FORGONE EXPENDITURE IN NIGERIA: IMPLICATIONS FOR EDUCATION GROWTH

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Abstract - This paper examined the impact of forgone education expenditure on Nigeria's education growth using annual data covering the period 1981 to 2019 by applying econometric techniques to test empirically the hypotheses developed. Cointegration analysis is introduced to capture long-run & short-run relationships among variables using systems simultaneous equation. This is because Vector Autoregressive (VAR) treats all variables as endogenous. Following this approach, employing VAR through Vector Error Correction Mechanism (VECM) procedure, the simultaneous equation was simulated. The study further conducted ex-ante forecasting involving impulse response and variance decomposition simulations to evaluate the period under study. Also the study examined causality relationships among series using the VECM Granger causality approach to understand short-run causality among variables via F-/Wald test simulation. Later, the systems simultaneous equation aforementioned is estimated employing Ordinary Least Square (OLS). Empirical results indicate that forgone education expenditure have a positive and significant relationship with education growth, whereas real education expenditure has a negative relationship with education growth in its three lags. The VECM Granger causality result also shows that forgone education expenditure cause education growth. A further review of the impulse response function indicates that forgone education expenditure will positively contribute to education growth in the short-run and long-run. Based on the findings, this study recommends that government should increase the share of education expenditure to meet with the UNESCO recommendation of 15-20 percent. In addition, government expenditure on education should be properly managed in order to enhance education growth.

Keywords - UNESCO; Education Expenditure; Education Growth; VECM.

I. INTRODUCTION

Education is the foundation upon which developed societies are built. This sector occupies unique position among the sectors of the economy, such as health, agriculture, manufacturing, communication, transportation, defence, finance, banking etc. it is through education that the professionals in other sectors of the economy emerge. According to reference [1], if you see any economy that is not doing well, find out what is spent on education. One would thus expect that government will allocate substantial fund for this sector that is laying the golden egg, so as to enable it meet its challenges and needs. There is always a better outcome for individuals who started with quality basic education, they do better in secondary school and in life. To achieve this, Nigerian government need to invest more in education programmes. Investment in education brings the highest returns from individuals, societies and countries.

One of the most important Sustainable Development Goals (SDGs), aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Since education transforms lives, it is at the heart of UNESCO's mission to build peace, eradicate poverty and drive sustainable development.Unfortunately, Nigeria, one of the signatories to the global goals, is not doing enough in funding education which is a human right for all. The meagre allocation is alarming, over the period of study, the country's funding for education averaged 7.2 per cent of the national budget which is inadequate to curb the menace of low level of education, large percentage of out-of-school children, dilapidating infrastructures and poor teaching staff. The United Nations International Children's Emergency Fund, [2], in one of its reports disclosed that Nigeria has the highest number of children out of school in the world with 10.5 million children not being educated. Primary attainment among the poorest households actually fell, from 35percent in 2003 to 22percent in 2013, with the gap between the average and poorest households increasing by about 20 percentage points. The country's best university only ranks "401" in the Times Higher Education World University Rankings. UNESCO Education for All (EFA), 2000-2015: Achievements and Challenges', recommended that 15 to 20 per cent should be allocated to education in the national budgets of developing countries. It also proposed that governments should spend between four per cent and six per cent of GNP on education [3].

The national Budget gives a detailed spending plan on financial activities, especially on goods and services like education, healthcare, power, roads and security of life. It also influences many facets of monetary policies on interest rates, exchange rate and economic growth [3]. The lean budgetary allocation for education in Nigeria has led to inadequate infrastructure facilities in public schools and those available are in state of disrepair. Salaries and allowances of teachers are owned thus encouraging industrial actions which are detriment to the academic

activities and provision of quality education for clients.

According to Nwadiani (2000) as referenced by [4], government hardly recognize education as an area of investment. To worsen the situation, World Bank, established in 1940's has been making provisions for capital investment in arrears as industries, transportation, agriculture and ports development. Education is however considered as non-productive sector for investment that requires huge financial resources. The regular faceoff between Academic Staff Union of Universities (ASSU), Non Academic Staff Union (NASU), College of Education Staff Union (COEASU), Nigerian Union of Teacher (NUT), among others and the federal government has been as a result of the issue of underfunding of education.

