AN EMPIRICAL ANALYSIS OF GOVERNMENT EDUCATION EXPENDITURE AND LABOUR PRODUCTIVITY IN NIGERIA

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ABSTRACT
This study examined the relationship between government expenditure on education and labour productivity in Nigeria covering the period of 1980 to 2015. The study was anchored on the theory of human capital theory. Autoregressive Distributed Lag (ARDL) model was used for the analysis since some variables incorporated in the model were stationary at level while others were integrated at first difference at 5% critical level. It was found that there is long run and short run positive relationship between government expenditure on education and labour productivity in Nigeria. The study therefore recommends that the Nigerian government should step-up budgetary allocations to the education sector in line with UNESCO threshold of 26% of the total budget for the developing countries.
Keywords: Autoregressive Distributed Lag (ARDL) model, Government Expenditure, Human Capital and Labour Productivity

INTRODUCTION
It has been observed that the ability of any nation to attain sustainable growth and development largely depends not on the available natural resources and other supportive factors, but on the ability to perfectly combine, transform and distribute these factors; which in turn, depends on the quality and quantity of human resources in the economy. This thought is of the opinion that the quality and quantity of labour determine production by virtue of it being a factor of production. Moreover, improving the quality of the work force yields implicit, non-economic outputs related to the generation of ideas and decisions, which have a significant positive impact on investment, innovation and other growth opportunities (Roux, 1994). In other words, the wealth and vitality of nations rest ultimately upon the development of people and the effective commitment of their energies and talents to production.

Capital and natural resources are therefore, passive agents while the active agents of modernization are human beings, for they alone can accumulate capital, exploit natural resources and build political and social organizations (Adenuga, 2010). This special human capacity can be acquired and developed through education, training, health promotion, nutrition, as well as investment in all social services that influence man's productive capacities (Adamu, 2003). Education being a key component of human capital formation is recognized as a vital tool in increasing the productive capacity of people especially at the higher

level. It contributes indirectly to economic growth via interaction with the productive structure of countries (that is, improving the labour productivity). In other words, individual with more education are more productive and innovative leading to the creation of new products and improving the productivity of factors (Queiros & Teixeira, 2014).

In a developing economy like Nigeria, the importance of education cannot be overemphasized. Like in most other countries, education is the engine of economic growth and development (Sankay, Ismail & Shaari, 2010). The need for increasing public expenditure in education could be found in various theories of public expenditure. The theories of Wagner, Musgrave theory of increasing state activities, the Keysnesian theory of deficit financing all emphasize the need for government spending to enhance economic welfare through its spending in the provision of public goods (Alajekwu & Obi, 2011). Therefore, high levels of government expenditure in education are likely to increase labour productivity, employment and investment. In a bid to facilitate these (development of human capital and economic growth) in Nigeria, practical steps have been taken by all the tiers of government in the federation in the formulating and funding of policies, programmes, schemes and establishment of relevant institutions. These include; the Universal Basic Education (UBE), Industrial Training Fund (ITF), Petroleum Trust Development Fund (PTDF), and Education Trust Fund (ETF). Hence, the Nigerian government allocates huge resources yearly to the education sector for human capital development in the country since 1980. With the bold attempts by successive governments, records have shown that government expenditure on education increased from ₦131.8 billion in 1986 to ₦355.4 billion in 2000 and ₦4,241.325 billion in 2015 (CBN, 2015). According to CBN (2017), the federal allocations to education have shown marginal yearly increases of 6.01% in 2016 which saw a decrease from the allocations for the preceding years. But despite these numerous programmes, policies and/or huge resources to the sector, the issue of government expenditure on education and labour productivity in Nigeria is still an empirical exercise whose verification cannot be disputed. This study therefore, examines the effects of government education expenditure on labour productivity in Nigeria.

Hypotheses of the Study
The study hypothesised that:

H_{o1}: Government education expenditure has no effect on labour productivity in Nigeria.

