

## Macroeconomic Variables Nexus and Human Development Index in Nigeria: 1986-2018

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**Abstract:** *The study looked at the connection between macroeconomic variable and human development index in Nigeria for the period 1986-2018. The variables for the study are money supply, government spending, price increases, exchange rate and interest rate are proxy for macroeconomic variables (the independent variable) and human development index (HDI) (the dependent variable). The data used for the study was sourced from Central Bank of Nigeria (CBN) statistical bulletin and World Bank Development Indicator. The data were analyzed with econometrics techniques involving descriptive statistics, Augmented Dickey Fuller and Philip Peron test for unit root. The auto regressive distributive lag (ARDL) was used to determine the effect of relationship between macroeconomic variable and human development index (HDI). The result obtained indicated that macroeconomic variables had a significant long run and short run effect on human development index (HDI) in Nigeria. Specifically money supply and interest rate have significant negative effect on human development index (HDI), government expenditure has a significant positive effect, whereas inflation rate and exchange rate have mixed dynamics shocks with negative and positive effects at varying short term periods in Nigeria. The study made some of the following recommendations: (a) That relevant policy instrument be put in place to increase human development index (HDI) through the creation of favourable socio-economic environment, (b) Government should increase the education budget to accommodate the poor children in the streets whose parents cannot afford school fees and finally government should encourage private sector investment to create employment opportunities so as to improve the quality of life and living standard of Nigeria people.*

**Keywords:** *Human development index, dependent variable, independent variables, macroeconomic variable, socio-economic environment*

## **INTRODUCTION**

Individuals are the most priceless possessions in every financial system (Ogunleye, Owolabi, Sanyaolu and Lawal, 2017). To attain expansion, it is crucial for this asset to be managed appropriately and efficiently. One way this can be done is by making sure enough investment is made in human capital. Human capital is the ability and skills of human assets and human capital development is the process of getting and growing the number of person who have the skills, education and know-how which are vital for the economic advancement of the country (Adelekum, 2011).

Macroeconomic indices are pointers showing the existing trade in the economy. The macroeconomics indices affect the total action, makeup, behaviour and resolution of an economy as a whole (O' Sullivan and Sheffrin, 2003). Like all professionals, the government in order to administer the total economy, must do an investigation and comprehend the major indices that decide the present behaviour of macro-economy (Beraharden, 2009). In today's world, we construe macroeconomic indices quite differently within the limit of the international economic crisis and other external economic shocks as they crop up and we cannot relate the directly observed macroeconomic indices in chaotic situations in the same way as we do in a serene period. The key macroeconomic pointers used in the study are money supply interest rate, inflation rate, government expenditure and exchange rate.

The human development index (HDI) is a arithmetical tool used to calculate a country's general accomplishment in its social and economic magnitude. The social and economic magnitude of a country is based on the health of people, their level of educational achievement and their style of living. The HDI was created to draw attention to the fact that people and their abilities should be the major deciding factor for assessing the progress of a country and not economic growth alone. The HDI can also be sued to question national policy choices, asking how two countries with the same level of GNI per capital can end up with different human development outcomes. These dissimilarities can arouse arguments about government policy main concern.

The human development index (HDI) is a rundown measure of normal accomplishment in major aspects of human development. a long, hale and hearty life, well-informed and a good standard of living. The HDI is the geometric mean of standard measures for each of these trade magnitudes.

### **Statement of the Problem**

In the past macroeconomic indices and human development index (HDI) have drawn major concentration from finance and development professionals and have been argued at length. quite a lot of studies executed on macroeconomic indices and human development index are with diverse findings. For instance Sullivan and Steven (2003) found that macroeconomic indices impact positively on human development index (HDI). Temitope and Bola (2013) and Eweren, Magbemens, Nwaogwugwu (2015) also relayed positive impacts on health care. Oluwatoye Adegboye and Fagebeminiyi (2018) reported a positive effect on education and mixed effect on gross national income per capital.

Again, empirical studies in Nigeria that employed time series data to calculate the consequence of macroeconomic indices on human development index (HDI) are little. Adding up, most of the studies did not think about the short run shocks on human development index (HDI).also a good number of the studies lack consensus on their findings on macroeconomic indices nexus and human development (HDI). One of the reasons for this is the lack that the these countries have different levels of macroeconomic indices and human development index(HDI) and their dimensions. This study therefore goes in line with the existing empirical studies by using yearly data for most recent year 2018 and autoregressive distributive lag model that is able of reporting both long run result and short run disturbances of macroeconomic indices on human development index in Nigeria.

### **Objective of the Study**

The main objective of the study is to investigate the effect of macroeconomic variables on human development index (HDI) in Nigeria.

However, other specific objectives include:

- i. Evaluate the effect of interest rate on human development index (HDI) in Nigeria.
- ii. Analyze the effect of inflation rate on human development index in Nigeria
- iii. Determine the effect of government expenditure on human development index in Nigeria.
- iv. Ascertain the effect of money supply on human development index (HDI) in Nigeria
- v. Examine the effect of exchange rate on human capital development (HDI) in Nigeria.

