjustments process to equilibrium for institutional quality; financial development and inclusive growth were asymmetric in Nigeria.

3. Data and methodology

3.1 Data description and sources

As for the outcome variable, inclusive growth measures the pace and distribution of output growth as well as its employment creation in an economy. The measurement is in line with the absolute definition of pro-poor growth (Tella and Alimi, 2016). Since inclusive growth is perceived from a multifaceted viewpoint of employability, output pace and growth distribution, three indicators used as factors of inclusive growth for this study are per capita income growth, income inequality and unemployment rate. A principal component analysis (PCA) was adopted by this research study to generate inclusive growth measure based on the three indicators. The estimation method was employed based on its inherent characteristic as an approach to lessen the dimensions of a series that contained a large set of variables mostly unrelated, albeit keeping an improved percentage of the variability in the dataset (Bro and Smilde, 2014). The PCA method is therefore utilized to compress the three selected indicators chosen from the framework of Anand, Mishra and Peiris (2013) inclusive growth to produce a variable with corresponding data, and it is denoted as "inclusive growth".

For the principal variable (financial development), the financial market plays a vital function in channeling investment funds to its greatest value since this study examines how the financial system can turn liquid and brief savings into illiquid and lengthy investments that promote capital accumulation. The literature established several measures to measure financial growth, such as domestic bank credit to the private sector (percentage of GDP), broad money supply (percentage of GDP), and

lending-deposit spread. Broad money being a term for liquid liabilities is the most comprehensive concept of financial intermediation, encompassing three financial institutions: the central bank, deposit money banks, and other financial institutions. The World Bank considers the depth of financial growth to include all financial development indices. Bank lending-deposit spread is calculated by subtracting the disparities between the lending rate and the deposit rate, is used to determine the efficiency of financial development. The variables were sourced from the World Development Indicators. All these are put together to form indices that measure financial development. An indicator is computed using the principal component analysis using the three financial development series.

Table 1: Principal component analysis for inclusive growth and financial development

Inclusive growth index

Principal Components	Component Matrix			Proportion	Cumulative Proportion	Eigen value
	Growth	Equality	Employment			
First PC	0.2799	0.6585	-0.6986	0.5089	0.5089	1.5268
Second PC	0.9373	-0.3448	0.0506	0.3259	0.8348	0.9777
Third PC	0.2075	0.6690	0.7137	0.1652	1.0000	0.4955

Financial development index

Principal Components	Component Matrix			Proportion	Cumulative Proportion	Eigen value
	Domestic Credit	Broad Money	Lending-Deposit Spread			
First PC	0.6439	0.6652	0.3780	0.6567	0.6567	1.9702
Second PC	-0.3377	-0.1962	0.9206	0.2819	0.9386	0.8457
Third PC	0.6866	-0.7204	0.0983	0.0614	1.0000	0.1841

Note: PC - principal component.
Source: Author's computation (2022).

In Table 1, the study shows the results of the principal components. The inclusive growth index generated from the three main components of inclusive growth explains about 50.89% of the total variance in the unique data with an eigenvalue of 1.5268. The financial development index created from the three measures (domestic credit to private sector by banks, broad money supply and lending-deposit spread) explains about 65.67% (eignevalue of 1.9702) of the total variance in the data.

Table 2 presents the summary statistics of the variables. The average growth of gross domestic product per capita stands at 4.25%, while its

highest and lowest rates are 15.33% and -2.04% respectively. It indicates that the standard of living account for an average of 4.25% of economic activities produced per individual in the Nigerian economy. Concerning the income equality (equ) of inclusive growth, the mean value of the series is 58.99% with maximum and minimum values of 64.9% and 48.1% correspondingly. Regarding the employment rate (emp) variable of growth inclusive, the average rate was 88.87% whereas the maximum and minimum values are 98.2% and 72.9% respectively. After using the principal component analysis to compute an index using the three components of inclusive growth, the average value of inclusive growth indicate a negative value of -0.0023 with maximum and minimum values of 1.829 and -2.1714 respectively.

Furthermore, the mean values of financial development variables measured by domestic credit to private sector by banks to GDP (dcps), broad money to GDP (bm), and interest rate spread (lds) were 9.54%, 16.88%, and 5.83%, while their respective maximum and (minimum) values stood at 19.6%, 27.38%, and 11.06% and (4.95%, 9.06%, and 0.32%). The mean value of financial development composite after using principal component analysis to compute an index was -0.00178 while the maximum and minimum values are 2.6317 and -2.1190 correspondingly. As regards the institutional quality, the mean value stood at 2.965, while the maximum and minim values were 3.9375 and 1.9375 respectively. This therefore means that the Nigerian institution in terms of quality of public services, government policy formulation and implementation promoting private sector development, quality of contract enforcement and property rights, and promotion of citizens' effort and competence are weak within the specified periods. One of the main reasons for the weak nature of economic institutional settings in the country is the unstable nature of her political structure over the years.

Table 2: Summary statistics

Variable Measurements	Signs	Mean	Std Dev.	Max.	Min.	Kurtosis	Skewness	Obs.
Outcome Variables								
GDP growth (annual %)	*gdpg*	4.2507	3.9149	15.329	-2.0351	0.5360	0.4600	36
Income Equality	*equ*	58.994	6.1703	64.9	48.1	-0.6592	-0.9068	36
Employment	*emp*	88.869	7.5141	98.2	72.9	-0.8037	-0.5312	36
Inclusive growth index	*incg*	-0.00228	1.2356	1.8290	-2.1714	-1.0813	-0.2194	36
Main Explanatory Variables								
Domestic credit to private sector by banks (% of GDP)	*dcps*	9.5376	3.5441	19.604	4.9480	1.1472	1.1017	36
Broad money (% of GDP)	*bm*	16.876	5.966	27.379	9.0633	-1.5201	0.4228	36
Interest rate spread (lending rate minus deposit rate, %)	*lds*	6.8343	2.5466	11.064	0.3167	1.2191	-1.0277	36
Financial development index	*fd*	-0.00178	1.4036	2.6317	-2.1190	-1.2628	0.2475	36
Institutional Quality	*iq*	2.9650	0.4380	3.9375	1.9375	0.6628	-0.2105	36
Other Controlling Variables								
Gross fixed capital formation (% of GDP)	*k*	31.100	13.140	54.948	14.169	-1.2622	0.2555	36
Labor force participation rate, total (% of total population ages 15-64) (modeled ILO estimate)	*lb*	58.977	2.1214	61.210	53.910	0.3337	-1.2928	36
Trade (% of GDP)	*topen*	34.271	10.943	53.278	9.1358	-0.0777	-0.4507	36
Inflation, consumer prices(annual %)	*inf*	19.177	17.685	72.836	5.3880	2.1437	1.8190	36
Official exchange rate (LCU per US$, period average)	*exr*	111.88	100.17	358.81	0.8938	0.0430	0.8193	36

Note: Std. Dev. – standard deviation; Max. – maximum; Min. – minimum; Obs. - observation.