REVIEW OF RELATED LITERATURE
Concept of Education Expenditure

According to Oluwatobi and Ogunrinola (2011), education expenditure is simply the amount of funds devoted to the development of the educational sector. Such education expenditure would expand educational opportunities at all levels, especially for the disadvantaged children; improving quality and enhancing the effective and efficient use of resources in all sectors of an economy. Expenditure in education is analogous to investment in physical capital in the sense that, after an initial investment is made a stream of higher future income can be generated from both expansion and access to education and improvement in health. It was further indicated by Jhinghan (2003), that earlier economists like Adam Smith, Thorstein Veblen and Alfred Marshall all stressed the importance of education in production. While Smith included it into a country's stock of fixed capital (the acquired and useful abilities of all the inhabitants), Veblen maintained that technological knowledge and skills formed a country's immaterial equipment or intangible assets without which physical capital could not be utilised productively. Marshall regarded education as a national investment and the most valuable of all capital is that invested in human beings. Jhinghan(2003) therefore, declared that the lack of or inadequate investment in education has been responsible for the slow growth in the less developed countries (LDCs) as this leads to reduced productivity of physical capital. Education expenditure is usually understood as basic government spending on education. Gregoriou & Ghosh (2007) captures the scope of government expenditure on education to include allocation of scare resources towards stabilization of the various indices of the educational system. As conflicting and intricate as education expenditure analysis may be, it is a vital component of government expenditure and hence instrumental to rapid economic growth and development (Shoup, 1977). Thus, the analysis of public expenditure on education is basically concerned with its role in the allocation and distribution of resources to the educational sector (OECD, 1998). Government expenditure on education according to Bureau of Economic Analysis (2010) includes all government consumption, investment, and transfer payments channelled towards developing human capital.

Labour Productivity

Labour productivity is a measure of economic growth within a country. It measures the amount of goods and services produced by one hour of labour. Specifically, labour productivity measures the amount of real gross domestic product (GDP) produced by an hour of labour. Workforce productivity is the amount of goods and services that a worker produces in a given amount of time. It is one of several types of productivity that economists measure. Workforce productivity, often referred to as labour productivity, is a measure for an organization or company, a process, an industry, or a country (Freeman, 2008).

Labour productivity is an important economic indicator that is closely linked to economic growth, competitiveness, and living standards within an economy. It represents the total volume of output (measured in terms of Gross Domestic Product, GDP) produced per unit of labour (measured in terms of the number of employed persons) during a given time reference period. The indicator allows data users to assess GDP-to -labour input levels and growth rates over time, thus providing general information about the efficiency and quality of human capital in the production process for a given economic and social context, including other complementary inputs and innovations used in production. Given its usefulness in conveying valuable information on a country's labour market situation, it was one of the indicators used to measure progress towards the achievement of the Millennium Development Goals (MDGs), under Goal 1 (Eradicate poverty and hunger), and it was included as one of the indicators proposed to measure progress towards the achievement of the Sustainable Development Goals (SDG), under Goal 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all) (Freeman, 2008). Productivity represents the amount of output per unit of input. The indicator of labour productivity is calculated as follows: Labour Productivity = GDP at constant prices/Number of employed persons

Education financing in Nigeria

Government funding of education in Nigeria comes from different sources. Education is a concurrent responsibility of both the federal and state governments under the constitution. There are four main sources of public funding for the public (non-federal) education sector: direct allocations from the federal government (through the Universal Basic Education Intervention Fund and the Education Trust Fund), state governments, local governments, and private individuals and organizations, including nongovernmental organizations and international donors in some states. There is a huge lack of information on state and local expenditures for education, which makes accurate estimates of total spending difficult.
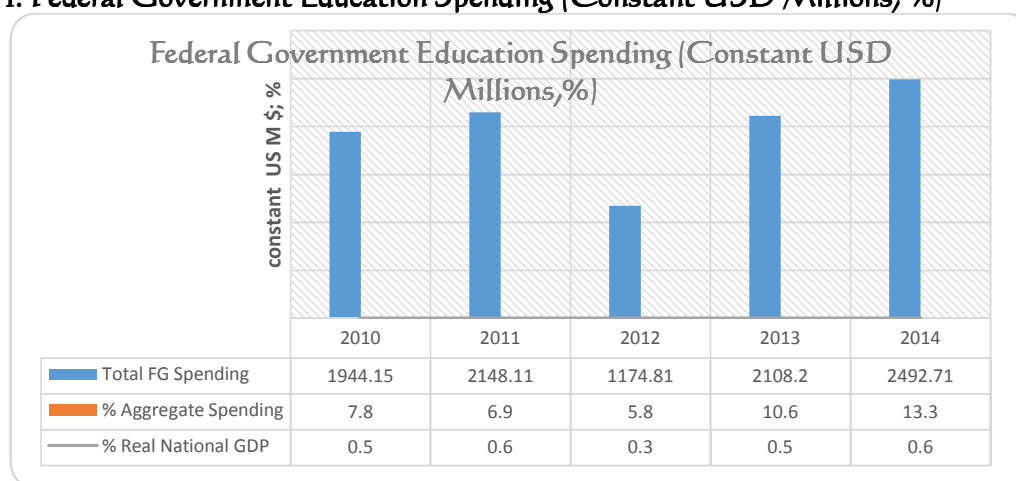
Statistical evidence shows that the level of government expenditure on education as a percentage of GDP was 6.36% in 1975. The trend slightly increased to 6.47% in 1990 and 6.74% in 2000 (World Bank, 2017). The level of government expenditure on education as a percentage of GDP maintained a single digit where 8.18% and 8.05% were recorded in 2005 and 2015 respectively (World Bank, 2017). The recent 2018 budget proposed, only 7% is allocated to the educational sector slightly higher than 6% and 6.01% of the 2017 and 2016 budget respectively which are contrary to the recommendation by UNESCO (Oyedeji, 2017). Education is supposed to attract considerable portion of government expenditure