### **Research Questions**

The following research questions are raised in the course of this study:

- i. How does interest rate affect human development index (HDI) in Nigeria.
- ii. What are the effects of inflation rate on human development index (HDI) in Nigeria?
- iii. How does money supply affect human development index (HDI) in Nigeria?
- iv. How does government expenditure affect human development index (HDI) in Nigeria?
- v. What are the effects of exchange rate on human development index (HDI) in Nigeria?

### **Research Hypothesis**

The followings are the research hypothesis for the study stated in their null form.

- Ho<sub>1</sub>: Interest rate has no significant effect on human development index (HDI) in Nigeria.
- Ho<sub>2</sub>: Inflation rate has no significant effect on human development index (HDI) in Nigeria
- Ho<sub>3</sub>: Government expenditure has no significant effect on human development index (HDI) in Nigeria.
- Ho<sub>4</sub>: Money supply has no effect on human development index in Nigeria.

H<sub>05</sub>: Exchange rate has no effect on human development index (HDI) in Nigeria

### **Significant of the Study**

Findings from the study will be of great profit to different group of person:

**Financial Sector.** The study will be helpful to the financial sector beneficiaries as they will know if they are making feasible decision based on macroeconomic indices. The study will be of significance to administration since they can tell the relationship between financial proceeds and macroeconomic pointers.

**Government:** The result of the study will enlighten the government on how to make ample provisions for health and education sector. The research will help the government of the day to know the condition of health and education sector as the country and how to perk it up especially in terms of budgetary allotments.

**Investor:** The study will make clear to them on how investment decisions are affected by changes in the macroeconomy and would significantly shed some leading lights on the part of intending investors on the investment chances and the effect of macroeconomics indices on investment resolution.

**Academics, Scholars and Researcher:** This study will open up an new area that has not been studied, hence stir up inquisitiveness in trying to dig deeper in this field particularly for those who may be fascinated in carrying out additional investigation in this field.

### **LITERATURE REVIEW**

Macroeconomic indices are pointers that are important to broad economy at the local or the national level which affect a large population rather than a few individuals. The macroeconomic pointers such as inflation, money supply, government spending, exchange rate and interest rate substitutes for macroeconomic indices are used in this study and are deeply explained.

### **Definition of Human Development Index**

**Definition:** The Human Development Index (HDI) is a arithmetic tool used to ascertain a country's generally accomplishment in its social and economic perspective. The social and economic perspectives of a country are based on the health of people, their level of education achievement and their style of living.

**Description:** Pakistani economist Mahbub ul Haq created HDI in 1990 which was further used to ascertain the country's advancement by the United Nations Development Program (IJNDP). Estimation of the index combines four key pointers: life expectancy for health, expected years of schooling, mean of years of schooling for education and Gross National Income per capita for standard of living.

Every year UNDP grades countries based on the HDI report given in their yearly report. HDI is one of the greatest apparatus to keep trail of the level of development of a country,

as it uses all key social and economic pointers that are accountable for economic development

### **Human Development Index (HDI)**

The HDI was created to call attention to the fact that people and their capabilities should be the final decisive factor for appraising the development of a country, not economic growth alone. The HDI can also be used to query national guiding principle, asking how two countries with the same level of GNI per capita can end up with diverse human development results. These dissimilarities can arouse debate about government policy precedence.

The Human Development Index (HDI) is a rundown tool of standard attainment in major dimensions of human development: a long and healthy life, being well-informed and having a decent style of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.

The health dimension is measured by life expectation at birth, the education dimension is calculated by mean of years of schooling for adults aged 25 years and more and expected years of schooling for children of school entering age. The standard of living dimension is measured by gross national income per capita. The HDI uses the logarithm of income, to reflect the reducing value of income with rising GNI. The scores for the three HDI dimension variables are then combined into a complex index using geometric mean.

The HDI makes clear and takes into consideration only part of what human development involves. It does not look at inequalities, lack, human safety, empowerment, etc. The HDRO offers the other composite indices as broader proxy on some of the main subjects of human development, inequality, gender differences and lack.

### **Interest Rate**

Interest rate is the fee a borrower pays for the money loaned to him for business or other transaction intentions. Stakeholders lend money from banks and other financial institutions. The reaction of investment operating cost alters ardently with interest rate which is at the mind of money-making analysis Acha, & Acha, (2011). Interest rate is the other strong factors that influence financial laws as well as weaker financial payments in directing values of investors; it speeds up investment if the high interest rate is applicable on savings. Interest rate affects savings almost all commercial banks commencing macroeconomic theories. The negative effect of higher investment rate prevents the macroeconomic impact of interest rate laws. In New York, loan and cash offers money as a assurance to the borrower of security. This is the most familiar form reinvestment in business performance. This program takes the type of tailored term loan of a collection of securities. Because the business deal is personalized, it is hard to make general declaration regarding its use. That said lender may bargain an yearly payments for rights to loan securities from valuable owners complete collection.