Source: Author's computation (2022).

The average values of the two key factor determinants of inclusive growth stood at 31.1% and 58.98% for capital investment as percentage of GDP (k) and labour force participation rate (lb) respectively under the reviewed periods. Their maximum values stood at 54.95% and 61.21% while the minimum values are 14.17% and 53.91% respectively. For the control variables, the mean values of trade openness proxy by total trade as a ratio of GDP (topen), inflation rate measured by annual growth rate of consumer price index (inf), and official exchange rate (exr) are 34.27%, 19.18%, and ₦111.88/US Dollar correspondingly. The three control variables have their minimum values to be at 9.14%, 5.39%, and ₦0.89/US Dollar whereas the maximum values are 53.28%, 72.84% and ₦358.81/US Dollar respectively for trade openness proxy by total trade as a ratio of GDP (topen), inflation rate measured by annual growth rate of consumer price index (inf), and official exchange rate (exr).

The correlation result of the correlation coefficients presented in Table 3 shows that the four financial development indicators have direct correlation with inclusive growth index. Likewise, the square of financial development series positively relate with the composite index of inclusive growth. As for the components of inclusive growth, the correlation table shows that all the financial development and their square are negatively associated with employment rate. Income per capita is negatively correlated with the financial development series and its square except domestic credit to private sector by banks and its square which have positive coefficients. As regards income equality, it positively correlates with domestic credit to private sector by banks, broad money supply and financial development index but negatively relates with interest rate spread.

Table 3: Correlation Matrix

	equ	emp	incg	dcps	bm	lds	fd	dcps²	bm²	lds²	fd²	k	lb	topen	inf	exr
gdpg	0.034	-0.179	0.346	0.099	-0.120	-0.058	-0.027	0.124	-0.138	-0.078	-0.019	-0.187	0.206	0.278	-0.321	-0.098
equ	1	-0.483	0.814	0.384	0.481	-0.255	0.335	0.383	0.481	-0.251	0.447	-0.336	-0.330	-0.309	-0.178	0.418
emp		1	-0.863	-0.622	-0.746	-0.339	-0.630	-0.538	-0.742	-0.360	-0.183	0.630	0.464	-0.165	0.439	-0.733
incg			1	0.579	0.651	0.042	0.585	0.536	0.644	0.052	0.337	-0.634	-0.391	-0.008	-0.416	0.671
dcps				1	0.809	0.229	0.904	0.780	0.801	0.217	0.429	-0.675	-0.446	0.090	-0.339	0.605
bm					1	0.330	0.934	0.742	0.795	0.325	0.365	-0.672	-0.600	-0.036	-0.297	0.698
lds						1	0.531	0.130	0.327	0.755	-0.353	-0.525	-0.128	0.612	-0.018	0.421
fd							1	0.836	0.928	0.511	0.275	-0.663	-0.571	0.189	-0.301	0.669
dcps²								1	0.739	0.112	0.523	-0.673	-0.350	0.069	-0.295	0.495
bm²									1	0.323	0.405	-0.670	-0.722	-0.049	-0.296	0.705
lds²										1	-0.253	-0.485	-0.141	0.546	-0.104	0.376
fd²											1	-0.083	-0.300	-0.461	-0.140	0.080
k												1	0.600	-0.285	0.365	-0.673
lb													1	0.390	0.317	-0.687
topen														1	-0.080	0.035
inf															1	-0.377

Note: gdpg - GDP growth; equ - Income Equality; emp - Employment; ig - Inclusive growth index; dcps - Domestic credit to private sector by banks; bm - Broad money; lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; dcps² - Domestic credit to private sector by banks squared; bm² - Broad money squared; lds² - lending rate spread squared; fd² - Financial development index squared; k - Gross fixed capital formation; lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade as % of GDP; inf – Inflation rate, consumer prices (annual %); and exr - Official exchange rate (LCU per US$, period average).
Source: Author's computation (2022).

It was noticed that the correlation coefficients of financial development index with domestic credit to private sector by banks and broad money supply which is above 0.9 will not cause multicollinearity problem since they are not estimated in the same model. The correlation relationship among the key and other controlling variables is presented in Table 4.8 which shows different magnitudes and degrees. The values of the correlation coefficients revealed the absence of multicollinearity problem. Thus, the problem of multicollinearity is avoided in the empirical analysis.

3.2 Model and estimation methods

Following the empirical equation of past studies such as Dawson (1998), Ali and Son (2007), Anand, Mishra and Peiris (2013), Tella and Alimi (2016), and Whajah, Bokpin and Kuttu (2019), the model modifies and specifies the model to capture the minimum threshold at which financial development stimulates inclusive growth. It is stated as follows:

$$incg_t = \vartheta_0 + \vartheta_1 k_t + \vartheta_2 fd_t + \vartheta_3 fd_t^2 + \vartheta_4 lb_t + \Pi ctv_t + \varepsilon_t \tag{1}$$

Where: $incg$ is inclusive growth; k denotes capital investment; fd represents financial development which is a column vector of domestic credit to private sector by banks to GDP, broad money supply to GDP, and bank lending-deposit spread; fd^2 is the square of financial development; and lb is labour force participation rate. Other control variables (ctv) in a row vector form are: trade openness measured by total trade to GDP ($topen$); unstable price proxy by annual growth of consumer price index (inf); and exchange rate (exr). The stochastic term is represented by ε; t denotes time; ϑ_0 is constant; and ϑ_{1-4}, Π are the coefficients of the variables.

To get the financial development threshold that stimulates inclusive growth is calculated by taking the partial derivate of inclusive growth with respect to financial development variables, which is dented as:

$$\frac{\partial(incg_t)}{\partial(fd_t)} = \vartheta_2 + 2\vartheta_4 fd \tag{2}$$

Afterwards, financial development is factored out after equating the derivative to zero. It is specified as:

$$fd = -\frac{\vartheta_2}{2\vartheta_4} \qquad (3)$$

Concerning the estimation approach, descriptive statistics were computed as it describes and summarizes the data properties in a meaningful way and determines the extent to which the data are typically distributed (Gujarati and Porter, 2017). Afterwards, the augmented Dickey-Fuller (ADF), Phillip-Perron (PP), and Kwiatkowski Phillips Schmidt Shin (KPSS) unit root approaches were employed to ascertain the preliminary properties of the data set. The three unit root tests results in Table 4 under the conventional methods follow approximately the same decision on stationary level of variables of interest at varying significant levels which were stationary at levels for the squared of domestic credit to private sector by banks and interest rate spread at 5%. As for the remaining variables, the unit root test results were found not to reject the null hypothesis "not stationary at level" at 5% McKinnon significance level. The variables that are not stationary at levels were further tested at first differences which were found significant 5% level. The variables are GDP growth, income equality, employment, inclusive growth index, domestic credit to private sector by banks, broad money, interest rate spread, financial development index, broad money squared, financial development index squared, gross fixed capital formation, labor force participation, trade, inflation rate and official exchange rate. The results suggest that at first difference, the time series of the variables were stationary and integrated of order one and therefore suggests that after differencing at first levels the series, they converge to their long-run equilibrium or true mean.