because of its position as a social service with direct economic significance; but in Nigeria, there is no denying the fact that education is very poorly funded. This is because it is yet to comply with the UNESCO recommendation that 26% of annual budget be spent on education.

Domestic Financing of Education in Nigeria

The Federal Government (FG) makes nationwide policies and runs secondary (both junior and senior) and post-secondary institutions, including universities, polytechnics, and colleges. The FG funds these through annual budgetary allocations and several targeted interventions funds, including the Tertiary Education Trust Fund (TETFund), Debt Relief Grant (DRG/MDGs), and constituency projects of federal legislators. These funds also benefit state government schools. In addition, the FG funds the construction of several Almajiri (Tsangaya) schools and participates in nomadic education and adult education campaigns. Its main intervention instrument in basic education is through a special Universal Basic Education (UBE) Fund, which makes matching grants to state governments (Nwoko, 2015). FG education spending averaged nearly $2 billion annually between 2010 and 2014, which amounts to 7.8% of aggregate FG spending or 0.5% of real GDP (see Figure 1). Spending started above this $2 billion average and rose steadily each year, except in 2012, when it dipped sharply to less than $1.2 USD billion. The sharp fall in 2012 was not specific to the education sector; all government functions were affected due to the implementation of the FG's fiscal consolidation regime aimed to streamline spending and eliminate waste. The reduction was reflected in education's share of aggregate spending and GDP, which dipped significantly in 2012, but picked up thereafter (Nwoko, 2015).

Figure 1: Federal Government Education Spending (Constant USD Millions, %)

Federal Government Education Spending (Constant USD Millions,%)

constant US M $; %

	2010	2011	2012	2013	2014
Total FG Spending	1944.15	2148.11	1174.81	2108.2	2492.71
% Aggregate Spending	7.8	6.9	5.8	10.6	13.3
% Real National GDP	0.5	0.6	0.3	0.5	0.6

Source: All 2014, UBEC, TETFund, DRG/MDG information from FM O E Annual Report 2014; other data from Audited FGN Financial Statements (2010 - 2013), courtesy (OAGF); Nwoko, 2015; analysis by authors.

FG education spending has both budgetary and extra budgetary elements. Budgetary allocations account for an average of 82% per annum of FG education spending, and are mainly to the Federal Ministry of Education (FMOE) and its agencies. Extra-budgetary funds represent the remaining 18% and often accrue for education through certain dedicated funds outside FMOE's control (such as the Debt Relief Fund (DRF)/MDG and legislators' constituency projects). The two most prominent extra budgetary funds in education are the UBE Fund and the Tertiary Education Trust Fund (TETFund), with UBE being the larger (Nwoko, 2015).