The net outcome is a government spending on GNP which has been the residue to single important source of difference in excess of stabilization of interest rate laws. The aim of

interest rate is in its reaction to money investment by looking forward to reducing the discrepancy relating to rate is in effects of cost and interest rates in the commercial banks. The behaviour of interest rate lies on the basic substitutability of capital for other factors for investment to take place.

### **Inflation**

It is the continuous rise in the overall price level within the economy which affects the price of the domestic money (Fatukasi, 2012). It is not once and for all rising price movement but has to be continued over time and influence all goods and services in the economy. Many things are accountable for inflation in Nigeria. The inflation which falls out from excess total demand is called fall inflation, the cost push inflation arises from upward movement in the cost of manufacturing while the structural inflation arises from some problems such as ineffective production, marketing and allocation systems in the industrial sectors of the economy. Other forms of inflation in developing country could be imported, open and seasonal inflation through globally traded goods and services. This is when the economy imports goods from country already, undergoing inflation.

The open inflation comes as an after effect of undisturbed market instruments and seasonal inflation is connected with seasons in production when supply problems invades the economy as a consequence of decrease in production particularly in farming produce. In Nigeria, other reasons can be linked to inflation such the nature of the economy, its history, and fiscal and monetary policy direction. Inflation is defined as a widespread rise in the level of prices obtained over a long period in an economy (Lipsev and Chrystal, 2015), that is, a continual rise in the price levels of goods and services, leading to a decline in the currency's purchasing power. Although price rise is a household word in many market-charged economies, and there exist a body of empirical studies on the over-arching problem of inflation, yet only selected few seem to know about the causes, workings, and the real effect of inflation on national economic growth.

### **Government Expenditure**

Government expenditure is the total in cash terms of the federal, state and the local government spending together with transfers to the parastals and the three levels of the government (Anyato, 2016). In as much as public spending is highly sought-after it however talks from of allotment and stabilization of resources (Musgrave and Musgrave 1989). The allotment function becomes essential so as offer both private and in particular social goods in suitable mix with obtainable resources. The availability of social and physical amenities through public investment and expenditure on some commodities and services theoretical can directly perk up productivity in the private sector through more effective allotment of resources due to the unique features of social goods (spill over and extern lalties, non excludability) if they will be made available at all or where they are produced the outcome will be insufficient and shockingly expensive if left in the hand of private individuals ,observed the basis the form of interference of government in the economy, and the general impact of government activities as three significant issues on government fiscal laws and economic growth.. Kellick (2009) also agreed that it is the duty of the state through spending, to make available the desirable services which the price mechanism cannot provide or produce at all or would only do so at high cost and with

lesser social gain. The attitude of continuous spending is government expenditure made frequently from year to year some examples includes personal cost operating cost, utility services, telephones, furniture and equipment.

On the other hand capital spending are done on new construction, land and building acquirement, fixed assets which have projected working life more than one year. This splits aggregate spending into transfer and non-transfer spending generally; there is confident spending which does not bring about resultant transfer of real resources to the government, the payment on dept unemployment assistance is an example of this spending.

Here the governments typically move extra financial wealth to some segment of the society. On the other hand non transfer payment may comprise the exact spending undertaken by the government for the use of commodities and services, to a great level, the use of wealth gotten in exchange for non-transfer payment may also be for consumption or investment purpose. To this extent, one can say spending on defense, education energy, road, and amenities. In put otherwise, they are typically referred to as real spending, with regards to public spending classification on section. It is because capital and recurring spending arises from different time of benefit that financing differences exists, because capital spending gives benefit over services year, it is prepared that the price should extend over the year of that benefit.

### **Money Supply**

Money is a compilation of liquid asset that is usually acknowledged as a means of exchange and for settlement of debts. Amongst its role, it serves to cut down the use of limited resource or increase it slowly. Committed to trade, increases resources for production, encourages trade, promotes specialization, and contributes to a society's wellbeing (Singh et al 2011). The supply of currency at any time is the total amount of currency the economy at a point in time (Jhingan, 2006). In Nigeria, the narrow money supply (M1) is defined as currency outside bank plus demand of commercial banks plus domestic deposits with the central banks less Federal Government deposits at commercial banks. In simple term, M1 is defined as;

$$M1 = C + D$$

Where:

M1 = Narrow money supply

C = Currency outside banks

D = Demand deposits.

Ajayi (2008) argues that M2 is the suitable description of money in Nigeria. M2 includes not only notes and coin and banks current accounts, but also 7-days bank deposits and some building society deposits. In the Nigerian circumstance board money (M2) is defined as M1 plus quasi money. Quasi-money as used here is defined as the sum of savings and time deposits with commercial banks. Representatively shown as;  $M2 = C + D + T + S$

Where: M2 = Board money

T = Time deposit

S = Savings deposit

C and D as defined above. According to Anyanwu and Oikhenam (1997), broad money is that which can be easily changed to cash with little or no loss.