Variables	Level			First Difference			I(d)
	ADF	PP	KPSS	ADF	PP	KPSS	
incg	-2.0999	-2.1493	0.1005	-7.0261***	-6.9057***	0.0783***	I(1)
gdpg	-1.8711	-3.5568**	0.1454	-4.6783***	-	0.0601***	I(1)
equ	-1.7597	-1.8350	0.1205	-5.0906***	-5.0906***	0.0785***	I(1)
emp	-2.2808	-3.5988**	0.1085	-4.5759***	-	0.0541***	I(1)
dcps	-3.998***	-2.7795	0.1674	-	-4.5068***	0.0392***	I(1)
bm	-2.9508	-2.1230	0.1545	-4.7223**	-7.1560***	0.0605***	I(1)
lds	-3.6567**	-3.2898*	0.1511	-	-5.8906***	0.0442***	I(1)
fd	-3.4622*	-2.2361	0.0635***	-4.8224**	-6.6552***	-	I(1)
dcps²	-4.276***	-4.3210***	0.06622***	-	-	-	I(0)
bm²	-2.5241	-2.3417	0.1519	-5.4794***	-9.5152***	0.07043***	I(1)
lds²	-3.711***	-3.5703**	0.0690**	-	-	-	I(0)
fd²	-3.262*	-3.0587	0.1571	-5.4649***	-6.5544***	0.0726***	I(1)
k	-0.7543	-0.6386	0.1489	-6.2791***	-6.5354***	0.0406***	I(1)
lb	-3.4651*	-2.3339	0.1450	-5.5852***	-5.5128***	0.0909**	I(1)
topen	-2.8554	-2.6092	0.1900	-7.3815***	-11.580***	0.0490***	I(1)
inf	-2.6345	-2.9831	0.1352	-4.2477**	-6.6240***	-0.0417***	I(1)
exr	-0.6298	-0.8653	0.1241	-4.4456***	-4.2527**	0.0783***	I(1)

Note: *** significant at 1%; ** significant at 5%; * significant at 10%. Calculated at trend and intercept and lag lengths selected automatically using the Schwarz Info Criterion (SIC). gdpg - GDP growth; equ - Income Equality; emp - Employment; incg - Inclusive growth index; dcps - Domestic credit to private sector by banks; bm - Broad money; lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; dcps² - Domestic credit to private sector by banks squared; bm² - Broad money squared; lds² - lending rate spread squared; fd² - Financial development index squared; k - Gross fixed capital formation; lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade as % of GDP; inf – Inflation rate, consumer prices (annual %); and exr - Official exchange rate (LCU per US$, period average).

Source: Author's computation (2022).

After that, the autoregressive distribution lag (ARDL) bound co-integration test was conducted to ascertain the long-run relationship between the variables for have combinations of I(0) and I(1) variables. The autoregressive distribution lag (ARDL) proposed by Pesaran, Shin and Smith (Pesaran, Shin and Smith, 1999). The generalized ARDL (p, q, …, q) model is specified as:

$$Y_t = \omega_{0i} + \sum_{i=1}^{p} \tau_i Y_{t-i} + \sum_{i=1}^{q} \mathrm{B}_i X_{t-i} + \sum_{i=1}^{q} \Psi_i Z_{t-i} + u_t \qquad (4)$$

Where: Y denotes inclusive growth; X represents the column vector of the main explanatory variables i.e. indices of financial development and institutional quality which are allowed to be solely I(0) or I(1) or co-integrated; Z is the row vector of control variables i.e. labour, capital, trade, inflation and exchange rate; τ, B and Ψ are coefficients; ω_{0i} is constant; p, q are optimal lag order; t is time; and u represents the stochastic disturbance term with zero mean. To establish the long run relationship, equation (4) is estimated by utilizing the ARDL error correction representation, which is specified as follow:

$$\Delta Y_t = \varphi_0 + \varphi_1 Y_{t-i} + \Phi X_{t-i} + \Theta Z_{t-i} + \sum_{i=1}^{p-1} a_1 \Delta Y_{t-i} + \sum_{i=1}^{q-1} \Pi_i \Delta X_{t-i} + \sum_{i=1}^{q-1} \Omega_i \Delta Z_{t-i} + e_t \qquad (5)$$

The difference operator is denoted by Δ; while the speed of adjustment coefficient is $1 - \sum_{j=1}^{p} \tau_i$. The short-run dynamic parameters of the model's adjustment to long run equilibrium are a_1, Π and Ω. It is also indicated in the above equation relies on its lag length, equilibrium disturbance term, and differenced independent variables. However, for variables that have their unit root results stationary at first differences and the existing cointegration among the variables using the Johansen cointegration test approach, the appropriate test used was the vector error correction model (VECM) approach. In a VECM form, the equation is written as:

$$\Delta Z_t = A_0 + \Pi Z_{t-1} + \sum_{i=1}^{k} \Gamma_j \Delta Z_{t=j} + \mu_i \qquad (6)$$

Where: Δ is the difference operator, Z_t is a n by 1 dimensional vector of non-stationary I(1) endogenous variables of the model, A_0 is a n by 1

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dimensional vector of constant; Π is the long-run matrix that determines the number of co-integrating vectors that consists of parameters representing the speed of adjustment towards long-run equilibrium and long-run parameter respectively; Γ is the vector of parameters that represents the short term relationship; and μ_i is k-dimensional vector of the stochastic error term normally distributed with white noise properties $N(0, \sigma^2)$.

Subsequently, the study conducted the long run relationship test using both the ARDL bound and Johansen Cointegration approaches which are found appropriate due to the outcomes of the unit root test. The estimation approach is employed because it is suitable for variables at different order of integration. The F-statistics estimates for testing the existence of long-run relationship between the square of domestic credit and interest rate spread and inclusive growth were presented in Table 5a. In the table, the estimated F-statistics of the normalized equations were found greater than the lower and upper critical bound at 1% significance level. It implies that the null hypothesis of no long-run relationship is rejected at 5% significance level. The implication of the above estimation is that there is existence of long-run relationship between the turning point of financial development using domestic credit to private sector by banks and interest rate spread and inclusive growth in Nigeria. The models have equilibrium condition that keeps the variables together in the long-run.

