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Financial deepening and human development in Nigeria: A non-linear approach

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ABSTRACT

Objective: The study investigated the effect of credit supply on GDP on Human Development and as well examined the impact of Money supply on GDP on human development. It equally assessed the link between bank penetration and human development and the link between financial intermediation and human development.

Research Design & Methods: This study used ex-post facto research design and a Non-Linear Autoregressive Distributed Lag (Asymmetry ARDL) to estimate the effect of financial deepening on human development. Eview 11 was used for the analysis.

Findings: This research work discovered that the positive contribution of credit supply and money supply to human development in Nigeria is weak and the relationship between financial deepening and development is not always linear. The study revealed that the effect of branch expansion in Nigeria is negative because of limited bank products or services.

Implications & Recommendations: The implication of this study is that expansionary monetary policies have the most significant positive impact on human development in Nigeria. The expansionary policy can as well worsen human development through inflationary pressure while a contractionary policy is an anti- human development approach and its effects on human development are negative. The study therefore recommends that: The central bank of Nigeria should place more emphasis on expansionary monetary tools to drive development and be cautious of inflation. CBN and banks should monitor their credit to avoid loan diversion by the beneficiaries and to beat extreme poverty.

Contribution & Value Added: The study used asymmetry ARDL model as an improvement over the conventional regressions that the previous authors have been using to examine the link between financial deepening and human development.

Article type:	research article
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INTRODUCTION

The rising case of poor human development is a major source of concern for policymakers in many economies. This concern has recently been heightened by worrying state of unemployment and continuous government inability to better the life of the masses due to scarce financial resources. Many policymakers believe that increasing financial access to the poor masses is a desirable goal because it would enhance human development. It is worthy of note that, human development, poverty alleviation, reduction in inequality and economic growth may not be possible in developing countries without financial system access, financial system depth, financial system efficiency (IMF, 2018). In recent time, financial deepening and human development has been subject of hot debate by policy makers in both developed and developing economies of the World. Part of the efforts made by Policy makers include

setting of Sustainable Development Goals by United Nations, enactment of Community Reinvestment Act of 1997 by United States and this Act requires banks to extend credit throughout their area of operations and discouraging them from targeting only small social and economic elites to break the cycle of poverty and other human development challenges (UNDP, 2015).

Similarly, The United Kingdom Department for International Development (UKDFID) put in place the Financial Deepening Challenge Fund in year 2000 to encourage UK and local financial services providers expand the ranges of financial products available in Africa and South Asia. In 2001 Canada introduced a legislation which requires all banks to offer bank accounts without minimum opening balances.

Related attempts made in developing economies include microfinance banking policy of 2005, financial sector reform of 1986, Central Bank of Nigeria Bank's Recapitalization policy of 2004, Financial Sector Development and Reform Program of 2014 which aim at achieving Global financial access in Nigeria and South Africa (World Bank Global Financial Development Report, 2014). In spite of all the aforementioned policies, the fact still remains that programmes, policies and legislative framework initiated in Nigeria to address people's economic, social and financial deepening challenges could be considered ineffective, weak and counterproductive (Adegboyo *et al.*,2021).

Hence, the debates on how financial deepening influence human development still remain a tensed issue without any moderate consensus and what is evident in developing nations is that there has been growing inequality and very narrowed financial services (Asongu, 2015). The issue of whether those countries that have formulated and adopted policies and programmes that can mitigate financial deepening challenges have witnessed human development still remains question to be empirically analyzed in Nigerian context.

The earliest studies by Schumpeter (1911), Gurley and Shaw (1955) which investigate the relationship between financial development and economic growth failed give empirical backing to their idea and did not believe that finance is one of the determinants of growth in their array of write ups on economics.

Another set of researchers (Enrica *et al.*, 1994; Gusav *et al.*, 1997) study the link between economic growth and human development and established a significant relationship in both direction.

Latest researches by Asteriou and Spano (2019), Younsi and Bechini (2018), Onaolapo (2015), Babajide *et al.* (2015) centre on Financial development, economic growth and inequality, financial inclusion and economic growth, with findings that financial inclusion, financial development has a positive effect on economic growth and inequality.

From all indications, the link between financial development and economic growth, financial development and inequality, financial inclusion and economic growth have been receiving much empirical attention locally and internationally but little is known about the effects of financial deepening on human development in Nigeria.

Additionally, this study is also motivated by the idea that an appropriate modelling or methods of analysis is needed to diagnose the real effect of financial deepening on human development. Thus, this work employed Asymmetric Autoregressive Distributed Lag as an improvement on conventional regressions to analysis the effect of financial deepening on human development.

The objectives of the study are:

1. To investigate the effect of credit supply to GDP on Human Development
2. To examine the impact of Money supply to GDP on human development
3. To assess the link between bank penetration and human development
4. To evaluate the relationship between financial intermediation and human development.

Based on the objectives of this study, the following hypotheses were formulated in their null form:

H1: Credit to private sector does not have significant effect on human development in Nigeria.

H2: Money Supply does not have significant impact on human development in Nigeria.

H3: Banks branch penetration does not have significant link human development in Nigeria.

H4: There is no significant relationship between commercial bank intermediation and human development in Nigeria.

Financial deepening may do more for the poor than simply help them achieve greater economic stability and prosperity. It could also provide the poor with greater cognitive resources, which would allow them to focus on basic needs and other necessity of life like education of their children, raise the volume of savings and investment (Goldsmith, 1969; McKinnon, 1973; Shaw, 1973).