Figure 2: Federal Financing for Education Nigeria (Constant USD Millions)
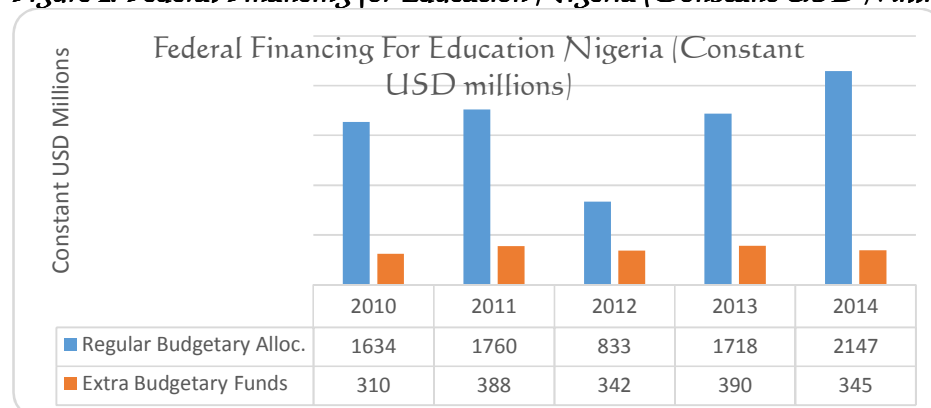
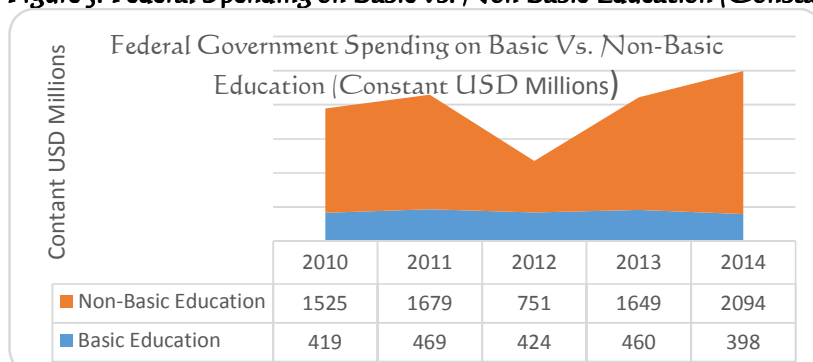|	2010	2011	2012	2013	2014
■ Regular Budgetary Alloc.	1634	1760	833	1718	2147
■ Extra Budgetary Funds	310	388	342	390	345

Source: All 2014, UBEC, TETFund, DRG/MDG information from FMOE Annual Report 2014; other data from Audited FGN Financial Statements (2010 - 2013), courtesy (OAGF); Nwoko 2015, analysis by authors.

The FMOE controlled 95% of budgetary allocations, which translates to 78% of total education spending at the federal level (see Figure 2). Targeted non-FMOE spending was 5% of budgetary expenditures (4% total education spending). UBEC receipts averaged $350 USD million between 2010 and 2014, but annual figures oscillated with FG earnings. TETfund is a dedicated fund for public (federal and state) tertiary institutions, financed by 2% prior tax on the profits of non-oil companies with over 100 personnel. Its share in total federal education funding is relatively small, averaging 0.3% in the period. Although budgetary spending appears prominent at 82%, it falls short of international good practice standards, which recommend minimal use of extra-budgetary funds to reduce associated fiscal risks (Nwoko, 2015).

Basic education spending averaged 23% of FG education spending between 2010 and 2014 counting UBEC allocations, DRF/MDGs, and constituency projects, but excluding embedded spending on the junior secondary section of FG secondary (unity) schools. Figure 3 depicts the annual trend.
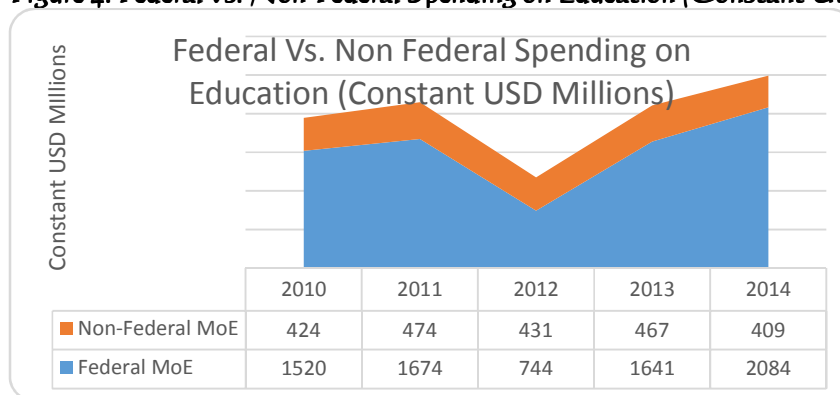
Figure 3: Federal Spending on Basic vs. Non Basic Education (Constant USD Million)

Federal Government Spending on Basic Vs. Non-Basic Education (Constant USD Millions)

	2010	2011	2012	2013	2014
Non-Basic Education	1525	1679	751	1649	2094
Basic Education	419	469	424	460	398

Source: All 2014, UBEC, TETFund, DRG/MDG information from FM O E Annual Report 2014; other data from Audited FGN Financial Statements (2010 - 2013), courtesy (OAGF); analysis by author.

Figure 4 shows federal vs. non-federal spending. The proportion of federal funding may seem small; however, basic education is a subnational government responsibility rather than a federal one as per Nigeria's fiscal federalism arrangements.