Table 5a: Cointegration Test Results using ARDL Bound Test

Dependent variable: y	Functions					F-statistics
Model I ARDL (2, 3, 2, 3, 3, 3, 3, 2)	$F_{incg}(incg \vert k, lb, dcps, dcps^2, topen, \text{inf}, exr)$					19.959***
Model II ARDL (2, 3, 3, 3, 3, 3, 1, 3)	$F_{incg}(incg \vert k, lb, lds, lds^2, topen, \text{inf}, exr)$					24.787***
	1%		5%		10%	
	I(0)	*I(1)*	*I(0)*	*I(1)*	*I(0)*	*I(1)*
Critical bound values for the models (k = 7)	2.73	3.90	2.17	3.21	1.92	2.89

Note: ***, ** and * denote rejection of null hypothesis at 1%, 5% and 10% significance levels respectively. incg - Inclusive growth index; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU/US$).
Source: Authors' computation (2022).

Table 5b: Johansen Cointegration Test using Johansen Cointegration Test

Series	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
		Lags interval (in first differences): 1 to 2				
		Trend assumption: *Linear deterministic trend*				
incg, k, lb, bm, bm², topen, inf, exr	r = 0	0.927214	224.0695***	159.5297	89.08802***	52.36261
	r ≤ 1	0.718891	134.9814**	125.6154	48.14641**	46.23142
	r ≤ 2	0.620870	91.83503	95.75366	32.97577	40.07757
	r ≤ 3	0.473559	58.85926	69.81889	21.81492	33.87687
	r ≤ 4	0.361500	37.04434	47.85613	15.25352	27.58434
	r ≤ 5	0.306496	21.79082	29.79707	12.44396	21.13162
	r ≤ 6	0.144958	9.346860	15.49471	5.324541	14.26460
	r ≤ 7	0.111574	3.022318	3.841466	4.022318	3.841466
incg, k, lb, fd, fd², topen, inf, exr	r = 0	0.914838	246.7582***	159.5297	83.74862***	52.36261
	r ≤ 1	0.793455	163.0096***	125.6154	53.62604***	46.23142
	r ≤ 2	0.654479	109.3835***	95.75366	46.13191**	40.07757
	r ≤ 3	0.636407	73.25163**	69.81889	34.39847**	33.87687
	r ≤ 4	0.384819	38.85316	47.85613	16.51852	27.58434
	r ≤ 5	0.343976	22.33463	29.79707	14.33298	21.13162
	r ≤ 6	0.153465	8.001658	15.49471	5.664541	14.26460
	r ≤ 7	0.066429	2.337117	3.841466	2.337117	3.841466

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. incg - Inclusive growth index; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU per US$).
Source: Author's computation (2022).

Meanwhile the Johansen cointegration test was used for the long run of the turning point of broad money and financial development index and inclusive growth. The optimal lag length employed in estimating the Johansen co-integration model was determined using the vector autoregressive (VAR) lag order selection criteria test and lag exclusion Wald tests, and the result revealed lag length 1 using Schwarz Information Criterion (SIC). The cointegration results are presented in Table 5b. The co-integrating equation reported for the models indicated that at McKinnon-Haug-Michelis 5% significance level, the Trace and Max Eigenvalue tests suggest that the incorporated time series variables are co-integrated at the first and third hypothesized co-integration equations for linear deterministic trend model with intercept when financial development is represented by money supply and financial development index. This suggests that there exist two and four cointegrating vector equations among inclusive growth and money supply and financial development index in their respective stated order. In general, the implication is that there exist a long-run relationship between financial development turning point and inclusive growth in Nigeria. Also, the cointegration results of financial development and inclusive growth components (i.e. income per capita growth, income equality and employment rate) are presented in Appendix I(a-c) respectively. Consequently, the result of both unit root test and Johansen cointegration test suggest that the ARDL and vector error correction model (VECM) are the most appropriate estimation technique to be used for the parameter estimates.

4. Results and discussion of findings

The autoregressive distributed lag (ARDL) and vector error correction (VEC) model results of the parameter estimates both in short-run and long-run are presented in Tables 6a-b respectively. The results on the tables provide answers to the null hypothesis that the minimum financial development threshold that stimulates inclusive growth is not statistically significant. For robustness check of our results, Tables 7a-b report the parameter estimates of the minimum financial development threshold that stimulates income growth, income equality and employment in Nigeria.

Table 6a: Short-run estimates of financial development and inclusive growth

Variables	Dependent Variable: Inclusive Growth (*incg*)			
	Domestic credit to private sector	Broad money supply	Lending rate spread	Financial development index
	1	**2**	**3**	**4**
$\Delta(incg(-1))$	-0.5254***	-0.2259	0.0843	-0.2611
	(0.0325)	(0.1830)	(0.0417)	(0.1835)
$\Delta(k(-1))$	0.1100***	0.02069	0.0972***	0.0123
	(0.0120)	(0.0316)	(0.0077)	(0.0301)
$\Delta(lb(-1))$	0.1480**	-0.4211*	0.0425	0.0645
	(0.0427)	(0.2335)	(0.0432)	(0.2110)
$\Delta(fd(-1))$	-0.4738***	-0.0092	0.8306***	-0.7134***
	(0.0523)	(0.1704)	(0.0511)	(0.2070)
$\Delta(fd^2(-1))$	0.0130***	0.00033	0.0231***	0.0317
	(0.0017)	(0.0045)	(0.0025)	(0.0773)
$\Delta(topen(-1))$	-0.0189***	0.0161	-0.1754***	0.0105
	(0.0033)	(0.0169)	(0.0071)	(0.0186)
$\Delta(inf(-1))$	0.0499***	-0.0012	0.0044**	0.000186
	(0.0029)	(0.0073)	(0.0017)	(0.0074)
$\Delta(exr(-1))$	0.0106***	0.0141***	0.0072**	0.0144***
	(0.0011)	(0.0055)	(0.0011)	(0.0057)
$ECT(-1)$	-0.8229***	-0.3514***	-0.7495***	-0.3783***
	(0.0355)	(0.0419)	(0.0676)	(0.0135)
Minimum thresholds	18.22%	n.a.	n.a.	n.a.

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. n.a. means not available since the square of financial development variables are not statistically significant or it failed to exhibit an open parabola curve.
Source: Author's computation (2022).