LITERATURE REVIEW

Conceptually, financial deepening could be described as an expansion in the scale of financial transactions in comparison with a national economy. Financial deepening drives economic growth, human development and alleviates poverty (Gelb, 1989; King & Levine, 1993; Levine, 2005; Levine *et al.*, 2000; Roubini & Sala-i-Martin, 1991; Stiglitz & Weiss, 1981; World Bank, 2018;). For this study, financial deepening simply means widening the supply of financial bonds, cash, stock, deposit liabilities or valuables in the economy. Notably, Gurley and Shaw (1955), McKinnon (1973) among many authors made two crucial observation on financial deepening. Firstly, the development of real money balance is a welcome development for an economy and secondly the development of an economy relies heavily on financial development and financial intermediation. However, in order to give empirical evidences to these propositions (Beck & Levine, 2002; Federici & Caprioli, 2009; Levine, 2005; Liu & Hsu, 2006; Ogwumike & Ifagandeh, 2008; Qi & Teng, 2006; Shaw, 1973; Tsoukas, 2011) carried out a number of cross-countries studies to accept or refute the propositions.

Financial Intermediation

It is the channeling of funds from the surplus unit to the deficit unit of the economy. The process of linking the borrowers and users together is likely to result in the deepening of the financial system (Goldsmith, 1969; Greenwood & Jovanovic, 1990; Harold, 2019). Linking users and the providers of funds will also increase investment. Channeling of fund from the surplus units to the deficit units of the economy promotes growth by way of higher cost of fund to be received on money, and the improved economic performance in turn makes it possible to execute a costly financial mix (Greenwood & Jovanovic, 1990). In the view of Montiel (1995), Beck and Levine (2004), growth and financial development are interconnected because to a limited extent, per capita income can determine the level of financial development and on the other hand, financial development can influence economic growth on temporary and permanent basis. The dimensions of financial deepening which are the channels through which the growth and development of economy are influenced include financial intermediation, bank penetration, Credit to the private sector to GDP, money supply to GDP, market capitalization to GDP, Treasury Bill Etcetera (IMF, 2018).

Human Development

Human development has to do with giving people opportunities and access to basic necessity of life to enhance their living standard, respecting human right and all other forms of self-esteems, access to education, health, political and economic independence (United Nations, 2015; UNDP, 2019). Human development has remained a topical issue in the global discuss because of the perceived and the assumed links between economic growth and development in the second half of the 20th Century (United Nations, 2015). In the beginning of 1960s there were agitations and calls to place less relevance to GDP because economic growth (GDP) had assumed both the leading objective, and measurement of economic performance in many countries in spite of the fact that GDP was not purposely created to be the measure of welfare. From 1970s to 80s development experts strongly argued using alternative focuses to go beyond GDP, by putting greater emphasis on employment, income redistribution, and whether people had met their basic necessity of life. The argument paved way for human development approach, which is about enhancing human life, instead of simply looking at the booming outlook of the economy in which human beings live. The HDI is captured with three key variables: Long life, measured as life expectancy at birth, educational qualification and health.

King and Levine Theory of Financial Development

These theorists re-investigate and re-confirm Schumpeter's study in 1993 and posit that indicators of financial development which are; financial depth or money supply to GDP, the contribution of banks in relation to the central bank, the proportion of bank loan given to individuals and private firms, and credit supply to private sector in relation to GDP are evidently and robustly related with growth, physical capital allocation efficiency and that financial development indicators are significantly associated with the latter coefficient of growth index. King and Levine are of the view that financial development influences the economic development. This theory is relevant to this study because a major indirect channel by which financial development affect human development is through economic growth (Galor & Tsiddon, 1996; Perroti, 1993).

Endogenous Growth Model

The endogenous growth model was pioneered by Lucas and Romer to shed light on the relationship between finance and economic growth. The theory of endogenous growth contends that economic growth is derived from within the economic system as a direct result of internal mechanism (Aghion *et al.*, 1998; Romer, 1994; Solow, 2000). In particular, the theory contends that improvement in human capital will improve the economic performance due to innovation or new forms of technology as well as efficient and effective ways of production.

Empirical Review

In the work of Ranis (2004), human development was used interchangeably with human capital to indicate a two way relationship between economic growth and human development and made a prominent suggestion that countries may enter either into a worsening situation of high growth and large gains in human development, or a difficult situation of low growth and low rates of human development. According to Ranis (2004), the levels of economic growth and human development are jointly dependent, either leading towards a higher spiral of development, or a cycle of poverty. However, the continuity and persistence of these cycles relies on the extent of the connectivity between economic performance and human development. Rani emphatically made a resounding assertions concerning the situation of developing countries; he pointed out that nations could find themselves in a cockeyed state, at least temporarily, with better growth and relatively poor human development, or vice versa. He further pointed out that the basis for poverty are; endemic corruption in government, poor social expenditures, and inequality in income distribution.

On the relationship that exist between financial deepening and human development, Jorgenson and Fraumeni (1994) reveal that human capital investment in the form of education and health spending by banks and government reduces mortality and increases life span thereby enhancing productivity. Similarly, studies on hospital financing highlight the importance of financial institutions in health care financing by exploring the use of derivatives and bonds (Stewart & Owhoso, 2004; Stewart & Trussel, 2006).

Studies by Becker (1962), Nelson and Phelps (1966), Romer (1994), Lucas (1990), Mushkin (1962), Benhabib and Spiegel (1994) assert that investment in human beings through financing of education, on the job trainings and health care inputs has future returns not only for the individual but for entire economy. Therefore, investment in health by households and expansion of the health sector by government and the private sector affect health outcomes and health-related factors like life expectancy, mortality, labour market participation and productivity, human capital accumulation, fertility decisions and demographic structure (Agenor, 2015).

Durusu-Ciftci *et al.* (2017) examine the long run effect of financial development on economic growth using a dataset of forty countries from 1989-2011. The analysis was carried out using Augumented-Mean Group and Common-Correlated Effect. It was reported that financial development has long run effect on per capital income and that credit market contributed significantly to growth.