This paper examines whether UNESCO recommendation (20 percent of total expenditure on education) could have grown the education sector. Such an empirical investigation is important both in assessing the relevance of a widely used growth models and in understanding the role of foregone allocation on the educational sector growth experience of Nigeria. The results could assist policymakers in designing growth-oriented fiscal adjustment programs and in setting expenditure priorities.

The rest of the paper is organized as follows. Section 2 sets up the theoretical framework and literature review. Section 3 discusses the data, and specifies the econometric model and methodology. Section 4 reports the empirical estimates and results. Finally, discusses the findings, conclusion and recommendation are presented in section 5.

II. THE THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The growth nexus between government expenditure and economic growth is an old one. Given the opining views are two main theories that have been dominant in this realm of debate, the Wagner and Keynesian schools of thought. [5]A renowned Germany economist of the time offered a model of the determination of public expenditure. Based on his empirical findings, it was concluded that an increase in the size of government expenditure is a natural consequence of economic growth. In other words, the Wagner's law pontificates that the share of the government expenditure in GDP will increase with intensified economic development. This is consequent upon the social, administrative and welfare issues that increase with need and complexity as the economy grows [5]. On the other hand, [7]initiates a model that during a period of recession, economic activities can be spurred up by the use of fiscal policies. In other words, an increase in government spending, expansionary fiscal policy among others can spur economic growth. These two theories being Wagner's law and the Keynesian theory have two opposing views in examining the relationship between government spending and growth. Wagner's model sets to elaborate that causality spans from growth to government spending while the Keynesian model holds an opposing view that causality spans from government spending to economic growth in the periods of recession [7].

A lot of research have been devoted to the analysis of the effects of education on economic growth.Academic research in this area is characterized by a certain degree of technical complexity and results often differ across studies depending on the methodology used, the sample considered, or how education is measured.Reference by [8],identified 57 studies which measure education in terms of outcomes (e.g. enrolment rates, literacy rates, and years of schooling in the workforce) rather than expenditure. But the studies that did look at educational expenditure as a proxy for education generally reported a positive effect of education on growth. According to [10], a recent study considered 29 papers that specifically looked at the impact of government education expenditures on economic growth. Of these 29 studies, 14 report a positive and statistically significant effect of government expenditure on growth, 12 report a negative effect, and 3 report no statistically significant effect. Averaging across all studies, the effect of educational expenditure on growth is positive - albeit modest - in the order of a 0.2-0.3% increase in growth for an increase in expenditure by 1% of GDP.

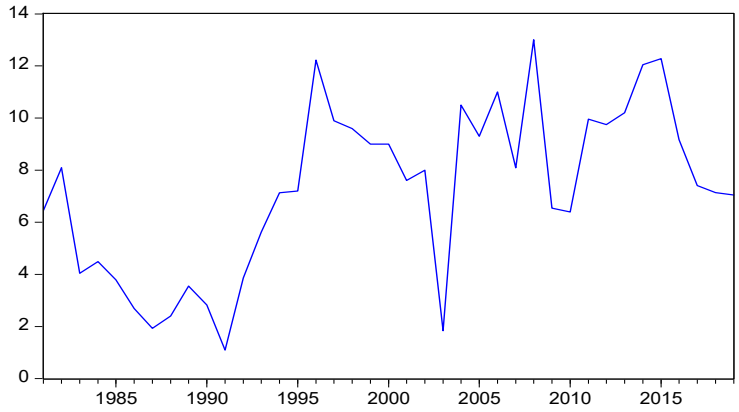
Reference from [11] study on the causal relationship between government expenditure and economic growth for Syria, Israel and Egypt, employed multivariate co-integration and variance decomposition approach and found that bi-directional (feedback) and long run negative relationship occurred between government expenditure and economic growth. Moreover, the causality test within the framework (that include share of government civilian expenditures in GDP, military burden, and economic growth) illustrated that military burden has a negative impact on economic growth in all the countries. Furthermore, civilian government expenditures have positive effect on economic growth for both Israel and Egypt. [13], examines the Keynesian opinion and the Wagner's Law on the role of public expenditure on economic growth for Malaysia (1970–2004). Employing the Auto-Regression Distributed Lag (ARDL) model and the 'bounds test as methodology, their analysis results showed the existence of a long-run relationship between their variables. [14], studied about government expenditure and economic growth in Nigeria. Using the co-integration and error correction methods and employing time-series data for the period 1979 – 2007, they developed their model based on Keynesian and endogenous growth model and they found that total capital expenditure, total