Figure 4: Federal vs. Non-Federal Spending on Education (Constant USD Million)

Federal Vs. Non Federal Spending on Education (Constant USD Millions)

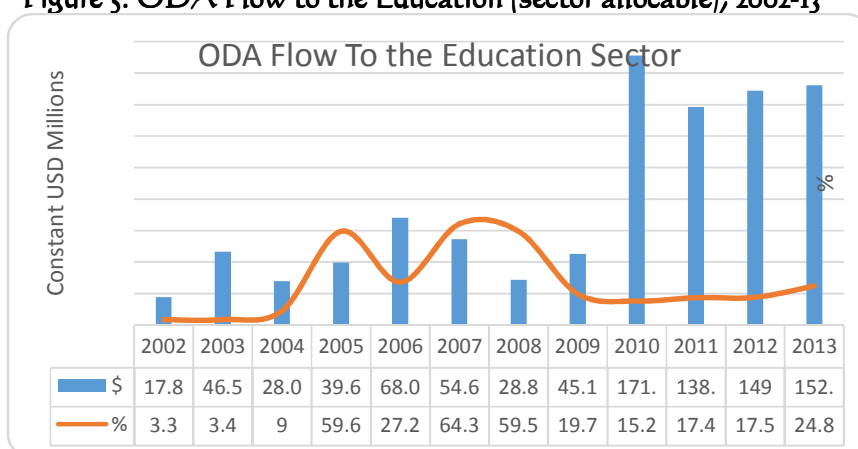|	2010	2011	2012	2013	2014
Non-Federal MoE	424	474	431	467	409
Federal MoE	1520	1674	744	1641	2084

Source: All 2014, UBEC, TETFund, DRG/MDG information from FM O E Annual Report 2014; other data from Audited FGN Financial Statements (2010 - 2013), courtesy (OAGF); analysis by author.

External Financing of Education in Nigeria

This section briefly examines the size and division of Oversees Development Assistance (ODA) to the education sector. The allocation of ODA to education sector was initially low and unstable, but leaped almost four times in 2010 to $171 USD million (Nwoko, 2015). Although aid flow did not sustain this momentum, it did not fall to its pre-2010 levels; education ODA was $152 USD million in 2013 (see Figure 5).The sharp rise in 2010 coincided with the outset of displacement of pupils in the northeast due to insurgency, suggesting that donors were likely responding to the situation.

Figure 5: ODA Flow to the Education (sector allocable), 2002-13

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
$	17.8	46.5	28.0	39.6	68.0	54.6	28.8	45.1	171.	138.	149	152.
%	3.3	3.4	9	59.6	27.2	64.3	59.5	19.7	15.2	17.4	17.5	24.8

Source: OECD - DAC; Nwoko, 2015; analysis by author

Theoretical Framework

The study used human capital theory. The proponents of this theory include Theodore Schultz, Garry Becker and Jacob Mincer. The theory was developed in 1960s due to the realisation that the growth of physical capital has accounted for only a small part of growth in the income. Furthermore, the emergence of education and skills training in military technology has also played an important role in the formulation of the theory. The main body of the Human Capital Theory can be found in the work of Becker (1994) titled "Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education." He acknowledged that the main motivation factor has probably been a realization that the growth of physical capital, at least at conventionally measured, explains a relatively small part of the growth of income in most countries. The research for better explanations has led to improved measures of physical capital and to an interest in less tangible entities, such as technological change and human capital. Also behind this concern is the strong dependence of military technology on education and skills, the rapid in expenditures on education and health, the age-old quest for an understanding of the personal

distribution of income, the recent growth in unemployment in the United States, the Leontief scarce-factor paradox, and several other important economic problems.

Schultz (1961), introduced return-on-investment which highlights the cost-benefit analysis of training and education. This served as a basis for Becker's theory of human capital. The theory emphasizes how education increases the productive and efficiency of workers by increasing the level of cognitive stock of economically productive human capability which is a production innate abilities and investment in human capital which the proponents of the theory have considered as or even more equally worthwhile than that of physical capital. According to Fagerhind and Saha (1997), human capital theory describes its mechanism within the framework of Labour Economics as education; to him, the transformation of the raw human resource into highly productive human resource is the process of education.

Empirical Review

Ngutsav, Akighir and Iorember (2017) investigated the relationship between education financing, labour productivity and economic development in Nigeria. The study was anchor on the human capital theory and secondary data were used from 1970 to 2015 to analyze these relationships with the help of the Vector Autoregressive Model (VAR). The study found that there is a long run relationship between education financing, labour productivity and economic growth in Nigeria. The study also found that in the short-run, education financing has a positive but insignificant relationship with labour productivity; and labour productivity in the short-run has a positive but statistically insignificant relationship with economic growth in Nigeria. Umoru and Yaqub (2013) also analyzed the labour productivity effects of health capital in Nigeria. The study used GMM methodology. Findings from the study showed that health capital investment is a significant determinant of labour productivity in Nigeria. The study recommends that the Nigerian government should build capacity through investment in education in order to enhance productivity of the labour force. This would protect the economy from further negative trends in productivity growth.