Akther *et al.* (2020) research on the relationship among finance, human development and growth in 118 countries including 54 IOC countries from 1996 to 2014 using GMM approach. The result of their findings revealed that there exist a positive link between human development variables (average year of

schooling, primary, secondary and tertiary school participation and health spending to GDP) and economic performance. While financial development (domestic credit to private sector, M3, banking deposit and financial system deposits to GDP) and economic growth are negatively correlated, bank cost to income that measures financial system efficiency has negative correlation with the economic growth.

Younsi and Bechtini (2020) evaluate the relationship among growth, financial development and inequality in BRICS countries using panel data analysis and cover the period between 1995 and 2015. The data for financial development were constructed for BRICS countries using Principal Component Analysis. The results of the study indicated that there is a long-run relationship between growth, financial development and inequality. It was reported that GDP per capital has significant positive impact on income inequality while the squared term of GDP per capital has significant negative effect on income inequality. The result of the study showed existence of unidirectional relationship between financial development indicators and income inequality while there is bidirectional causal link between inflation and income inequality.

Agheli and Hadian (2017) investigate the nexus between finance and growth for fifteen developing and Middle Eastern countries using Kónya (2006) bootstrapped panel methodology. The study covers 1980 to 2013. The findings from the study demonstrates that a low financial development account for non- existence of causal relationship between financial development and economic growth. However, there is existence of supply leading and demand following evidence for some others.

Kilic and Ozcan (2018) investigate the relationship between financial development and human capital development in emerging economies between 1990 and 2015 using panel dataset. The researchers constructed proxies for human capital and financial development to mirror the dimensions of both variables. The result of the study showed that financial development has a positive significant impact on human capital in emerging economies.

Asteriou and Spanos (2019) investigate the nexus between financial development and economic growth having factored in the shock from 2008/2009 financial crisis and introduced Structural break to capture pre-financial- crisis and post-financial crisis effect of financial development on growth. The study used panel dataset of twenty six European Union countries and covers 1990-2016. The result of the study revealed that financial development enhanced growth before and after the financial crisis and retard economic activity after the crisis.

Osuka *et al.* (2018) investigate the nexus between human development and financial deepening using time series data from 1991 to 2015 and ARDL approach. The findings of the study revealed that there is a unidirectional causal relationship between financial deepening and Human Development. The study also asserts that financial deepening is a sin-qua-non for improving Human Capital in Nigeria.

Maciejewski and Głodowska (2020) confirm that the countries that experienced the highest level of economic development has no justification to believe that higher level of development in the financial system retards their economic performance. The result further assert that the development of the financial sector, which is harmful to economic performance, occurs in nations that are in transitional stage and those countries with an average economic development level.

Cheshti (2017) investigate the relationship between human development index developed by UNDP and financial development indicator developed by IMF. The result of the investigation revealed that financial development has significant and enhancing effect on human development.

RESEARCH METHODOLOGY

The study use ex-post facto research design.

Model Specification

The study adapts Levine and King's model with little modifications to achieve the study objectives.

Levine and King's (2002) regression is specified as:

$$Y_{it} = a_0 + B_1 F_{it} + B_2 X_{it} + e_{it} \quad (1)$$

Where Y_{it} is the growth or development, a_0, B_1, B_2 are coefficients, F_{it} is an indicator of a country i Financial Sector Development at time t, X_{it} is the value of control variable for a country i at time t, e_{it} is the error term.

However, the dependent variable (growth) in the Levine and King's regression in the equation (i) above was substituted with Human development in the equation (ii) below;

$$HDI_{it} = a_0 + B_1F_{it} + B_2X_{it} + e_{it} \quad (2)$$

because of the interconnectivity that exists between growth and development.

The independent variable (indicators of financial sector development) in the equation (i) above was also substituted with financial deepening variables in the equation (ii) below;

$$HDI_{it} = a_0 + B_1FD_{it} + B_2X_{it} + e_{it} \quad (3)$$

because financial deepening is synonymous with financial development and is a more acceptable measure of increase in the scale of financial transactions as indicated in the IMF report of 2018.

Time series regression /equation as against the panel regression above were formulated for this study.

According to (IMF, 2018; King and Levine, 2002; UNDP, 2015) the modified or expanded model for this study is specified as follows:

$$hdi_t = f\left(\frac{m2_t}{gdp_t}, \frac{cps_t}{gdp_t}, dep_t, bp_t\right) \quad (4)$$

where:

$\frac{m2_t}{gdp_t}$ - is the ratio of broad money supply to GDP (financial deepening);

$\frac{cps_t}{gdp_t}$ - is the ratio of credit to private sector to GDP (financial deepening);

$deposit_t$ - is the total bank deposit (bank intermediation);

bp_t - is bank penetration (financial access).

Table 1. Sources and Measurement of Variable

Variables	Definition/Meaning	Sources
HDI	Human development index	United Nation Development Programme Report (1990-2019)
$\frac{m2_t}{gdp_t}$	Ratio of money supply to GDP	Central Bank of Nigeria Statistical Bulletin (1990-2019)
$\frac{cps_t}{gdp_t}$	Ratio credit to private sector to GDP	Central Bank of Nigeria Statistical Bulletin (1990-2019)
Bank deposits	Total deposit in the Nigerian banks	Central Bank of Nigeria Statistical Bulletin (1990-2019)
Bank penetration	Total number of banks branches in Nigeria	Central Bank of Nigeria Statistical Bulletin (1990-2019)

Source: UNDP (2020); CBN (2020).

Pre-Estimation Test

First and foremost, a pre estimation analysis such as descriptive statistics and unit root test were conducted to know the data characteristic and order of integration. The unit root test considered are conventional unit root; namely ADF, Kwiatkwoski-Phillips-Schmidt-Shin (KPSS), Zivot Andrew unit root and confirmatory analysis by comparing ADF with KPSS and Zivot Andrew. Zivot Andrew was specifically included to handle single break and guide the researcher on the appropriate estimation model.