recurrent expenditures, and government expenditure on education have negative effect on economic growth. On the contrary, rising government expenditure on transport and communication results to an increase in economic growth.[15], carried out a study on the relationship between government expenditure and economic growth in South Africa for the period of 1990 to 2015 using the Vector Error Correction Model and Granger Causality techniques. The time series data included in the model were gross domestic Product (GDP), government expenditure, national savings, government debt and consumer price index or inflation. Results obtained from the analysis showed a negative long-run relationship between government expenditure and economic growth in South Africa.

State of Nigeria Education

The state of Nigerian education got worst in the late 90s when the sector was starved of funding. Gradually, this was followed by infrastructure decay and brain drain. With the flight of these three elements, the education sector went down a slope. Inadequate funding and improper utilization of provided funds can be attributed to the root causes of the decline in the education sector. The Federal government, which is responsible for sustaining federal universities, has over the past decade not significantly increased the share of the government budget dedicated to education, despite exploding student numbers. Between 1981 and 2019 education spending fluctuated from 6.5 percent of the total budget in 1981 to 12.3 percent in 2015, and reduced to 7.05 percent in 2019. When compared with neighboring Ghana, in 1981, according to World Bank, Ghana spent 7.4 percent (its lowest) of its budget expenditure on education which shows its commitment to improving the sector, compared with Nigeria's 6.5percent in the same year despite the fact that Nigeria has a larger population and even more resources. In 2012, Ghana share of education expenditure was highest (37.5%) while Nigeria's highest share was 12.3 percent in 2015. Nigeria's lowest share was 1.83 percent in 2003 see figure 1.

Figure 1: Education Share of Total Expenditure (1981-2019)



Source: Computed by the researcher from http://www.indexmundi.com/ and educeleb.com

Due to funding constraints, Nigeria is the number one country of origin for international students from Africa: It sends the most students overseas of any country on the African continent, and outbound mobility numbers are growing at a rapid pace. According to data from the UNESCO Institute of Statistics (UIS), the number of Nigerian students abroad increased by 164 percent in the decade between 2005 and 2015 alone, from 26,997 to 71,351. Most of Nigeria's public universities are in deteriorating condition. And while efforts at increasing capacity by building new universities have generally been positive for access in absolute terms, they have also created issues related to instructional quality. Nigeria's institutions and lecture halls are severely overcrowded, student to teacher ratios have skyrocketed, and faculty shortages are chronic. Lab facilities, libraries, hostels, and other university facilities are often described as in being in a state of decay. Reports from 2012 suggested that only 43 percent of Nigeria's university teaching staff held Ph.D. degrees, and that Nigeria had one of the worst lecturer-to-student ratios in the world [12].The University of Abuja and Lagos State University, for example, reportedly had lecturer to student ratios as high as 1:122 and 1:114 respectively [12].

Although rankings are a notoriously poor proxy for university quality, they do provide the best relative guide available. It's thus worth noting that, in 2017, only one of Nigeria's universities is currently listed among the top 1,000 in international university rankings in the Times Higher Education Ranking the University of Ibadan at 801. Universities from other African countries like South Africa, Ghana, and Uganda are ranked considerably higher. From the mid-1990s, strikes have become an almost ritual occurrence at Nigerian universities, causing delayed graduations, disrupting lectures, loss income for

university staff, and further eroding the already low trust in the education system. In 2013, 60 public universities were paralyzed by strikes for more than five months over demands for funding increases and better employment benefits for university staff. In 2016, strikes, likewise, disrupted classes at 10 federal and state universities [12].

Studies have shown that adequate motivation is a precondition for the achievement of maximum output in any work environment. Insufficient salaries, dearth of incentives and lack of motivation contribute to the decline in the education sector. Every worker deserves wages as even sinners get wages for their sins, this means that every teacher on the surface of the earth needs to be paid. The annual salary for a public school teacher in South Africa ranges between $13,000 and $14,000, which is higher than that of a public school teacher in Nigeria. The primary school teacher in Nigeria with a TC II starts on Grade Level 4 and earns between $1,335 and $1,500 annually. An NCEholder earns between $1,666 and $1,800 annually depending on their level. The highest paid in the primary school system is the head teacher who earns around $6,000 annually with Grade Level between 14 and 16. Inconsistent payment is another issue which has made the profession a last option for jobseekers especially young graduates. If the profession is respected and government is consistent with payment, teachers will have the right frame of mind to impact knowledge [16].