Monetary laws rests on the connection between the price at which money can be loaned and the aggregate supply of money in the economy. It is commonly referred to as being expansionary or contractionary, where an expansionary policy raises the supply of money in the economy speedily, and contractionary policy reduces the aggregate money supply.

### **Exchange Rate**

Theoretically, an exchange rate means the value of one currency in relation to another. Exchange rate is the proportion of a currency and the quantity of currency for which that unit can be exchanged at a given time (Ngerebo-a andlbe, 2013). In other words, exchange rate is the value of one's currency (Mordi, 2006). Exchange rate of currency is the relationship between home and international prices of commodities and services. Also, exchange rate can either increase or decrease. An increase in the exchange rate takes place if fewer unit of domestic currency exchanges for a unit of foreign currency while decrease in exchange rate takes place if extra unit of domestic currency exchanges for a unit of foreign currency.

The nominal exchange rate (NER) is a monetary notion which assesses the relative price of two countries' money or currencies, e.g., naira in relation to the U.S. dollar (e.g., ₦360: US\$ 1.00) and vice versa. But the real exchange rate (RER), as the name suggests, is a real idea that checks the virtual price of two goods-tradable goods (exports and imports) (Obadan, 2016). Also, the nominal exchange rate is the quantity of domestic currency that must be traded to obtain a unit of foreign currency. Exchange rate is the quantity of local or home currency needed to buy one unit of a international currency. According to Schiller (2008), the exchange rate is evaluated by the demand and supply of the foreign currency, trade balance, current account balance and capital account balance.

### **Theoretical Framework**

The theoretical framework of the study is based on the Keynesian Model because the theory is linked with economic expansion, investment, productivity by human capital and change in style of living. The Keynesian economic theory of 1936 during the great melt down states that there was inadequate total demand and that an active stabilization law was needed to ensure good economic performance. Therefore, fiscal policy devices were stipulated as the solution to inadequate total demand to drive the economy. To the Keynesian the personal owned business economy needs stabilized and fiscal laws. The Keynesian noted that personal owned business was conservative in nature and opted for a detailed interference to fine-tune the economy in the neighborhood to full employment and low inflation. Keynesian Model stated the importance of government interference in business through expenditure and debt financing. It follows therefore, that the hypothesis is appropriate in the study on developing economies like Nigeria. Keynesian argued that if more money is put in the hands of government, more jobs will be made available thus, increasing the style of living of the people. Long and healthy life, means of schooling or education and gross national income per capital thus, increasing the worth of human development index of the country.

### **Empirical Review**

Okafor and Ogbonna (2017) studied the long run connection between the macroeconomic indices and human development index in Nigeria. The indices were human development index, government expenditure on education sector in Nigeria the outcome of VAR model depicts that the testing shows that HDI is essential in the current year (-1) but seems to convey that the current value of EDU and HTH are most important factors that shows the current value of HDI (-1). It is economically confirmed that what affects human capital development in Nigeria are the nature pattern and level of government spending in education and health because the model reveal their significant direct impact on the HDI.

Onokero (2019) investigated the impact of fiscal laws on Nigeria human development index (HDI) during the democratic era (1999-2016). The study used the unit root, co-integration tests and error correction model on the time series data. The result showed that the HDI and selected fiscal policy indices incorporated in the model have a long run relationship during the period. The study also showed that fiscal policy indices of domestic debt and tax have direct and important effect on Nigeria HDI both in the short and long run period. Total government spending has opposite and insignificant impact on Nigeria HDI both in the short and long run. This meant that total government spending in the democratic period has not enhanced the wellbeing of Nigeria.

In addition, external debts had indirect and insignificant effect on Nigeria HDI in short and long run, this shows that budget deficit financing by external debt does not enhance the wellbeing of Nigerians. The total sum (CUSUM) and total sum of squares (cusum) of the remaining showed that Nigerian democratic system of government from 1999 to date is stable.

Al, Raza and Yousuf (2012) examined the role of fiscal law in the human development index of the paxistam. The study used the autoregression distributed lags (ARDL) bounds testing approach of co-integration on different macroeconomic indices from 1972 to 2010 to people in the country. The findings revealed a rise in per capital income and education development while tat showed has a negative and irrelevant effect on human development. democratic government has negative impact on human development index. The study suggests that there is need for policy maker to decrease the level of corruption in the public expenditure for maximum benefits of human wellbeing.

Nwakan and Nnamdi (2018) studied the connection between taxes and human development index in Nigeria for the period 1970-2010. Based on the income tax and exercise tax respectively displayed a positive relationship with the level of HDI. Also a negative connection exists between corporate tax and human development index. The Johansen Maximum likelihood formula shows that a long run relationship exists among the variables. The study suggested that there is need to developed federal fiscal structure so as to ensure the full potential of taxation in realising HDI in Nigeria.