Model Estimation

Asymmetric Autoregressive Distributed Lag (non-linear econometric approach) which is an extension of Auto Regressive Distributed Lag (ARDL) was used to analyse the relationship or the effect of financial deepening on human development in Nigeria because of the non-normality and asymmetric problem. Unlike conventional time series regression which assumes linearity, constant parameter

and proportional changes between the dependent and independent variables, the Asymmetric ARDL assumes asymmetric relationship and considers the fact that nonlinearity is very common within the social sciences and that asymmetry is fundamental to human condition (Pesaran & Shin, 2001). It is the view of the researcher that estimating a relationship which perhaps contains asymmetry with symmetric techniques would appear unfair and lead to serious inappropriate policy conclusion and recommendations (Pessaran & Shin, 2001). The flexibility and suitability of Asymmetric ARDL for 1(0) and 1(1) order of integration, and its capability to test for hidden long run relationship and perform better when the sample is small is appealing to the researcher (Granger & Yoon, 2002).

According to Pessaran and Shin (2001) ARDL model is specified as:

$$\Delta HDI_t = \alpha + \sum_{i=1}^{n} B_{1i}\,\Delta HDI_{t-i} + \sum_{i=0}^{n} B_{2i}\,\Delta \frac{M2}{GDP}_{1t-i} + \sum_{i=0}^{n} B_{3i}\,\Delta \frac{CPS}{GDP}_{2t-i} + \sum_{i=0}^{n} B_{4i}\Delta DEP_{4t-i} + \sum_{i=0}^{n} B_{6i}\Delta BPE_{5t-i} + C_1 HDI_{t-1} + D_1 \frac{M2}{GDP}_{t-1} + D_2 \frac{CPS}{GDP}_{t-1} + D_4 DEP_{t-1} + D_5 BPE_{t-1} + e_{it} \quad (5)$$

Where Δ represent first difference, HDI is the dependent variable, t is period, α denote intercept, $\frac{m2_t}{gdp_t}, \frac{cps_t}{gdp_t}, dep_t, bp_t$ are expressed in form of k by 1 vector of regressors, $C_1, D_1, D_2, D_3, D_4, D_5$ represent long run coefficients while B_1, B_2, B_3 represent short run coefficients, $t - i$ represent optimal lags for the dependent and independent variable, e_{it} represents error term.

However, to examine if the assumption that nonlinearity is very common within the social sciences and that asymmetry is fundamental to human condition are valid and detect asymmetric effects of financial deepening on human development, the researcher decompose financial deepening variables into its positive and negative partial sums:

$$\frac{M2}{GDP_t}^{+} = \sum_{j=1}^{t} \Delta \frac{M2}{GDP_j}^{+} = \sum_{j=1}^{t} \max(\Delta \frac{M2}{GDP_{j,0}}^{+}) \quad (6)$$

$$\frac{M2}{GDP_t}^{-} = \sum_{j=1}^{t} \Delta \frac{M2}{GDP_j}^{-} = \sum_{j=1}^{t} \min(\Delta \frac{M2}{GDP_{j,0}}^{-}) \quad (7)$$

$$\frac{CPS}{GDP_t}^{+} = \sum_{j=1}^{t} \Delta \frac{CPS}{GDP_j}^{+} = \sum_{j=1}^{t} \max\left(\Delta \frac{CPS}{GDP_{j,0}}^{+}\right) \quad (8)$$

$$\frac{CPS}{GDP_t}^{-} = \sum_{j=1}^{t} \Delta \frac{CPS}{GDP_j}^{-} = \sum_{j=1}^{t} \min\left(\Delta \frac{CPS}{GDP_{j,0}}^{-}\right) \quad (9)$$

$$DEP_t^{+} = \sum_{j=1}^{t} \Delta DEP_j^{+} = \sum_{j=1}^{t} \max\left(\Delta DEP_{j,0}^{+}\right) \quad (10)$$

$$DEP_t^{-} = \sum_{j=1}^{t} \Delta DEP_j^{-} = \sum_{j=1}^{t} \min\left(\Delta DEP_{j,0}^{-}\right) \quad (11)$$

$$PENE_t^{+} = \sum_{j=1}^{t} \Delta PENE_j^{+} = \sum_{j=1}^{t} \max\left(\Delta PENE_{j,0}^{+}\right) \quad (12)$$

$$PENE_t^{-} = \sum_{j=1}^{t} \Delta PENE_j^{-} = \sum_{j=1}^{t} \min\left(\Delta PENE_{j,0}^{-}\right) \quad (13)$$

RESULTS AND DISCUSSION

Descriptive Statistics

From the table 1, the null hypothesis of normal distribution was rejected for deposits and the proportion of Credit Supply to GDP. This technically revealed that distribution of these two variables were not independent and identical. The results provided by Skewness, Kurtosis and Jarque Bera P value as regard deposits and credits supply showed the presence of potential asymmetry in the distribution of time series data. Therefore, the asymmetric autoregressive distributive lag modeling (NARDL) might be needed to address the problem of asymmetry (Shin *et al.*, 2014), if further preliminary test also suggest non linearity.

From The kurtosis statistic, bank penetration, CPS/GDP, M2/GDP were platykurtic in nature while HDI and Deposits on the other hand are leptokurtic. From the results below using the P-values associated with the Jarque-Bera statistics, the HDI, M2/GDP and bank penetration were normally distributed while CPS/GDP was marginally abnormal and Deposits was not normal. Overall, both deposits and CPS/GDP exhibited non normality or asymmetric and the issue of asymmetry might stem from non-normality and asymmetry of both the bank deposits and CPS/GDP.