III. METHODOLOGY

3.1 Data Source

The study utilizes time–series data (1981–2019). The data were obtained from various issues of the Central Bank of Nigeria (Statistical Bulletin& Annual Report and Statement of Accounts) and the World Bank. All data will be converted into log-log equation for time series processing except inflation. Thus, the coefficient can be interpreted as an elasticity. The variables and their sources are presented in table 1.

S/No	Variables	Measurement	Sources of Data
1.	Real education sector output (RLGDP)	Measures the market value of all Nigeria's education products produced in a specific time period i.e. year (in billions).	Central bank of Nigeria (CBN) statistical bulletin volume 29, December 2018
2.	Government expenditure on education (REDXP)	Measures the total amount of money spent on education in a specific time period i.e. year (in billions)	https://www.indexmundi.com/
3.	Forgone education expenditure (FEDXP)	20 percent of total federal government expenditure on education minus actual expenditure on education in a specific time period i.e. year (in billions)	Computed by the researcher
4.	Gross domestic investment (GDI)	It measures additions of capital goods, such as equipment, tools, transportation assets, and electricity (in billions). A proxy for infrastructure.	https://data.worldbank.org/indicator
5.	Human capital (HCAP)	Average years of secondary schooling, representing the numbers of years in school	https://data.worldbank.org/indicator
6.	Inflation rate (INF)	Annual percentages of average consumer prices a year- on - year changes	https://data.worldbank.org/indicator

Table 1: Variables Measurement and Sources of Data
Source: Researcher's Compilation, 2020

3.2 Model Specification

This study's estimation will differ from empirical works that studied the relationship between government expenditure and economic growth [6] and [7]). Therefore, the study will introduce the target variable (forgone education expenditure) to test the type of relationship between UNESCO's recommendation (15-20 percent of total government expenditure should be spent on education) and education growth in Nigeria. The relationship is expressed implicitly as:

$$EDGDP = f(FEDXP, REDXP) \quad (1)$$

Since the study is interested in estimating the impact of forgone education expenditures on education growth in the short- and long-run simultaneously, our preferred econometric method is VECM. Nevertheless, as a robustness test, we will also utilize OLS and VAR methods to gauge the effect of forgone education expenditures on education growth

in the short-run. In order to undertake the empirical analysis using the VECM technique, the variables involved in the model must be non-stationary and integrated of the same order, or they should be stationary. To test for the order of integration of the variables, we use the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Under both tests, the null hypothesis is that the variable contains a unit root and the alternative variable is stationary.

The choice of forgone expenditure on education and government expenditure on education are based on the two theories; Wagner's law and the Keynesian theory that have two opposing views in examining the relationship between government spending and growth. As, they have been selected in addition to inflation rate, human capital and gross domestic investment to determine their influence on education growth over the period under study. Openness to trade is not included as an explanatory variable as it was not considered as a variable of interest in this study. Equation 1, is expanded to include the other three explanatory variables to become:

$$EDGDP = f(FEDXP, REDXP, INF, GDI, HCAP) \quad (2)$$

The economic expectations of each the parameters of the explanatory variables in relationship with the dependent variable is stated below as

$f_1 > 0, f_2 > 0, f_3 < 0, f_4 > 0, f_5 > 0;$

This means that all the identified variables have positive relationship with education growth, while inflation is expected to exert negative influence on education growth.

Where:

EDGDP = Education growth;

FEDXP= Forgone expenditure;

REDXP = Real education expenditure;

INF= Inflation Rate;

GDI= Gross domestic investment

HCAP = human capital, proxied by number of years spent in secondary school

Equation 2 can be written in the econometric model and in their respective natural log form as thus;

$$LEDGDP_t = \beta_0 + \beta_1 LFEDXP_t + \beta_2 LREDXP_t + \beta_3 INF_t + \beta_4 LGDI_t + \beta_5 LHCAP_t + \varepsilon_t \quad (3)$$

LEDGDP is the natural log of education growth; LFEDXP is the natural log of forgone education expenditure; LREDXP is the natural log of real education expenditure, LGDI is the natural log gross domestic investment; LHCAP is the natural log of human capital, proxied by number of years spent in secondary school; L is natural logarithm; β_0 is the intercept or autonomous parameter estimate; $\beta_1 \ldots . \beta_5$ is the Parameter estimate associated with the determinants of education growth in Nigeria and ε_t is the stochastic error term.