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First, the short run analysis in this sub-section shows the dynamic pattern in the model and also ensures that the dynamics of the model have not been constrained by inappropriate lag length specification. In Table 6a, the lag length on all variables as the model was set at one and three for VECM and ARDL respectively because the number of observation is limited while putting the augmenting the variables into one model and this was found to be sufficient based on the results of the automatic selection of Schwarz Information Criterion (SIC). Accordingly, the results were presented in columns 1-4 based on the variables of financial development. The error correction term (ECT) that measures the speed or degree of adjustment is reported in the short-run estimation results in Table 6a. It shows the rate of adjustment at which the outcome variable changes owing to changes in the explanatory variables. The coefficients of the ECT are found to be negative and statistically significant at the conventional level for the models in columns 1–4. For the augmented model of financial development index, the ECT value (-0.3783) implies that the model corrects its short-run disequilibrium by 37.83% speed of adjustment in order to return to the long run equilibrium.

According to the short-run parameters, it shows that the lag one of inclusive growth has a negative relationship with the current level of inclusive growth but its significant estimate was only established in the first column. Thus, it does not follow the a'priori expectation as it means that the level of economic activities in the previous periods are not sufficient to ensure improvement in economic activities in the current short period. For the financial development variables, only domestic credit to private sector by banks exhibit an open parabola curve i.e. a U-shape curve in the short run. However, broad money supply and financial development index also exhibit the attribute but its squared coefficient is not significant statistically. As for interest rate spread, the signs of its coefficients do not exhibit the attributes of an open parabola curve, albeit the coefficients are statistically significant at 5% level. The study concludes that the minimum domestic credit to private sector by bank as a ratio of GDP that would stimulate inclusive growth is at 18.22% in the short run. As regards the key factors of inclusive growth, the table shows that investment is an enabler of inclusive growth while labour force participation rate have conflicting parameter estimates. In the case of the controlling variables, trade openness has positive link with inclusive

growth whereas inflation and exchange rate positively influenced inclusive growth.

Table 6b: Long-run estimates of financial development and inclusive growth

Variables	Dependent Variable: Inclusive Growth (*incg*)			
	1	2	3	4
Capital investment (k)	-0.2273**	0.1096***	-0.0295*	0.0598
	(0.0594)	(0.0318)	(0.0111)	(0.1272)
Labour force participation rate (lb)	-0.0550	-2.1880***	-0.4323***	-5.8790***
	(0.1360)	(0.1817)	(0.0824)	(0.6184)
Domestic credit to private Sector (dcps)	-3.0186***			
	(0.5941)			
Broad money supply (bm)		-2.4933***		
		(0.3605)		
Lending rate spread (lrs)			-0.6661***	
			(0.1271)	
Financial development index (fd)				6.9011***
				(1.0711)
Financial development squared	0.1119***	0.0699***	-0.0383***	-4.9515***
	(0.0199)	(0.0103)	(0.0083)	(0.5641)
Trade openness(topen)	0.1403	0.4866***	0.2129***	1.7571***
	(0.0741)	(0.0294)	(0.0205)	(0.1250)
Inflation rate (inf)	-0.0136	0.0533***	0.0259***	-0.2305***
	(0.0100)	(0.0119)	(0.0038)	(0.0393)
Exchange rate (exr)	0.0015	-0.0254***	0.0127***	-0.0092
	(0.0037)	(0.0051)	(0.0013)	(0.0176)
Constant	22.843***	-0.0493***	23.644***	-0.0357
	(10.355)	(0.1142)	(4.4700)	(0.1184)
Minimum thresholds	13.49%	17.84%	n.a.	0.697
Adjusted R^2	0.7759	0.4350	0.6793	0.4154
F-Stat	74.737***	4.1329***	51.163***	3.0574***
Serial Correlation	(0.7019)	(0.9769)	(0.6255)	(0.6992)
Normality Test	(0.2888)	(0.2458)	(0.2794)	(0.1696)
Heteroskedasticity test	(0.5031)	(0.2312)	(0.2964)	(0.7921)

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. n.a. means not available since the square of financial development variables are not statistically significant or it failed to exhibit an open parabola curve.
Source: Author's computation (2022).

As for the long-run estimates in Table 6b, the parameters of domestic credit to private sector by banks to GDP and broad money supply to GDP exhibit an open parabola curve i.e. a U-shape curve. The coefficient of financial development index exhibits a downward open parabola curve i.e. an inverted U shape since its squared estimates is less than zero. Concerning the coefficient of interest rate spread, the signs do not exhibit the attributes of an open parabola curve, although the coefficients are statistically significant at 5% level. Therefore, the minimum domestic credit to private sector by bank and money supply (as ratios of GDP) that stimulates inclusive growth is at 13.49% and 17.84% in the long run respectively. However, financial development exhibits a maximum threshold of 0.697 that maintain inclusive growth in the long run. Regarding the key factor of inclusive growth, capital investment and labour force participation rate have negative impacts on inclusive growth. Concerning other control variables, trade openness ameliorates inclusive growth but the coefficients of inflation and exchange rate shows conflicting outcomes.

Besides, the coefficient of determination (measured by the Adjusted-R^2) is high for the models in column 1–4 which ranges from 41.54% to 77.59%. As for the augmented model of the financial development index (column 4), the adjusted R^2 at 41.54% indicate that about 41.54% of the total variations in inclusive growth was explained by the financial development variables in the model. As for the overall test, the F-statistics values are statistically significant at 5% level of significance which means that the estimated models are well specified and statistically significant. Concerning the diagnostic tests, the estimated VECM and ARDL models are tested for serial correlation, normality and heteroskedasticity. The results in Table 6b revealed that the models passed the serial correlation test indicating that the error terms are not correlated up to order 2. The null hypothesis of normality and heteroskedasticity tests were not rejected at the conventional rate implying that the error terms are normally distributed and have same variance.