Table 2. Descriptive statistics

Variables	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque-Bera Prob.	Prob.
HDI	0.46	0.48	0.58	0.32	0.074	-0.52	2.17	2.30	0.32
DEPOSITS	2714.233	451.9631	12146.91	11.49	3970.380	1.324259	3.338325	9.208435	0.010010
CPS/GDP	11.2599	8.2436	20.773	6.2173	5.3757	0.8703	1.9585	5.3145	0.0701
BPENE	3327.129	2407.000	5809	1367	1527.368	0.540499	1.684861	3.743440	0.153859
M2/GDP	14.48608	13.0639	21.2905	9.1517	3.9306	0.5732	1.8072	3.5350	0.1708

Source: own computation using Eview, 2021.

Preliminary or Pre estimation Analysis

While it is essential to conduct a formal unit root test, it is of upmost importance to first plot the time series under investigation in order to get a clearer picture of the stationarity and integrating properties of the variables. Based on the above view, HDI, M2/GDP, CPS/GDP, Deposits and Bank Penetration were graphically examined and presented in figure 1 to 5 (Appendix). It is evident from the graph that the variables were trended in nature which was a clear evidence of unequal means and variance over-time (which means the variables could only be stationary after difference). The researcher had on this basis assumed that the variables under study were not stationary over the study period.

Unit Root Test

The researcher employed Augumented Dickey Fuller, Kwiatkowski-Phillips-Schmidt-Shin test statistic and Zivot Andrews unit root tests to examine numerically and statistically the stationarity nature of the variables since using these three unit root test would enhance the credibility of the unit root test results (Enders, 1995). ADF and KPSS unit root test were initially conducted to determine the properties of the series. The researcher discovered that there existed a structural break in the series while carrying out preliminary test. The descriptive statistics such as skewness, Kortois and JB statistics pointed out the issue of non-normality or asymmetries which made the researcher to suspect that ADF and KPSS unit roots might have given ambiguous and false result because both tests ignored the importance of structural break in a series. Hence, Zivot Andrew unit root was employed to confirm the existence of a structural break and the timing of the break because ZA is capable of providing superior empirical results in the presence of unknown single structural break in the series.

Table 3. Augumented Dickey Fuller

Variable	Constant with trend @level	@difference	Order of integration
HD	–	-4.296729 (-7.169834)***	1(1)
CPS/GDP	–	-4.323979 (-4.760542) ***	1(1)
M2/GDP	–	-4.309824 (-4.880502) ***	1(1)
Deposits	–	-4.309824 (-6.910605) ***	1(1)
Bank penetration	–	-3.679322 (-3.688802)***	1(1)

* (**) (***) denotes significance at 10%, 5% and 1%.

Source: own computation using Eview, 2021.

Table 4. Kwaiatkowski Philips – Schmidt-Shin (KPSS) Unit Root

Variables	Constant with trend level	Order of integration
HD	0.216000 (0.090042)	1(1)
CPS/GDP	0.216000 (0.164708)	1(1)
LM2/GDP	0.216000 (0.095679)	1(1)
Deposits	0.216000 (0.188756)	1(0)
Bank penetration	0.216000 0.081170	1(1)

Source: own computation using Eview, 2021.

Table 5. ZIVOT Andrew Unit Root Result

Variable	T-Stat	Time break	Order of Integration
HD	-5.3475 (-10.3465) ***	1993	1(0)
CPS/GDP	-5.3475 (-5.6307) ***	2006	1(1)
LM2/GDP	-5.3475 (-5.8758) ***	2006	1(1)
Deposits	-5.7191 (-7.9220) ***	2003	1(1)
Bank penetration	-5.3475 (-5.6367) ***	2003 (3rd quarter)	1(1)

* (**) (***) denotes significance at 10%, 5% and 1%.
Source: own computation using Eview, 2021.

Table 6. Confirmatory analysis

Variable	ADF	KPSS	ZA with break	Decision
HD	1(1)	1(1)	1(0) (1993 + 2month)	inconclusive decision due to structural break
CPS/GDP	1(1)	1(1)	1(1) (2006 +5months)	Conclusive decision
LM2/GDP	1(1)	1(1)	1(1) (2006+6months)	Conclusive decision
Deposits	1(1)	1(0)	1(1) (2003+7months)	Conflicting decision due to break
Bank penetration	1(1)	1(1)	1(1) (2003+3months)	Conclusive decision

Source: own computation using Eview, 2021.

NARDL Model

Before conducting the NARDL test, the researcher strictly follow Pessaran and Shin rule of I(1) for the dependent variable, I(1) and I(0) or mutually cointegrated for independent variables (see table 6 for details). Although, the unit root result for HD and deposit were not conclusive, yet the NARDL result remained valid because a valid conclusion could be drawn from the Bound test for cointegration even in the presence of a conflicting unit root tests (Pesaran et al, 2001). As part of the preliminary steps, the researcher logged deposit variable which appeared to have exhibited skeweness and exponential distribution while HDI, CPS/GDP and M2/GDP were not logged because they were in percentage. From the NARDL results, 99% of the variation in human development was explained by money supply, bank credit, deposits and bank penetration. The DW value of 3.14 indicated that appropriate lags were selected for the model and there was no serial correlation. The F- statistics is statistically significant at 1%. Thereafter, the long run coefficient (calculated) obtained are 0.08, 0.15, 0.07, 0.23, 0.00007,

0.00009, 0.000056 and 0.000027 respectively. From the above long run coefficient, an increase in the proportion of money supply led to about 8% improvement in the human development index while a decrease (contractionary policies*)* in the proportion of money supply led to a fall in human development index by 15%. An increase in the proportion of credit supply to the private sector would improve human development index by 7% but a decrease (contractionary policies) in the proportion of credit to the private sector would worsen or deplete human development index by 23%.