The entire estimation procedure consists of five steps: first, unit root test; second, lag selection; third, cointegration test; fourth, the error correction model estimation, fifth, Causality and sixth, VAR stability test. The paper is based on the following hypotheses for testing the causality and co-integration between LEDGDP, LFEDXP, LREDXP, INF, LGDI and LHCAP. (i) Whether there exists a short run relationship between government spending variables namely, LFEDXP, LREDXP and LEDGDP in Nigeria, (ii) whether there exists a long run relationship between LFEDXP, LREDXP and LEDGDP in Nigeria and (iii) Whether there is causality between LEDGDP growth and LFEDXP, LREDXP, INF, LGDI, LHCAP.

IV. DATA PRESENTATION AND ANALYSIS

The analysis will be divided into two namely; descriptive statistics and empirical analysis.

4.1 Descriptive Statistics

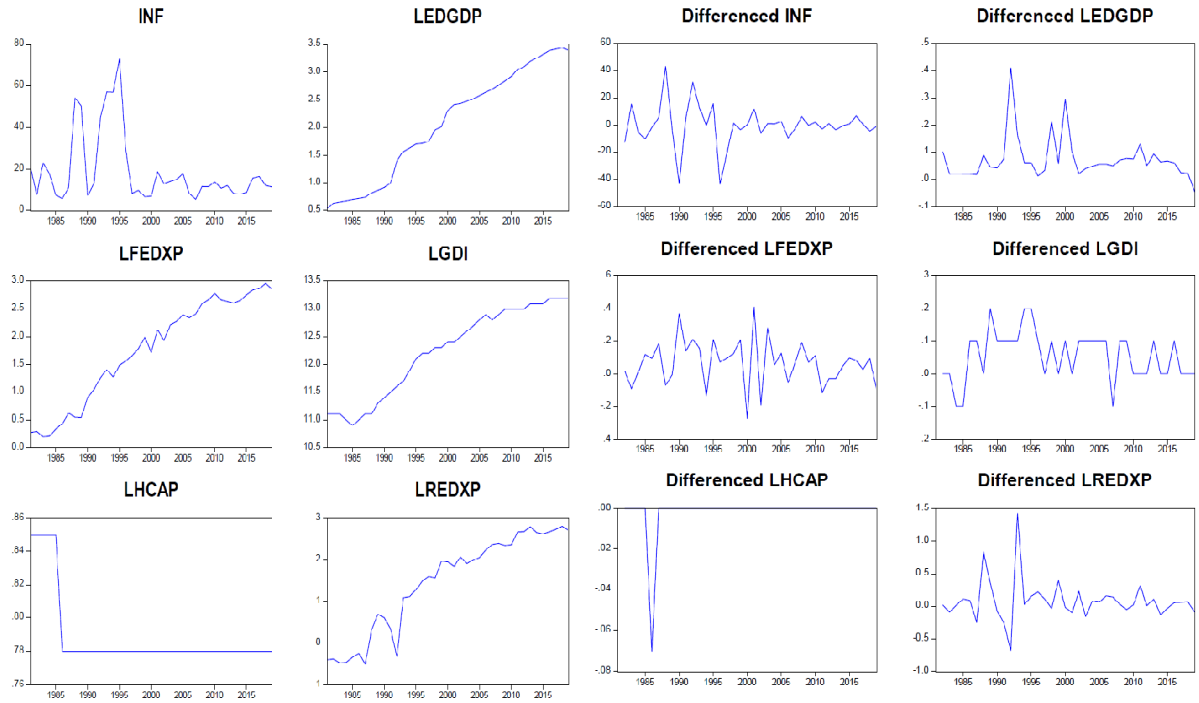
	LEDGDP	LFEDXP	LREDXP	INF	LGDI	LHCAP
Mean	2.06	1.75	1.46	19.12	12.23	0.79
Median	2.31	1.93	1.91	12.10	12.40	0.78
Maximum	3.44	2.96	2.81	72.84	13.20	0.85
Minimum	0.53	0.20	-0.51	5.38	10.90	0.78
Std. Dev.	0.99	0.93	1.17	17.08	0.80	0.02
Skewness	-0.16	-0.38	-0.55	1.78	-0.36	2.22
Kurtosis	1.60	1.72	1.84	5.00	1.62	5.95
Jarque-Bera	3.36	3.60	4.19	27.17	3.92	46.27
Probability	0.19	0.17	0.12	0.00	0.14	0.00
Sum	80.16	68.18	56.75	745.56	477.00	30.77
Sum Sq. Dev.	37.43	32.86	51.85	11080.04	24.52	0.02
Observations	39	39	39	39	39	39