Table 7a: Short-run Estimates of Inclusive Growth Components (Robustness Checks)

Variables	Per Capita Income Growth (*gdpg*)				Income Equality (*equ*)				Employment Rate (*emp*)			
	Domestic credit	Money supply	Interest rate spread	Financial dev. Index	Domestic credit	Money supply	Interest rate spread	Financial dev. index	Domestic credit	Money supply	Interest rate spread	Financial dev. index
	1	2	3	4	5	6	7	8	9	10	11	12
Δ(incg(-1))	2.317***	-0.313*	-0.394***	-0.406***	1.074***	0.798***	-0.111**	0.019***	-0.417***	-0.541***	-0.369***	-0.579***
	(0.112)	(0.195)	(0.065)	(0.171)	(0.136)	(0.223)	(0.051)	(0.205)	(0.046)	(0.155)	(0.107)	(0.150)
Δ(k(-1))	-2.008***	0.109	-0.760***	0.028	1.953***	0.054	-0.308**	0.061	0.117	-0.019		0.057
	(0.112)	(0.234)	(0.087)	(0.208)	(0.198)	(0.185)	(0.072)	(0.175)	(0.098)	(0.216)		(0.206)
Δ(lb(-1))	1.704***	-2.129	3.384***	-1.751	1.623***	1.088	3.046***	1.818	-1.410***	0.866***		1.056***
	(0.085)	(1.445)	(0.433)	(1.405)	(0.113)	(1.062)	(0.353)	(1.303)	(0.502)	(0.159)		(1.518)
Δ(dcps(-1))	-0.440				6.983***				4.406***			
	(0.277)				(0.882)				(0.565)			
Δ(bm(-1))		-1.018				0.443				0.253		
		(1.090)				(1.726)				(1.211)		
Δ(lds(-1))			2.984***				9.338***				2.868**	
			(0.643)				(0.533)				(1.084)	
Δ(fd index(-1))				-0.832				0.078				0.230
				(1.253)				(1.223)				(1.534)
Δ(fd^2(-1))	-0.109***	0.032	-0.227***	0.761*	-0.262***	-0.017	-0.304***	-0.303	-0.116***	-0.013	-0.218***	-0.288
	(0.012)	(0.029)	(0.043)	(0.468)	(0.028)	(0.063)	(0.026)	(0.441)	(0.019)	(0.032)	(0.071)	(0.535)
Δ(topen(-1))	-2.424***	0.280**	-0.296***	0.282**	-1.431***	0.757***	-0.717***	0.155***	-0.511***	-0.139		-0.176
	(0.104)	(0.109)	(0.052)	(0.128)	(0.104)	(0.088)	(0.0397)	(0.011)	(0.046)	(0.116)		(0.126)
Δ(inf(-1))	0.623***	0.0004	0.085***	0.011	0.382***	-0.019	-0.494***	-0.011	-0.132***	0.026		0.018
	(0.022)	(0.048)	(0.020)	(0.048)	(0.040)	(0.043)	(0.026)	(0.043)	(0.021)	(0.050)		(0.049)
Δ(exr(-1))	-9.155***	0.040	-9.587***	0.034	13.51***	0.0081	14.21***	0.019	-3.109***	-0.113**	-1.303	-0.114***
	(0.526)	(0.036)	(1.017)	(0.036)	(1.113)	(0.037)	(0.857)	(0.033)	(0.702)	(0.040)	(1.612)	(0.040)
ECT(-1)	-0.456***	-0.673***	-0.764***	0.410***	-0.625***	-0.304**	-0.738***	0.193***	-0.807***	-0.142**	-0.633***	-0.086***
	(0.018)	(0.057)	(0.077)	(0.061)	(0.081)	(0.127)	(0.0398)	(0.024)	(0.043)	(0.0594)	(0.105)	(0.0054)
Min. thresholds	n.a.	n.a.	6.58%	0.547	13.31%	n.a.	15.37%	n.a.	18.99%	n.a.	6.58%	n.a.

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. n.a. means not available since the square of financial development variables are not statistically significant or it failed to exhibit an open parabola curve.
Source: Author's computation (2022).

Table 7b: Long-run Estimates of Inclusive Growth Components (Robustness Checks)

Variables	Per Capita Income Growth (*gdpg*)				Income Equality (*equ*)				Employment Rate (*emp*)			
	Domestic credit	*Money supply*	*Interest rate spread*	*Financial dev. Index*	*Domestic credit*	*Money supply*	*Interest rate spread*	*Financial dev. index*	*Domestic credit*	*Money supply*	*Interest rate spread*	*Financial dev. Index*
	1	2	3	4	5	6	7	8	9	10	11	12
Capital	-0.305***	0.554***	-0.108	-0.016	-3.723	1.074***	-1.428**	-0.957**	-0.672*	-0.219***	-0.595*	0.523***
	(0.078)	(0.163)	(0.163)	(0.188)	(2.223)	(0.063)	(0.485)	(0.444)	(0.351)	(0.092)	(0.307)	(0.238)
Labour	-1.039***	-8.338***	-2.565**	9.856***	-2.846	-2.837***	-3.389*	-21.38***	-2.031**	6.397***	0.632	12.68***
	(0.349)	(0.926)	(1.117)	(0.930)	(3.875)	(0.221)	(1.745)	(2.115)	(0.703)	(0.531)	(0.913)	(1.146)
Domestic Credit	-5.018***				-3.227**				1.152			
	(0.549)				(1.099)				(3.987)			
Money supply		-14.59***				18.58***				7.337***		
		(1.873)				(0.642)				(1.044)		
Lending rate			-2.325				9.843**				10.59***	
			(1.897)				(3.722)				(3.412)	
FD index				9.475***				-24.88***				13.62***
				(1.581)				(3.650)				(1.981)
FD squared	0.202***	0.423***	0.054	-6.833***	1.138**	-0.701***	-1.433***	11.54***	-0.103	-0.201***	-0.695***	-5.998***
	(0.023)	(0.054)	(0.125)	(0.849)	(0.349)	(0.023)	(0.304)	(1.9907)	(0.142)	(0.030)	(0.245)	(1.037)
Trade	0.360**	1.878***	1.124***	-2.671***	1.328	0.863***	1.876**	5.998***	0.340	-1.275***	-0.204	-2.856***
	(0.177)	(0.152)	(0.324)	(0.189)	(1.662)	(0.035)	(0.633)	(0.427)	(0.214)	(0.085)	(0.199)	(0.230)
Inflation	-0.240***	0.230***	-0.076	-0.207***	0.231	0.024*	0.717***	0.845***	0.0012	-0.242***	-0.031	-0.731***
	(0.012)	(0.060)	(0.094)	(0.059)	(0.249)	(0.013)	(0.222)	(0.142)	(0.087)	(0.034)	(0.077)	(0.072)
Exch. Rate	-4.160***	-0.059**	-3.570	0.027	-12.85	-0.080***	0.288	-0.161**	-13.30***	0.109***	-11.71***	0.120***
	(0.507)	(0.025)	(2.388)	(0.026)	(13.88)	(0.006)	(3.787)	(0.059)	(2.751)	(0.015)	(3.256)	(0.033)
Constant	1.124	-0.727	1.494***	-0.517	5.313	0.147	2.215**	0.132	2.7182***	0.302	8.719**	0.251
	(2.034)	(0.717)	(0.580)	(0.734)	(3.512)	(0.690)	(0.909)	(0.686)	(0.528)	(0.802)	(4.826)	(0.816)
Min. Thresholds	12.43%	17.24%	n.a.	0.693	1.42%	13.26%	3.43%	1.08%	n.a.	18.29%	7.62%	1.135
Adjusted R²	0.6084	0.4207	0.7844	0.3249	0.6260	0.4468	0.5700	0.4474	0.7581	0.4339	0.6356	0.4353
F-Statistics	3.924***	4.731***	5.311***	4.765***	4.34***	3.962***	6.682***	4.529***	4.908***	5.838***	9.412***	4.850***
Serial Correlation	(0.7249)	(0.8983)	(0.4523)	(0.9902)	(0.4109)	(0.7889)	(0.6020)	(0.7987)	(0.1903)	(0.7183)	(0.7570)	(0.4986)
Normality Test	(0.4432)	(0.5021)	(0.3443)	(0.6381)	(0.5814)	(0.2564)	(0.5820)	(0.1176)	(0.0629)	(0.3294)	(0.5509)	(0.2123)
Heteroskedasticity	(0.7020)	(0.3214)	(0.2232)	(0.2352)	(0.5909)	(0.2931)	(0.9120)	(0.2513)	(0.8508)	(0.2189)	(0.2690)	(0.1938)