Interestingly, bank penetration and deposit had significant negative and positive impact on human development index in Nigeria. The cumulative effect of Branch expansion was negative and this result is consistent with Cristina and Paola (2017) which was an indication that branch expansion has not increased credit availability, service quality, client base, financial depth, financial efficiency and general accessibility to bank services. The cumulative effect of deposit mobilization was positive. In the short run, a negative shock to money supply sometimes worsened or improved human development index while a positive shock to money supply also reflected mixed result on human development but the cumulative effect of the shock in money supply on human development is positive and this was a confirmation of Nonlinear relationship between money supply and human development in Nigeria.

The Nonlinear effect of money supply on human development might be attributable to policy inconsistence and huge proportion of cash outside the bank system. Surprisingly, there was also asymmetry relationship between credit to private sector and human development in the short run. It was discovered that a positive shock to credit had a negative effect on human development and this might be attributable to factors such as; country inability to meet an empirically acclaimed Pro growth/development threshold of 70-100% of CPS to GDP. Likewise, a negative shock to credit supply significantly worsened human development in Nigeria.

Conclusively, the cumulative effect of credit supply on human development was negative for the period under study. Both negative and positive shocks to bank branch penetration affect human development negatively in the short run. There was also an asymmetry relationship between bank deposits and human development. The mixed effect of bank deposit on human development is not surprising because this might be attributable to poor saving habit and low income of the Nigerians.

Table 8. Nonlinear ARDL Model

Variables	Coefficient	Std. Error	T-Statistic	Probability
Constant	**-0.147523**	**0.001047**	**-140.8786**	**0.0045*** **
$HD(-1)$	0.142287	0.001737	81.89394	0.0078***
$M2\ TO\ GDP^{+}(-1)$	0.011388	0.0000273	417.0473	0.0015***
$M2\ TO\ GDP^{-}(-1)$	0.021024	0.0000509	412.9660	0.0015***
$CR\ TO\ GDP^{+}(-1)$	-0.O10186	0.0000506	-201.3121	0.0032***
$CR\ TO\ GDP^{-}(-1)$	-0.032211	0.000122	-263.6596	0.0024***
$BANK\ PENE^{+}(-1)$	0.0000105	0.000000221	47.69439	0.00133***
$BANK\ PENE^{-}(-1)$	-0.0000128	0.000000472	-27.19923	0.0234***
$DEPOSIT^{+}(-1)$	-0.0000079	0.000000055	-146.0322	0.0044***
$DEPOSIT^{-}(-1)$	0.0000384	0.000000185	207.1087	0.0031***
$\Delta M2\ TO\ GDP^{-}(-1)$	-0.005413	0.0000284	-190.5700	0.0033***
$\Delta BANK\ PENE^{+}(-1)$	0.0000352	0.000000129	273.8736	0.0023***
$\Delta CR\ TO\ GDP^{+}(-1)$	-0.015196	0.0000448	-338.8482	0.0019***
$\Delta CR\ TO\ GDP^{-}(-1)$	-0.019564	0.0000891	-219.5042	0.0029***
$\Delta M2\ TO\ GDP^{-}(-1)$	0.018877	0.0000720	248.5911	0.0026***
$\Delta M2\ TO\ GDP^{+}(-2)$	-0.004254	0.0000428	99.37927	0.0064***
$\Delta DEPOSIT^{+}$	-0.0000019	0.000000067	-28.75614	0.0221***
$\Delta M2\ TO\ GDP^{+}$	0.014061	0.0000631	222.8851	0.0029***
$\Delta HD(-3)$	-0.145470	0.000529	-257.1090	0.0023***
$\Delta CR\ TO\ GDP^{+}(-3)$	-0.007631	0.0000198	-385.6169	0.0017***
$\Delta CR\ TO\ GDP^{-}(-2)$	-0.006073	0.0000371	-163.7828	0.0039***
$\Delta BANK\ PENE^{-}(-3)$	0.0000501	0.000000429	116.7659	0.0055***

Variables	Coefficient	Std. Error	T-Statistic	Probability
Constant	**-0.147523**	**0.001047**	**-140.8786**	**0.0045*** **
$\Delta CR\ TO\ GDP^{-}(-3)$	0.010118	0.0000725	139.6260	0.0046***
$\Delta DEPOSITS^{-}(-3)$	-0.019352	0.000310	-62.34250	0.0102***
$\Delta DEPOSITS^{+}(-3)$	0.00000137	0.0000000803	17.00361	0.0374***
$\Delta M2\ TO\ GDP^{+}(-1)$	0.000303	0.0000629	4.820326	0.1302

* (**) (***) denotes significance at 10%, 5% and 1%; R2 – Adjusted 0.9999;
F – Stat (51.0956)0.001105; RSS 0.00000000138; DW 3.136126
Source: own Ccomputation using Eview, 2021.

From the table 8, the calculated f-stat of 51.79 was statistically significant at 1% and exceeds the upper bound Pessaran critical value of 4.01 when k is 4 at 5% p-value. This confirmed the existence of hidden cointegration between Human Development and Financial Deepening for the period under study. There was a long run nonlinear relationship between financial deepening and human development in Nigeria.

Table 9. Bound Test of Cointegration for NARDL

Test Statistic	Value	Df	Probability
F-statistic	51.79378	(7, 1)	0.0011***
Chi-square	36.25565	7	0.0000***

* (**) (***) denotes significance at 10%, 5% and 1%
Source: own computation using Eview, 2021.

Test for Presence of Asymmetry

The table 9 investigated the presence of asymmetry using Wald Test. The calculated f-stat of 33.26 is statistically significant at 1% and exceeds the upper bound Pessaran critical value of 4.01 when k is 4 at 5% p-value. From the result, the null hypothesis of equality is rejected as p-value is less than 0.05. The Wald test indicated that there was asymmetry in the long run impact of financial deepening on Human Development. The positive effect of the series was not the same with the negative effect of the series on Human Development. It was evident from this result that positive shock and negative shock of financial deepening had unequal and mixed effect on Human Development. The result gave a picture of the happenings in Nigeria because in spite of the positive trend for PCI between 2003 -2015 couple with the increase in M2/GDP and increase in bank deposits base, increase in credit and bank branch expansion, the living condition of Nigerians have deteriorated.