Table 2. Summary Statistics of the variables (1981-2019).
Source: Authors computation using Eviews 9, 2020.

Table 2 above provides the summary descriptive statistics, namely, sample means, maximums, minimums, medians, standard deviations, skewness, kurtosis and the Jarque-Bera tests with their p-values. It is clear that all the statistics show the characteristics common with most time series, for instance, normality in the form of platykurtic there are a number of noticeable differences, between the variables. Firstly, inflation has the largest unconditional average of 19.12% while Human Capital has the least unconditional average of 0.79%. The standard deviation shows the level of volatility in the variables. It displays the rate at which each variable deviates from the mean value. From the table above, inflation is the most volatile at 17.08% while the real Human Capital is the less volatile 0.02%. The skewness measures the asymmetric nature of the data.

4.2 Series Trend Analysis

Times series data often exhibits increasing or decreasing trends, with fluctuations. As such, trend analysis is necessary before unit root testing, to establish whether the series have a unit root or not. The results of graphical display in Figure 2A indicate that the series exhibit a random walk with drift and trend except inflation rate. Figure 2B show that the series reflect a trend with a pattern of large fluctuations, meaning that the series are non-stationary.



A: The Series In Their Raw (Undifferentiated) Form
Source: Researcher's Computation Using Eviews 9

B: Results Of The Series Trend Test After First Difference
Source: Researcher's Computation Using Eviews 9

Figure 2: Trend Analysis

4.3 Stationarity Test

4.3.1 Unit Root Tests

Unit root tests will be conducted based on the Ender (2014) approach. The second ADF test at level involved a trend and intercept, while in the third, none were included. Later data was tested at first difference. Following [17] and [18] methods, the series are estimated.

The results of the ADF tests at level, constant & trend, none and first difference are summarized in table 3 below. As indicated by the asterisk, the variables are not stationary when tested at level with a constant and constant and trend. However, as indicated by the asterisk, we therefore conclude that the series are non-stationary, because data is stationary when the ADF test statistics are less than the test critical values at $5\%(ADF\,test\ statistics < test\,critical value\ at\ 5\%)$. The corresponding probability value for stationary data is less than $0.05(P-value < 0.05)$. The corresponding probability value for stationary data is less than $0.05(P-value < 0.05)$. Following the ADF test, all series are non-stationary at level but stationary at first difference. However, ADF tests are often affected by the choice of the lag length (p) and lose power while estimating a large sample. As such, the ADF tests results are validated by the Phillips–Perron (PP) test.

Variables	ADF Test Statistic				PP Test Statistic			
	Constant	Constant & Trend	None	First Difference	Constant	Constant & Trend	None	First Difference
LEDGDP	-0.82	-1.17	2.03	-4.64*	-0.82	-1.43	3.19	-4.64*
LFEDXP	-2.54	-0.76	1.57	-9.14*	-1.20	-1.40	2.47	-9.01*
LREDXP	-1.27	-2.67	0.43	-7.65*	-1.46	-2.61	0.69	-11.55*
INF	-2.91	-2.29	1.70	-5.68*	-2.79	-2.86	-1.79	-9.69*
LGDI	-0.90	-0.46	4.88	-4.26*	-0.82	-1.17	-3.49	-4.37*
LHCAP	-1.18	-1.77	-1.05	-6.08*	-1.18	-1.82	-1.08	-6.08*

Table 3: Unit Root Tests Result

Notes (ADF): Test critical values at 5% (At level: constant = -2.92, Constant and trend = -3.50, none = -1.94 while at First difference = -2.92); P-value= Probability value, * signifies stationarity.
Notes (PP): Test critical values at 5% (At level: constant = -2.92, Constant and trend = -3.50, none = -1.94 while at First difference = -2.92); P-value= Probability value, * signifies stationarity.