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. n.a. means not available since the square of financial development variables are not statistically significant or it failed to exhibit an open parabola curve.
Source: Author's computation (2022).

Concerning the short run estimates of the robustness checks in Table 7a, it shows that the minimum domestic credit to private sector by banks as a ratio of GDP threshold that stimulate income equality and employment is 13.31% and 18.99% respectively. Similarly, the minimum financial development index that stimulates income per capita growth is 0.547. As for the short run interest rate spread parameters, the results show that the maximum interest rate spread thresholds that sustain income growth, income equality and employment are 5.68%, 15.3% and 6.58% respectively. In the long run, the minimum domestic credit to private sector to GDP threshold that arouse income per capita growth and income equality is 12.43% and 1.42% respectively. Concerning the minimum money supply to GDP threshold, it stimulates per capita income growth, income equality and employment at 17.24%, 13.26% and 18.29% correspondingly. The maximum interest rate spread threshold that would uphold income equality and employment rate is 3.43% and 7.62% respectively. Overall, the thresholds of financial development index that stimulate income growth, income equality and employment rate is 0.693, 1.077 and 1.135 respectively.

Also, the coefficient of determination is relatively high for the estimated models in column 1–12 which range from 32.49% to 75.81%. The overall test shows that the explanatory variables statistically and significantly influence inclusive growth components at 5% level. With reference to the diagnostic tests, the estimated VECM and ARDL models are tested for serial correlation, normality and heteroskedasticity. The results in Table 7b revealed that the models passed the serial correlation test indicating that the error terms are not correlated up to order 2. The null hypothesis of normality and heteroskedasticity tests were not rejected at the conventional rate implying that the error terms are normally distributed and have same variance.

5. Conclusion

The study examines the thresholds of financial development that stimulate inclusive growth in Nigeria between 1985 and 2020. Using both VECM and ARDL estimators, t he study provides the empirical results regarding the financial development threshold that stimulates inclusive growth. Concerning the financial development indicators, the study shows that the minimum domestic credit to private sector by bank as a ratio of GDP that would stimulate short run inclusive growth is at

18.22%. Statistical data from the Central Bank of Nigeria shows that the country only had her domestic credit to private sector by bank as a ratio of GDP greater than 18.22% in 2008 and 2009 standing at 18.57% and 19.6% respectively. The country only had a 12 year periods of double digit whereas the remaining years had single digits. On the other hand, the minimum broad money supply, interest rate spread and financial development index that boost inclusive growth was not established in the short run. In the long run, it was discovered that the minimum domestic credit to private sector by bank and money supply (as ratios of GDP) that stimulate inclusive growth are at 13.49% and 17.84% in the long run respectively. However, financial development exhibits a maximum threshold of 0.697 that maintain inclusive growth in the long run. The thresholds of interest rate spread were not established bath at short and long run.

Based on the findings that the role of money supply cannot be overemphasized in the inclusive growth process in Nigeria, the apex bank needs to control money supply in a way that it would not cause disequilibrium between the aggregate demand and supply or excess liquidity/shortage. It means that money supply smoothen the rate at which economic activities in Nigeria grew over the years. In addition, cautious action is also needed by the financial industry for domestic credit to private sector by banks in order to achieve a desirable level of inclusive growth. This was based on the findings that it played a key role in determining the growth inclusiveness in Nigeria. The action should be limited to the absorptive capacity of the economy as it tends to promote overall output growth and revive the Nigerian economy. Concerning the fact that interest rate spread is also an important financial variables that determine the inclusive growth pattern of the Nigerian economy, the Monetary Policy Committee (MPC) should take caution and also coordinate its activities when setting the monetary policy rate so that the desired behavioural changes in the real sector will be achieved.

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Appendix

Appendix Ia: ARDL and Johansen Cointegration Test of Income Growth
A) ARDL Cointegration Test Result

Dependent variable: y	Functions	F-statistics
Model I ARDL (2, 3, 3, 3, 3, 3, 3, 3)	$F_{gdpg}(gdpg\|k, lb, dcps, dcps^2, topen, \inf, exr)$	15.031***
Model II ARDL (2, 1, 1, 2, 2, 2, 2, 1)	$F_{gdpg}(gdpg\|k, lb, lds, lds^2, topen, \inf, exr)$	6.7492***

	1%		5%		10%	
	I(0)	*I(1)*	*I(0)*	*I(1)*	*I(0)*	*I(1)*
Critical bound values for the models (k = 7)	2.73	3.90	2.17	3.21	1.92	2.89

Note: ***, ** and * denote rejection of null hypothesis at 1%, 5% and 10% significance levels respectively. gdpg - GDP per capita growth; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU/US$).
Source: Authors' computation (2022).