Edeme (2014) examined the impact of sectoral public expenditure and fiscal laws on human development index in Nigeria using data from 20 states for the period 1999-2012. Data on each state were obtained from several issues of Accountant-General's statements, CBN yearly statements and United Nations Development Programme (UNDP) statements. For soundness of the examination, total recurrent and capital public expenses on education, health, agriculture, rural development, energy, housing, environmental protection and manageable water were employed as indicator of human development. The findings revealed that there is a positive functional relationship between education, health, agriculture, rural development, energy, housing and portable water development spending and human development on these segments and concluded that the relative impact of capital spending in enhancing human development was greater than that of recurrent spending.

## **RESEARCH METHODOLOGY**

### **Research Design and Source of Data**

The study used the ex-post facto researcher design to examine the effect of macroeconomic variable on human development index (HDI) in Nigeria. The data for study was generated from the Central Bank of Nigeria (CBN) statistical bulletin and annual reports and Accounts and World Bank Development indicators. The time frame for the study is 32 year from 1986-2018.

### **Model Specification**

The model used in this study in a modification of the model used by Onokero (2019) who studied the effect of fiscal policy on human development index in Nigeria model is specified below.

HDI = f (DD, Tax, ED) where  
HDI = Human Development Index  
DD = Domestic debt  
Tax = Taxation  
ED = External debt

The above model is modified in line with the objective of the study as follows:

HDI = f (MS, EXR, INF, GOVEXP, INT) where  
HDI = Human Development Index  
MS = Money Supply  
EXR = Exchange Rate  
INF = Inflation Rate  
GOV = Government Expenditure  
INT = Interest Rate

The relationship can be explicitly formulated in a model thus:  $HDI = a_0 + a_1 MS + a_2 EXR + a_3 INF + a_4 GOV + a_5 INT + P$  where  $a_0$  is a constant or interest,  $a_1, a_2, a_3, a_4,$  and  $a_5$  are the coefficient of the explanatory variables while  $P$  is stochastic error term.

### Method Of Date Analysis

The multiple regression model was emphasized using the Autoregressive Distribution Lag (ARDL) method. The variable were first subjected to preliminary test including Descriptive Statistics and stationary test (unit & root) and then diagnostic test to confirm the reliability of the regression results. The e-view version of econometric software was used to perform in the analysis.

### Data Presentation and Analysis

Data presentation: The legal data for this study was presented in the appendix. The data was logged to present the data in the same base before it was use for the analysis. Another reason is to achieve normality.

**Table 1: Descriptive Statistics**

	Macroeconomic Variables and Human Development Index					
	HDI	LMS	INF	EXR	LGOVT	INT
Mean	51.53387	6.547237	68.074474	90.09474	11.67463	17.61579
Median	75.27050	6.611111	70.18000	97.40000	11.81725	17.68500
Maximum	25.07972	10.12982	85.66000	360.5000	14.53615	29.80000
Minimum	14.47000	2.672078	37.97000	0.610000	8.431766	7.750000
Std. Dev.	7.536495	2.555846	12.61960	91.21405	2.287401	4.626646
Observation	32	32	32	32	32	32

Sources: Extract from Eviews Output

The summary statistics show that the average of human development index is about 51.5. the average mean for money supply is 6.54, while average mean of inflation rate, exchange rate, government expenditure and interest rate were 6.547237, 68.07474, 11.67463 and 17.61579 respectively. The standard deviations of macroeconomic variables such as money supply inflation rate, exchange rate, government expenditure and interest rate are 2.971298, 2.55846, 12.61960, 91.21405, 2.287401 and 4.626646. The values of the standard deviation indicate that there is wide spread of human development index in Nigeria. This is also evident in the wide gap between the maximum and minimum values. For example, the maximum value of HDI is 25.07972 while the minimum is 14.47000, with difference 10.60977. similarly, the maximum of money supply is 10.12983 while the minimum is 2.672078. these performance variations are rater at the high side. Even in the case of inflation rate the maximum is 85.66 and the minimum is 37.97. it is equally observed that exhnage rate varied widely over time. For instance, exchange rate is 360.5 while its minimum value is 0.61. the wide variation over time indicates high level of fluctuation of macroeconomic Variables which affects human development index in Nigeria.

This study conducted some preliminary analysis such as Unit root test and co-integration. The variables for this analysis are subjected to two types of unit root test to determine whether they ar unit root or stationary. The tests employed are the Augmented Dickey Fuller (ADF) test and the Philips-Perron test (PP) Test. The null in both the ADF and PP is the presence of unit root.