In other countries, Arshada and Malika (2015) investigated the impacts of human capital on labor productivity in Malaysia using panel data analysis. The panel data employed covered 14 states in Malaysia spanning from 2009 to 2012. Findings from the study are estimated using the fixed effects generalized least squares (GLS) model. They showed that human capital quality (higher educational levels and better health status) is positively significant in improving the level of labor productivity in Malaysia. The study estimates suggest that the

impact of health on labor productivity is greater than the impact of education. Improvements in the quality of health and education are therefore crucial for Malaysia to achieve higher productivity growth.

According to Riasat, Atif and Zaman (2011), education plays a vital role in human capital formation. It raises the productivity and efficiency of individuals and thus produces skilled manpower that is capable of leading the economy towards the path of sustainable economic development. It is observed by the study that countries with high education expenditure and high level of educated human capital, (that is, specialization in technology and/or knowledge–intensive skills) grow faster, economically. However, there is dearth information or empirical studies on the impact of government education expenditure on labour productivity in Nigeria known to the researcher.

RESEARCH METHODOLOGY

This research work is fundamentally analytical and descriptive as it embraces the use of secondary data in examining the relationship between education expenditure and labour productivity in Nigeria. The descriptive statistics include the use of mean, median, mode, skewness, kurtosis, Jacque-Berra, probabilities, among others. The analytical tools consist of econometrical techniques such as; Augmented Dickey-fuller (ADF) Unit Root Test was used for stationarity test, and Autoregressive Distributed Lag Model (ARDL) was employed forthe empirical analysis.

Model Specification

The theory of human capital posits that, the more educated and healthy the labour force is, the more productive it becomes. Thus, the productivity of the labour force is driven by the status of health capital and education (Kalemli-Ozcan et al, 2009). A healthy and educated work force is expected to contribute positively to the output and hence the productivity of a nation. Thus, the production function can be explicitly expressed as:

$$GDP_t = K_t^\alpha H_t^\beta E_t^\gamma L_t^{1-\alpha-\beta-\gamma} A_{it}^T \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.1$$

Where Health (H) and education (E) are the two components of human capital and maintaining the assumption of constant returns to scale (CRTS), the augmented aggregate productivity function can be written as:

$$GDPL = \left[\frac{K_t}{L_t}\right]^{\frac{\alpha}{1-\alpha-\beta-\gamma}} \left[\frac{H_t}{L_t}\right]^{\frac{\beta}{1-\alpha-\beta-\gamma}} \left[\frac{E_t}{L_t}\right]^{\frac{\gamma}{1-\alpha-\beta-\gamma}} A_{it}^T \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.2$$

According to equation (2), labour productivity measured by output per worker (GDPL) is derived as a function of physical, health and education capitals per unit of labour service. Following the modelling procedures of Umoru and Yaqub

(2013) with modifications, the productivity model for this study is expressed as follows:

$$\text{GDPL} = \text{f}(\text{GEXE}, \text{GEXH}, 1/RGDP) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .3$$

The empirical evidence in this research uses total expenditure on education (GEXE) as a proxy for education financing, investment-GDP ratio as a proxy variable for worldwide technological transfer; health capital is proxy by total expenditure on health (GEXH). Labour productivity is measured as output per unit of labour service defined as output-labour ratio. The variables: GEXE and GEXH are interactive in the production process, thus we included health capital-labour interaction and education-labour interaction. Health capital-labour interaction measures healthy labour force in Nigeria while education-labour interaction measures the educated labour force and health education-labour interaction is a measure of the healthy educated labour force in Nigeria. The justification for the interaction is to evaluate the magnitude of the effects of health capital and education on productivity of the Nigerian labour force. We expect a positive impact of the healthy labour force on productivity. This is premised on the ground that with growth in labour supply, productivity is enhanced and hence a spill over effect on the growth of national output. The education variable is expected to contribute positively and significantly to labour productivity. Elsewhere, it has been empirically evaluated that education constitutes an essential determinant of productivity and growth by reducing structural unemployment (Blankenau & Simpson, 2004). Hence, following the Autoregressive Distributed Lag Modelling Approach of Pesaran and Shin (1997), the ARDL representation of equation 3 is stated as follows