4.3.2 The Phillips–Perron Unit Root Test

The advantage of the PP test over the ADF test is that the test corrects any heteroscedasticity and serial correlation in the errors terms (u_t). Also, PP tests do not require lag selection and are based on a serially correlated regression error term. Similar to the ADF test, the null for PP is also based on the null that the series are non-stationery. The results of the PP test are indicated in Table 3 above. The results indicate that the series are non-stationary at level but stationary at first difference. Figure 2B shows the variables in their differenced form. This result justifies the use of VAR model for estimation.

4.4 Determination of Lags

Table 4 reports lag-order selection statistics. Criteria of SC FPE, HQIC, LR, and AIC show lag order of three. AIC has the lowest value. So the study will proceed further tests with lags (3).

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-41.25012	NA	5.56e-07	2.625007	2.888927	2.717122
1	140.8213	293.3373	1.71e-10	-5.490073	-3.642634*	-4.845267
2	187.5970	59.76890	1.12e-10	-6.088721	-2.657763	-4.891225
3	243.5446	52.83941*	6.14e-11*	-7.196922*	-2.182445	-5.446735*

Table 4: VAR Lag Order Selection Criteria
Source: Researcher's calculations from Eviews 9, 2020. * indicates lag order selected by the criterion

4.5 Cointegration Test

Having verified that all variables are integrated to order one $I(1)$, the next step is to perform cointegration test. Due to the fact that there are multivariate time series, the multivariate cointegration technique proposed by [19] is applied to determine whether there are stable long-run relationship.

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob.**	Hypothesized No. of CE(s)	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	213.7349	95.75366	0.0000	None *	92.46661	40.07757	0.0000
At most 1 *	121.2683	69.81889	0.0000	At most 1 *	54.47977	33.87687	0.0001
At most 2 *	66.78855	47.85613	0.0003	At most 2 *	29.79343	27.58434	0.0256
At most 3 *	36.99512	29.79707	0.0062	At most 3 *	23.70503	21.13162	0.0212
At most 4	13.29010	15.49471	0.1046	At most 4	12.93873	14.26460	0.0801
At most 5	0.351373	3.841466	0.5533	At most 5	0.351373	3.841466	0.5533

Table 5: Cointegration Results
Source: Researcher's calculations from Eviews 9, 2020. * Denotes rejection of the null hypothesis at the 0.05 level

The major aim of this test is to ascertain whether a linear combination of the integrated variable is becoming stationary over the long-run, if this hold, then it means cointegration exists among the variables, this further implies that there is existence of long run relationship among the variables. Table 5 indicates the presence of a long-run economic relationship among all the variables as both trace and Max-Eigen statistics indicated 4 cointegrating equation among the variables.

Vector Error Correction Model (VECM) Estimation

In an attempt to determine the appropriate model on the empirical relationship between forgone education expenditure and education growth in Nigeria, two Vector Auto-regression Models (VAR and VEC) were built using the same variables. The VEC model, although non- structural as the VAR, served as its restricted counterpart. Meanwhile, the existence of cointegration relationship between the variables as reported in Table 6, invalidated the adoption of the VAR. The Vector Error Correction Model (VECM) becomes the appropriate model under this condition. The result is presented in two sections, the first section shows the cointegrating equations and the second section presents the result of the Vector Error Correction models. The regression result is presented in Table 7.