**Table 2: Augmented Dickey Fuller Test (ADF)**

Variable	At Level		First Difference		Order of Integratio n
	t-Statistic	Prob	t-Statistic	Prob	
MS	-2.264016	0.1892	-2.425122	0.1437	1(2)
INT	-4.656213	0.0007			1(0)
INF	-4.323464	0.0025			1(0)
EXR	1.753328	0.995	-4.934566	0.0004	1(0)
HDI	-0.730834	0.8247	-5.378259	0.0050	1(1)
GOVT	-2.046787	0.2665	-4.355259	0.0050	1(1)

**Table 3: Philips-Perron Test (PP)**

Variable	At Level		First Difference		Order of Integratio n
	t-Statistic	Prob	t-Statistic	Prob	
MS	-2.264016	0.1892	-4.575709	0.0010	1(1)
INT	-4.774825	0.0005			1(0)
INF	-2.775847	0.0730			1(0)
EXR	1.753328	0.9995	-4.927991	0.0004	1(1)
HDI	-0.730834	0.8247	-5.378115	0.001	1(1)
GOVT	-1.995253	0.2873	-3.355259	0.0150	1(1)

The analysis of the stationary of the variables were performed using the ADF and PP Tests. Both tests showed similar result outcome. The ADF result are shown to Table 2 while the PP results were in Table 3 from both tables, the results for INT and INF were integrated at levels. This suggests that the variables are stationary at their levels [1(0)], but were found stationary in the first differences 1(1). It is worthy of note that MS was not stationary at 1(0) and 1(1) using the ADF but was found stationary at 1(1) using the PP. Thus the result of the PP was taken to imply that MS is stationary at 1(1).

These results of Unit root tests (stationary test) showed that some of the variables (INT and INF) are stationary at level 1(0) while others including MS, EXR, HDI and GOVT are found stationary at first difference 1(1). The stationary found at level suggests that the variable cannot be affected by changes in times series when they are employed in regression analysis. On the other hand, the variables that are stationary at first difference showed that they respond to change in time series. Based on the nature of the variables having a combination of 1(0) and 1(1) stationeries, the most suitable tool of analysis is the Autoregressive Distributive Lag (ARDL) technique.

**Estimation of the Specified Models**

The Autoregressive Distributive Lag (ARDL) technique was used to investigate the effect of macroeconomic variables on human development in Nigeria. The two forms of regression analysis conducted are the Bound test and ARDL Short run regression estimation.

### **Estimation of Long run Effect**

The estimation of long run relationship in the specified models are shown on Table The analysis is the Bound test to determine the long run relationship macroeconomic variable and each of the human capital development indices. The ARDL results compared the bound critical values with the F-statistics values. The decision rule is: If the F-statistic is above the upper and lower critical bound values, then there is a long run relationship in the model; but where the F-statistics is below the upper and lower bound critical values, it is inferred that there is no long- run effect (relationship). The null hypothesis is that “No long-run relationship exists”.

**Table 4: AROL Bounds Test for long Run Effect of Macroeconomic Variables on Human Development**

Models	F-Statistic	Lower Critical Value Bound at 5% level	Upper Critical Value Bound at 5% level
Model: Human Development Index	26.2993*	2.62	3.79

Significant at 5%

Source: Extracts from Eviews 9 output on Appendix

From the results in Table 4 the critical bound values were computed at 5% level of significance. The lower critical bound value is 2.62 while the upper critical value is 3.79. The F-statistics is 26,2993. The results showed that HDI have F0-statistic greater than the Upper (3.79) and Lower (2.62) critical bound values. This model with F-statitics that fall outside the critical bound values, suggest rejection of the null hypotheses. The results are summarized as follows:

- Macroeconomic variables (money supply, exchange rate, inflation rate, government expenditure and interest rate) have a significant long-run effect on human development index in Nigeria.
- Since a long run relationship is found, further analyses have been carried out to determine and explain the nature of the long run relationship that exists.

### **Analyses of AROL Long Run Coefficients and Error Correction**

Four out of the five models proved to .have long run relationships in a macroeconomic variables and human capital development nexus. Thus, healthcare, unemployment, per capita income and human development index receives long run macroeconomic shocks within the periods under study. This section explained the nature of the relationship as well as the speed of adjustment to long-run equilibrium. The results from CointEq (-I) from the cointegrating form is used to explain the speed of adjustment. The nature of the relationship is explained by the Long Run.