$$lnGDPl_t =$$
$$\alpha_0 + \sum_{i=1}^{p} \theta_I \Delta lnGDPL_{t-i} + \beta_1 lnGEXE_t + \beta_2 lnGEXH_t + \beta_3 ln\, 1/RGDP_t +$$
$$\sum_{i=0}^{q-1} \beta^*_1 \Delta lnGEXE_{t-i} + \sum_{i=0}^{q-1} \beta^*_2 \Delta lnGEH_{t-i} + \sum_{i=0}^{q-1} \beta^*_3 \Delta ln\, 1/RGDP_{t-i} +$$
$$u_t \ldots \ldots 4$$

$$where$$

u_t is serially uncorrelateddisturbances with zero meansand constant variance-covariances.

$\beta^*_1 - \beta^*_3$ are short-run consistent parameters

The estimators of β are asymptotically perfectly collinear with the estimator of θ

DATA PRESENTATION AND ANALYSIS
Descriptive Statistics
The descriptive statistics of the variables used in this study are presented in Table 1

Table 1: Descriptive Statistics

Tools	GDPL	GEXE	GEXH	RGDP
Mean	0.027823	1.09E+09	26.21034	399282.1
Median	0.012804	5.08E+08	25.60000	433203.5
Maximum	0.200223	4.67E+09	36.80000	716949.7
Minimum	0.001037	2340672.1	17.90000	54612.30
Std. Dev.	0.048768	1.33E+09	5.254002	205488.0
Skewness	2.720417	1.580748	0.170733	-0.324343
Kurtosis	8.830274	4.127147	1.833351	1.987531
Jarque-Bera	79.49346	13.61250	1.785517	1.807360
Probability	0.000000	0.001107	0.409525	0.405076
Sum	0.834702	3.17E+10	760.1000	11978464
Sum Sq. Dev.	0.068970	4.95E+19	772.9269	1.22E+12
Observations	36	36	36	36

Source: Authors' Computation using E-views 9.5 Output

It can be seen from the table above that RGDP has the highest mean rating of ₦399282.1 billion with a high standard deviation of ₦205488. It is also observed that the variable has the median, maximum and minimum value of ₦433203.5 billion, ₦716949.7 billion and ₦54612.30 billion respectively. The variable GEXH has a mean rating of ₦26.2billion and a standard deviation of 5.3. It is also observed that the variable has a median, maximum and minimum value of ₦25.6 billion, ₦36.8billion and ₦17.9billion respectively. The variable GEXE has a low mean rating of ₦1.09billion and a standard deviation of ₦1.3billion, meanwhile the variable GDPL has the lowest mean rating of 0.03% and a low standard deviation of 0.05%. It is also observed that the variable has the median, maximum and minimum value of 0.0128%, 0.2% and 0.001% respectively.

The estimates were also fortified with the values of skewness and kurtosis of all the variables involved in the model. The skewness is a measure of asymmetry of the distribution of the series around its mean, the skewness of a normal distribution is zero. It is positively skewed when the distribution has a long right tail and it is negatively skewed when the distribution has a long left tail. The variables GDPL, GEXE and GEXH are skewed to the right (positively skewed), while the variable RGDP is skewed to the left (negatively skewed). Kurtosis is a measure of the symmetry of the histogram. The bench mark for

symmetrical of the distribution is 3.0, when it is 3.0, it is mesokurtic, when it is higher than 3.0 it is called leptokurtic and when it is less than 3.0 it is called platykurtic. The variables GEXH and RGDP are platykurtic which implies that the data for the variables are highly spread, while the variables GDPL and GEXE are leptokurtic which implies that the data for the variables are concentrated. The Jarque-Bera statistics is used to measure the normality of the variable used in the estimation. In the estimate in Table 1, the Jarque-Bera statistics for GDPL, GEXE, GEXH and RGDP INFL are not normally distributed but exhibited a distribution which is considered normal after transformation.

Unit Root Test

The unit root test was carried out using Augmented Dickey-Fuller (ADF) for all variables in the study. The results of the stationary test are presented in Table 2.