Table 10. Test for asymmetry

Test Statistic	Value	Df	Probability
F-statistic	33.26911	(5, 1)	0.0042
Chi-square	16.63456	5	0.0000

* (**) (***) denotes significance at 10%, 5% and 1%
Source: own computation using Eview, 2021.

Discussion

This study found that financial deepening has short run and long run asymmetric effect on human development in Nigeria. From the long run coefficient, an increase in the proportion of money supply led to about 8% improvement in the human development index while a decrease (contractionary policies) in the proportion of money supply led to a fall in human development index by 15%. Investigation also revealed that an increase in the proportion of credit supply to the private sector would improve human development index by 7% but a decrease (contractionary policies) in the proportion of credit to the private sector would worsen or deplete human development index by 23% and this result was consistent with empirical studies of Fry, 1995; World bank, 1990; World bank, 2017; Huber,2018. Obviously, money supply and credit supply played significant but weak role in human development and this was contrary to the work Levine (2000) and supported the research work of

Maciejewski and Głodowska (2020). Interestingly, both bank penetration and deposit mobilization has a significant effect on human development.

CONCLUSIONS

Previous studies (Kilic & Ozcan, 2018; Osuka *et al.*, 2018), affirmed that financial deepening variables had significant and positive effect on human development. However, this research work discovered that the positive contribution of credit supply and money supply to the development in Nigeria is weak and the relationship between financial deepening and development is not always linear. The study revealed that the effect of branch expansion in Nigeria is negative because of limited bank products or services. It was concluded that there is mixed relationship between financial deepening variables and human development in Nigeria. Conclusively, an inverted U-shape link between financial deepening and development has been empirically confirmed by this study for Nigeria when contractionary monetary policy was applied. The limitation for this study is lack of long run data for human development index and lack of consensus on the appropriate measure of human development. Future studies should consider the role of inflation in financial deepening and human development because expansionary policies expose monetary authority to inflationary pressure.

Since money supply to GDP and credit supply to GDP seem to have the most significant impact on human development in Nigeria, the following recommendations were made in line with the findings of the study.

The central bank of Nigeria should place more emphasis on expansionary monetary tools to drive development and be cautious of inflation.

Policy makers should maintain a Credit to GDP ratio of not less than 70% in order to influence human development (income level, education, health,) positively.

CBN and banks should monitor their credit to avoid loan diversion by the beneficiaries and to beat extreme poverty.

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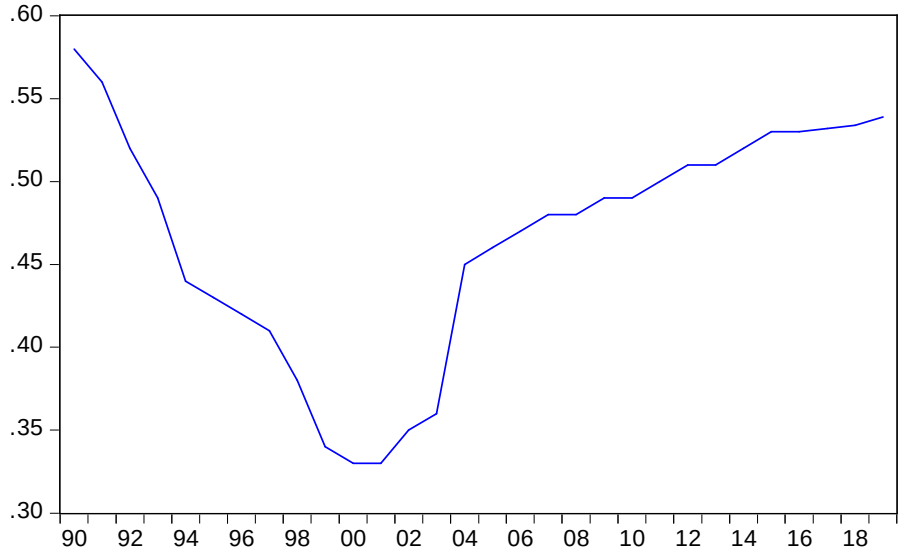
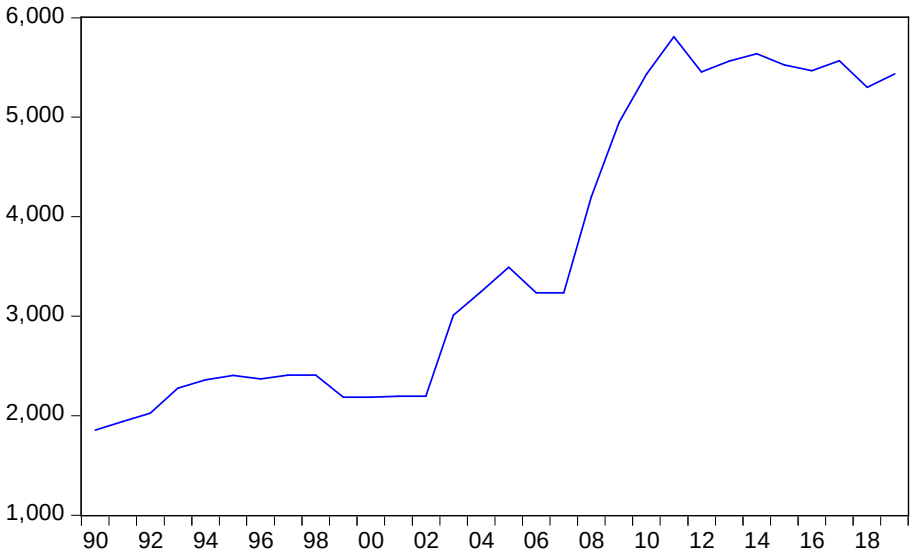
Appendix:

HDI



Source: own computation (2021) using Eviews

BPENE



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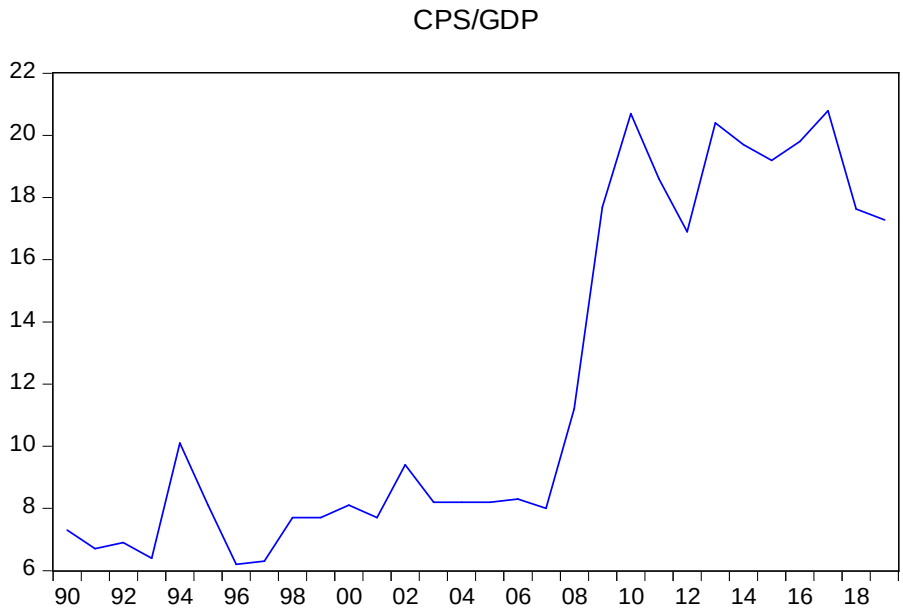

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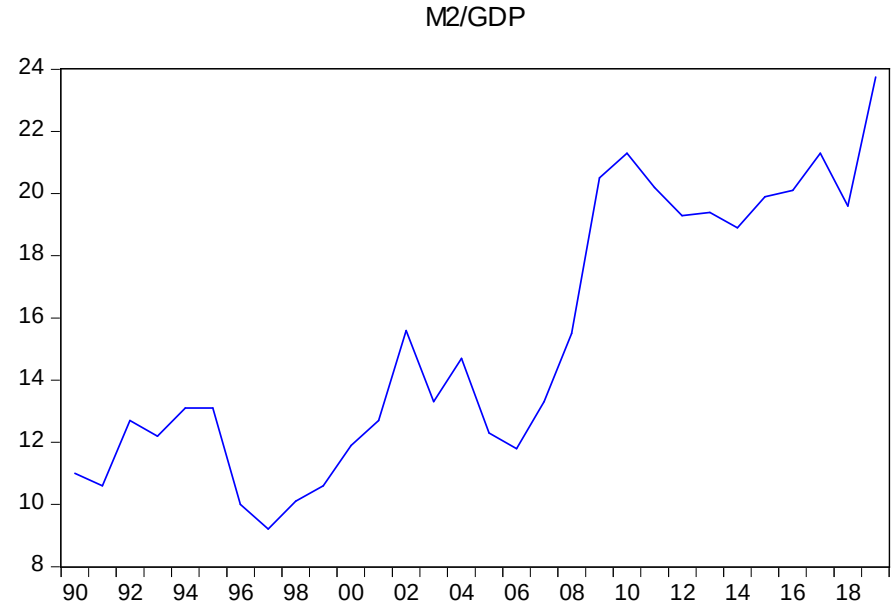

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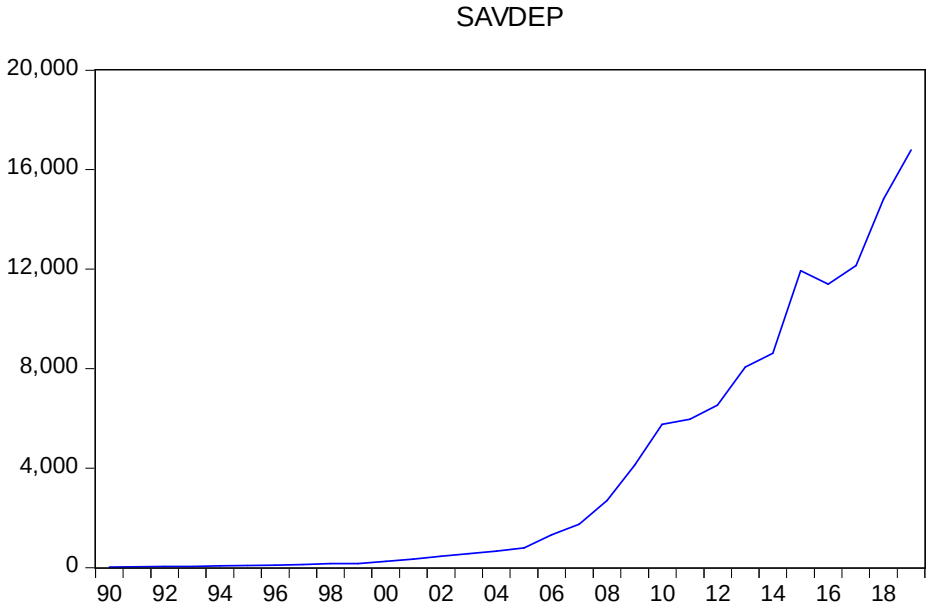

Source: own computation (2021) using Eviews

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Conflict of Interest

T The author hereby declare that there was no any financial that could influence the result of this research.

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