**Table 5: Model of the long Run Relationship between Macroeconomic Variables and Human Development Index in Nigeria**

<b>Variables</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
D(LMS)	-0.154350	0.051171	-3.016371	0.0295
D(LMS(-1))	0.062427	0.062871	0.992931	0.3663
D(EXR)	0.000514	0.000201	2.556409	0.0509
D(EXR(-1))	0.000787	0.000401	1.962034	0.1070
D(EXR(-2))	-0.001794	0.000457	-3.926837	0.0111
D(EXR(-3))	-0.004163	0.000525	-7.930150	0.0005
DONF)	0.004066	0.001104	3.682865	0.0143
D(INF)	0.002854	0.000835	3.419043	0.0189
DONF)	-0.001530	0.000562	-2.719402	0.0418
D(LGOVT)	-0.029313	.016479	-1.778815	0.1354
D(LGOVT(-1))	-0.138581	0.066400	-2.087062	0.0912
D(LGOVT(-2))	-0.099730	0.042392	-2.352540	0.0654
D(LGOVT(-3))	-0.219927	0.054374	-4.044733	0.0099
D(INT)	-0.008930	0.003572	-2.499788	0.0545
D(1NT(-1))	-0.003608	0.002351	-1.534454	0.1855
D(INT(-2))	0.012579	0.004672	2.692091	0.0432
D(INT(-3))	0.013987	0.002754	5.079578	0.0038
CointEq(-1)	-0.646336	0.128168	-12.845134	0.0001
<b>Long-Run Coefficients</b>				
<b>Variables</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
LMS	0.294426	0.037034	7.950173	0.0005
EXR	0.003109	0.000217	14.298188	0.0000
LNF	0.003523	0.000679	5.191510	0.0035
LGOVT	0.317265	0.034166	9.286090	0.0002
INT	-0.016397	0.006323	-2.593143	0.0487
C	-1.408786	0.171869	-8.196838	0.0004

The result on Table 5 is the coefficient error correction (-0.646336) and the corresponding probability value (0.0004). The coefficient is rightly signed (negative) with p.value less than 0.05 level, indicating a statistically significant speed of adjustment. This means that changes in the human development index trend in Nigeria will eventually return on a growing normal trend over the long run period. The coefficient indicates about 65% of the dynamism in human development index in Nigeria due to macroeconomic instability can be corrected within a year. This implies that the selected macroeconomic variables (MS, TNF, EXR, GOVT and TNT) can be used to stabilise the human development index in Nigeria.

The nature of the long run relationship is explained by the coefficient of the long run models.  $HDI = -0.2944 * LMS + 0.0031 * EXR + 0.0035 * 1NF \pm 0.3173 * LGOVT - 0.0164 * INT - 0.4088$  The results show the coefficients of Money Supply (MS), Exchange Rate (EXR), Inflation Rate (INFL), and Government Expenditure have positive relationships with human development index while interest rate show a negative relationship in Nigeria. The probability values for MS, EXR, INF, GOVT and INT are all less than 0.05 indicating

significance effects. Thus, the study posit that money supply, exchange rate, inflation rate and government expenditure have positive and significant effect on human development index in Nigeria. However, interest rate has negative and significant effect on human development index in Nigeria.

Hypotheses Testing: Ho - Macroeconomic variables have no significant effect on Human Development index in Nigeria

**Table 6: Short Run Model of the Relationship between Macroeconomic Variables and Human development Index in Nigeria**

Method: ARDL

Sample (adjusted):1990-2018

Dynamic regressors (4 lags, automatic): LMS EXR INF LGDVT INT

<b>Variables</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
HDI(-1)	-0.646336	0.128168	-5.042880	0.0040
LMS	-0.154350	0.051171	-3.016371	0.0295
LMS(- 1)	-0.267948	0.075554	-3.546451	0.0164
LMS(-2)	-0.062427	0.062871	-0.992931	0.3663
EXR	0.000514	0.000201	2.756409	0.0409
EXR(-1)	-0.000565	0.000223	-2.583926	0.0423
EXR(-2)	0.000787	0.000401	-1.962034	0.1070
EXR(-3)	0.001794	0.000457	3.926837	0.0111
EXR(-4)	0.004163	0.000525	7.930150	0.0005
INF	0.004066	0.001104	3.682865	0.0143
INF(-1)	0.003059	0.000926	3.303332	0.0214
INF(-2)	-0.002854	0.000835	-3.419043	0.0189
LNF(-3)	0.001530	0.000562	2.719402	0.0418
LGOVT	-0.0293,13	0.016479	-1.778815	0.1354
LGOVT(-1)	0.093400	0.040912	2.282968	0.0713
LGOVT(-2)	0.138581	0.066400	2.087062	0.0912
LGOVT(-3)	0.099730	0.042392	2.352540	0.0654
LGOVT(-4)	0.219927	0.054374	4.044733	0.0099
INT	-0.008930	0.003572	-2.499788	0.0445
INT(-1)	0.004892	0.002384	2.051577	0.0955
INT(-2)	0.003608	0.002351	1.534454.	0.1855
INT(-3)	-0.0 12579	0.004672	-2.692091	0.0432
INT(-4)	-0.013987	0.002754	-5.079578	11.0038
C	-2.319336	0.349553	-6.635151	0.0012
R- squared	0.999387			
F- statistic	354.3397	Durbin-Waston Stat		2.410421
Prob(F- statistic)	0.000001			

From the ARDL, the coefficient of the dependent variable (HD) introduced as an endogenous variable in the model showed a negative value at lag 1, with probability value less than 0.05. This means that human development index is an endogenous variable in the model.