Table 2: Unit Root Test Results

Augmented Dickey-Fuller statistics of the variables							
Variables	At Level	First Difference	Critical Value (1%)	Critical Value (5%)	Critical Value (10%)	Prob. Value	Order of Integration
lnGDPL	-3.931335		-3.646342	-2.954021	-2.615817	0.0049	I(0)
lnGEXE	-0.429216	-8.438819	-3.646342	-2.954021	-2.615817	0.0000	I(1)
lnGEXH	-1.828829	-6.457247	-3.646342	-2.954021	-2.615817	0.0000	I(1)
lnINFL	-2.460897	-5.685618	-3.646342	-2.954021	-2.615817	0.0000	I(1)
ln1/$RGDP$	-2.134760	-5.661727	-3.639407	-2.951125	-2.614300	0.0000	I(1)

Source: Authors' Computation Using E-views 9.5 Output

The unit root test results have revealed that, the measure of labour productivity GDPL is stationary at level; while the variables GEXH, GEXE and RGDP were integrated (unit root) at first difference i.e. I(1). This satisfies the assumptions for the application of ARDL approach.

The Impact of Government Expenditure on Labour Productivity in Nigeria

In analyzing the impact of government expenditure on labour productivity using the ARDL, the bounds test was used to test for the existence of long-run relationship between government expenditure and labour productivity in Nigeria and the results are presented in Table3.

Table 3: Bounds Test Results

ARDL Bounds Test	F-Statistic	Critical Value Bounds @ 5%	
	6.1955	Lower Bound (I0)	Upper Bound (I1)
		4.01	5.07

Source: Authors' Computation using E-views 9.5 Output

The results of the bounds test showed that F-statistic value of 6.1955 is greater than the upper bound critical value of 5.07 at 5% level of significance. This led to the rejection of the null hypothesis of no long-run relationship between government expenditure on education and labour productivity in Nigeria; implying that there is the existence of long-run relationship between government expenditure on education and labour productivity in Nigeria. Having ascertained the existence of the long-run equilibrium, the long-run and short-run estimates were computed and results are presented in Tables 4 and 5.

Table 4.4 Long-Run Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnGEXE	0.848774	1.469145	0.577733	0.5681
lnGEXH	0.314252	7.224498	0.043498	0.9656
ln1/$RGDP$	6.521370	11.161720	0.584262	0.5637
C	-35.799449	42.449538	-0.843341	0.4062
@TREND	-0.073237	0.224619	-0.326050	0.7468

Source: Author's Computation using Eviews 9

The long-run coefficients of the ARDL (1,0,0,1) showed that government expenditure on education and health as well as the worldwide technology have positive but insignificant relationship with labour productivity in the long-run in Nigeria.

Table 5 Short-Run Estimates
Dependent variable: LOGGDPL

Variables	Coefficients	Std Errors	t-ratio	P-values
D(lngexe)	0.197386	0.055620	3.54887	0.0033
D(lngexh)	0.573081	0.103456	5.53955	0.0009
D(**ln1/$rgdp$**)	-13.8089	5.059007	-0.33397	0.7407
D(@Trend)	-0.01703	0.05098	-1.96059	0.0599
CointEq(-1)	-0.23255	0.11861	-1.96059	0.0599

Source: Author's Computation using E-views 9.5 Output

The short-run estimates have shown that government expenditure on education has positive and significant relationship with labour productivity in Nigeria. This implies that increase in government expenditure on education leads increases in labour productivity. Also, government expenditure on health has positive and significant relationship with labour productivity in Nigeria. The index of worldwide technology has negative but insignificant relationship with labour productivity. This may be because of low level of technological advancement of the Nigerian economy. The speed of adjustment is negative and is statistically significant at 10% level of significance; implying if there is any deviation from the equilibrium in the long-run it will be adjusted to equilibrium annually by 23.3%.

Diagnostic Tests

In order to validate the performance of the model, the following diagnostic tests, Ramsey RESET test, Breusch-Godfrey LM test, and Breusch-Pagan-Godfrey heteroscedasticity test were performed.

Table 6: Diagnostic Tests for GE-LP

Tests	Statistics	Probability values
Ramsey RESET test (F-statistic)	0.08714	0.7701
Autocorrelation (Breusch-Godfrey LM test)	0.60050	0.5559
Heteroskedasticity (Breusch-Pagan-Godfrey)	1.5572	0.1966

Source: Author's computation using Eviews 9

All the diagnostic tests have revealed that the null hypotheses should be accepted implying that the model is free from misspecification problem, and that the successive errors are not correlated with each other and there is equal variance among the errors of the model.

RECOMMENDATIONS

On the basis of the above conclusion, the study recommends that the Nigerian government should set-up budgetary allocations to the education sector in line with the UNESCO threshold of 26% of the total budget of the developing countries. This is because Nigeria is highly labor-intensive, thus, a higher value must be accorded to having educated and healthier workforce in order to maximize productivity. Therefore, it is imperative for, the Nigerian government to invest significantly on education and health capital.

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