B) Johansen Cointegration Results

| Series | Lags interval (in first differences): 1 to 1 | | | | |
| | Trend assumption: *Linear deterministic trend* | | | | |
	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
	$r = 0$	0.912037	216.9240***	159.5297	82.64837***	52.36261
	$r \leq 1$	0.780334	134.2756**	125.6154	51.53200**	46.23142
	$r \leq 2$	0.642075	82.74358	95.75366	34.93266	40.07757
gdpg, k, lb, bm,	$r \leq 3$	0.445079	47.81092	69.81889	20.02358	33.87687
bm², topen, inf, exr	$r \leq 4$	0.326903	27.78734	47.85613	13.45946	27.58434
	$r \leq 5$	0.204283	14.32788	29.79707	7.769385	21.13162
	$r \leq 6$	0.119651	6.558499	15.49471	4.332869	14.26460
	$r \leq 7$	0.063363	2.225630	3.841466	2.225630	3.841466
	$r = 0$	0.902744	225.3304***	159.5297	79.23386***	52.36261
	$r \leq 1$	0.836270	146.0965***	125.6154	61.52430***	46.23142
	$r \leq 2$	0.593064	84.57220	95.75366	30.56934	40.07757
gdpg, k, lb, fd, fd²,	$r \leq 3$	0.532428	54.00286	69.81889	25.84690	33.87687
topen, inf, exr	$r \leq 4$	0.315264	28.15596	47.85613	12.87655	27.58434
	$r \leq 5$	0.229836	15.27941	29.79707	8.879166	21.13162
	$r \leq 6$	0.111999	6.400247	15.49471	4.038621	14.26460
	$r \leq 7$	0.067102	2.361626	3.841466	2.361626	3.841466

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. gdpg - GDP per capita growth; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU per US$, period average).
Source: Author's computation (2022).

Appendix Ib: ARDL and Johansen Cointegration Test of Income Equality
A) ARDL Cointegration Test Result

Dependent variable: y	Functions					F-statistics
Model I ARDL (2, 3, 3, 3, 3, 3, 3, 3)	$F_{equ}(equ\|k, lb, dcps, dcps^2, topen, \inf, exr)$					4.2802***
Model II ARDL (2, 3, 3, 3, 3, 3, 2, 3)	$F_{equ}(equ\|k, lb, lds, lds^2, topen, \inf, exr)$					10.419***
	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
Critical bound values for the models (k = 7)	2.73	3.90	2.17	3.21	1.92	2.89

Note: ***, ** and * denote rejection of null hypothesis at 1%, 5% and 10% significance levels respectively. equ - Income Equality; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU/US$).
Source: Authors' computation (2022).

B) Johansen Cointegration Test

Series	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
	Lags interval (in first differences): 1 to 1					
	Trend assumption: *Linear deterministic trend*					
equ, k, lb, bm, bm² topen, inf, exr	r = 0	0.914971	239.7856***	159.5297	83.80208***	52.36261
	r ≤ 1	0.774429	155.9835***	125.6154	50.63016**	46.23142
	r ≤ 2	0.653642	105.3533***	95.75366	36.04959	40.07757
	r ≤ 3	0.550637	69.30374*	69.81889	27.19740	33.87687
	r ≤ 4	0.452110	42.10634	47.85613	20.45712	27.58434
	r ≤ 5	0.345894	21.64922	29.79707	14.43254	21.13162
	r ≤ 6	0.147644	7.216685	15.49471	5.431547	14.26460
	r ≤ 7	0.051150	1.785138	3.841466	1.785138	3.841466
equ, k, lb, fd, fd², topen, inf, exr	r = 0	0.907157	254.2200***	159.5297	80.81261***	52.36261
	r ≤ 1	0.812396	173.4074***	125.6154	56.89627***	46.23142
	r ≤ 2	0.719161	116.5112***	95.75366	43.17914**	40.07757
	r ≤ 3	0.583014	73.33203**	69.81889	29.73987	33.87687
	r ≤ 4	0.434612	43.59216	47.85613	19.38825	27.58434
	r ≤ 5	0.393235	24.20391	29.79707	16.98685	21.13162
	r ≤ 6	0.157472	7.217059	15.49471	5.825856	14.26460
	r ≤ 7	0.040092	1.391203	3.841466	1.391203	3.841466

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. equ - Income Equality; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU per US$, period average).
Source: Author's computation (2022).

Appendix Ic: ARDL and Johansen Cointegration Test of Income Equality

A) ARDL Cointegration Test Result

Dependent variable: y	Functions				F-statistics	
Model I ARDL (2, 3, 2, 3, 3, 3, 1, 2)	$F_{emp}(emp|k, lb, dcps, dcps^2, topen, \inf, exr)$				16.7606***	
Model II ARDL (2, 0, 0, 1, 1, 0, 0, 1)	$F_{emp}(emp|k, lb, lds, lds^2, topen, \inf, exr)$				3.8984**	
	1%		**5%**		**10%**	
	I(0)	*I(1)*	*I(0)*	*I(1)*	*I(0)*	*I(1)*
Critical bound values for the models (k = 7)	2.73	3.90	2.17	3.21	1.92	2.89

Note: ***, ** and * denote rejection of null hypothesis at 1%, 5% and 10% significance levels respectively. emp – employment rate; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU/US$).
Source: Authors' computation (2022).

B) Johansen Cointegration Test

Series	Lags interval (in first differences): 1 to 1					
	Trend assumption: *Linear deterministic trend*					
	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
	r = 0	0.931084	246.4084***	159.5297	90.94541***	52.36261
	r ≤ 1	0.811918	155.4629***	125.6154	56.80983***	46.23142
	r ≤ 2	0.603656	98.65311**	95.75366	31.46607	40.07757
emp, k, lb, bm,	r ≤ 3	0.554705	67.18703*	69.81889	27.50662	33.87687
bm², topen, inf, exr	r ≤ 4	0.428265	39.68041	47.85613	19.00868	27.58434
	r ≤ 5	0.260681	20.67173	29.79707	10.26886	21.13162
	r ≤ 6	0.169582	10.40287	15.49471	6.318097	14.26460
	r ≤ 7	0.113204	3.084772	3.841466	3.084772	3.841466
	r = 0	0.907863	261.2966***	159.5297	81.07213***	52.36261
	r ≤ 1	0.853744	180.2245***	125.6154	65.36139***	46.23142
	r ≤ 2	0.725294	114.8631***	95.75366	43.92984**	40.07757
emp, k, lb, fd, fd²,	r ≤ 3	0.598609	70.93322**	69.81889	31.03590*	33.87687
topen, inf, exr	r ≤ 4	0.417454	39.89733	47.85613	18.37177	27.58434
	r ≤ 5	0.254197	21.52555	29.79707	9.971992	21.13162
	r ≤ 6	0.189107	11.55356	15.49471	7.127045	14.26460
	r ≤ 7	0.122073	3.426518	3.841466	3.426518	3.841466

Note: ***, ** &* denotes rejection of the hypothesis at the 0.01, 0.05 and 0.1 level respectively. emp - employment Equality; dcps - Domestic credit to private sector by banks (% of GDP); bm - Broad money (% of GDP); lds - Interest rate spread (lending rate minus deposit rate, %); fd - Financial development index; k - Gross fixed capital formation (% of GDP); lb - Labor force participation rate, total (% of total population ages 15-64); topen - Trade (% of GDP); inf - Inflation, consumer prices (annual %); and exr - Official exchange rate (LCU per US$, period average).
Source: Author's computation (2022).