Table 6 further revealed that Money Supply (M2) has negative relationships at all the short run periods from current period to lags 1 and 2, respectively. However, the coefficients are statistically significant with p-values less than 0.05 in the current year and at lag 1, respectively. This means that money supply has a significant negative effect on human development index in Nigeria.

More so, Inflation rate (INFL) showed a positive relationship at from current year, lags 1, and 3, and negative relationship in the lag 2. The t-statistics has p-value less than 0.05 in the current year, lag 1, 2 and 3, respectively. This indicates that inflation rate has a significant positive short run effect on human development index in Nigeria in the current year, lags 1 and 3 and a reversed negative effect in lag 2. This means that inflation rate has mixed effect on human development index in Nigeria.

Again Exchange Rate (EXR) was found to have a positive relationship with human development index in the current year, lags 3, and 4; and negative relationship at lags 1, and 2, respectively. The p-values show that the coefficients are statistically significant in the current year, lags 1, 3 and 4, respectively. This suggests that exchange rate has significant positive effects on human development index in Nigeria in current year, lags 3 and 4, and a reversed significant negative effect at the elapse first year. This means that exchange rate has mixed effect on human development index in Nigeria.

However, Government Expenditure (GOVT) showed negative relationship with human development index at current year; and positive relationships in their lags 1, 2, 3 and 4, respectively. The probability value are less than 0.05 in periods of lags 4. This indicates that government expenditure a significant positive effect on human development index at elapse of the fourth year. This means that government expenditure has significant positive affect on human development index in Nigeria.

The result of the Interest Rate (INTR) revealed negative effects in the current year, and lags 3 and 4, respectively. The periods in lags 1 and 2 have positive relationships with human development index in Nigeria. However, the probability values showed significant effects in the current year, lag 3 and 4, respectively. This means that interest rate has negative and significant short run effect on effect on human development index in Nigeria.

On the overall, the coefficient of determination (R<sup>2</sup>) revealed that about 99% of the change in human development index can be explained by macroeconomic variables in Nigeria. This is confirmed by a significant p-value of 0.000001 from the t-statistics (354.3397). The Durbin Watson statistics of 2.41042 suggests that the result is reliable.

The results has shown that macroeconomic variables have a short run significant effect on human development in Nigeria. Specifically, money supply, and interest rate have a

significant negative effect on human development index, government expenditure has a significant positive effect; whereas inflation rate and exchange rate have mixed dynamics shocks with negative and positive effects at varying short term periods in Nigeria.

### **DISCUSSION OF THE FINDINGS**

The study analyzed macroeconomic indices and human development index nexus. The data for the study were sourced from CBN statistical bulletin and World Bank development in digital 2018. The data sourced were subjected to statistical and econometric investigation and the findings revealed that macroeconomic indices have a significant positive effect on human development index (HDI) in Nigeria. The resultant effect is that stable macroeconomic index can make human development index (HDI) in Nigeria. The study is in agreement with Antwi, Mills and Zhao (2013) which studied the impact of chosen macroeconomic indices on human development index in Nigeria using co-integration tests. Findings showed a longer relationship between macroeconomic indices and human development index. This is also in line with the work of Ismaila and Imoughele, (2015) who found positive important relationship between macroeconomic indices and Human Development Index (HDI) in Nigeria.

### **SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATION**

The study examined the impact of macroeconomic indices on human development index (HDI) in Nigeria for the period 1986-2018. The data for the study was studied using ARDL techniques. The findings of the study are stated as follows;

Macroeconomic indices represented by money supply, inflation rate, exchange rate, government spending and interest rate has a important long run and short run impact on human development index (HDI) in Nigeria. In particular, money supply and interest rate have a important negative impact on human development index, government spending has a important positive impact while dynamics shock with negative and positive impacts at different short term period in Nigeria.

The study therefore agreed that macroeconomics indices as substitutes are valid policy instrument for short and long run management of human development index (HDI) in Nigeria. A combined management of money supply, inflation rate, exchange rate, government spending and interest rate are enough policy tool in administering the style of living, public health and human development index of a developing economy like Nigeria.

The study therefore suggests among other things that pertinent policy instruments be put in place to improve life expectancy in pattern of living and raise tertiary school enrolment thus improving the value of human development index in Nigeria. This can be obtained through efficient management of the important policy instrument such as redistribution of income and diversification of the economy away from oil.

Private sector investment should be encouraged by the government at all level to generate more employment opportunity for the people in other to enhance the living pattern and quality of life of the people.

Government should raise the money allocated for education to take into consideration the poor children in the street whose parents cannot pay for school fees. This will in the long run enhance the quality of life and the living style of the people. Government should ensure steady macroeconomic laws to prevent policy summersault and raise its spending in the area of amenities development as a way to provide more jobs and enhance the living pattern of the people.

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