Error Correction:	D(LEDGDP)	D(LFEDXP)	D(LREDXP)	D(INF)	D(LGDI)	D(LHCAP)
ECT	-0.14	-0.43	0.25	14.57	-0.12	0.01
D(LEDGDP(-1))	-0.15	1.05	1.70	61.34	0.20	-0.06
D(LEDGDP(-2))	0.43	-1.48	-1.13	35.87	-0.07	0.07
D(LEDGDP(-3))	-0.32	-0.06	0.95	32.95	0.16	0.02
D(LFEDXP(-1))	0.07	0.22	0.53	14.45	0.51	-0.05
D(LFEDXP(-2))	0.53	0.16	-0.54	26.65	0.16	-0.02
D(LFEDXP(-3))	0.23	-0.56	0.09	-27.20	-0.18	0.03
D(LREDXP(-1))	-0.21	-0.35	0.19	5.89	-0.03	0.00
D(LREDXP(-2))	-0.06	-0.23	0.20	11.97	-0.01	0.00
D(LREDXP(-3))	-0.01	-0.33	-0.06	-13.71	-0.12	0.01
D(INF(-1))	0.00	0.01	0.00	0.04	0.00	0.00
D(INF(-2))	0.00	0.00	0.01	-0.53	0.00	0.00
D(INF(-3))	0.00	0.00	-0.01	0.15	0.00	0.00
D(LGDI(-1))	-0.53	-1.02	-0.16	6.33	-0.42	0.11
D(LGDI(-2))	-0.29	-0.19	1.56	32.13	-0.14	0.06
D(LGDI(-3))	-0.28	-0.68	0.98	-12.25	-0.01	0.05
D(LHCAP(-1))	1.97	-0.41	-2.83	-78.79	-0.71	-0.24
D(LHCAP(-2))	0.38	1.11	-10.83	-603.32	0.06	0.01
D(LHCAP(-3))	1.68	10.01	-5.53	-255.65	1.14	-0.49
C	0.12	0.35	-0.26	-15.40	0.05	-0.02
R-squared	0.71	0.86	0.80	0.91	0.78	0.48

Table 6: The Result of Vector Error Correction Model
Source: Researcher's calculations from Eviews 9, 2020.

Table 6 above show that the error correction term of the target equation D(LEDGDP) and that of D(LFEDXP) & D(LGDI) is negative while that of D(LREDXP), D(INF), D(LHCAP)are positive. The R squared of the equations in the VEC model shows that about 71% percent and 86%, 80%, 91%, 78% and 48% of the variation in the dependable variables are explained by the models respectively. This indicates that the six models are fit.

Simultaneous equation has been established and estimated by VAR through the VECM procedure in Table 6. However, the simultaneous equation estimated under VAR through VECM procedure only provides the coefficients, standard errors and t-statistics but there is no provision for probability values. Therefore, there is the need to estimate the simultaneous equation as a basis for measuring the relationship between forgone education expenditure and other explanatory factors on education growth. This is because t-statistic is first appropriate for a study involving two samples and within-groups design. As such, this being a simultaneous model interpreting results based on t-statistics results becomes inappropriate. Second, t-statistics are not appropriate for a sample size greater or equal to 30 ($n \geq 30$) as in this study.

The independent variables have the variances of the two groups but are not homogeneous [19]. To establish the impact of the explanatory variables on Nigeria's education growth, the study estimates the simultaneous equation by employing OLS.

	Coefficient	Std. Error	t-Statistic	Prob.
ECT	-0.14331	0.078192	-1.83278	0.0868
D(LEDGDP(-1))	-0.15394	0.255313	-0.60295	0.5556
D(LEDGDP(-2))	0.433301	0.340712	1.271754	0.2228
D(LEDGDP(-3))	-0.3215	0.245864	-1.30761	0.2107
D(LFEDXP(-1))	0.072137	0.175895	0.410112	0.6875
D(LFEDXP(-2))	0.526923	0.184096	2.862217	0.0119
D(LFEDXP(-3))	0.234686	0.200303	1.171658	0.2596
D(LREDXP(-1))	-0.20791	0.118124	-1.76012	0.0988
D(LREDXP(-2))	-0.05931	0.107821	-0.55004	0.5904
D(LREDXP(-3))	-0.00661	0.092413	-0.07148	0.944
D(INF(-1))	0.00038	0.001847	0.205919	0.8396
D(INF(-2))	-0.00242	0.001214	-1.99285	0.0648
D(INF(-3))	0.000458	0.001408	0.325017	0.7497
D(LGDI(-1))	-0.53199	0.337022	-1.57851	0.1353
D(LGDI(-2))	-0.28802	0.314586	-0.91556	0.3744
D(LGDI(-3))	-0.28357	0.275087	-1.03083	0.319
D(LHCAP(-1))	1.974332	1.328951	1.485632	0.1581
D(LHCAP(-2))	0.37525	1.196874	0.313525	0.7582
D(LHCAP(-3))	1.680964	2.349562	0.715437	0.4853
C	0.120538	0.058837	2.048685	0.0584

Table 7: Error Correction Result
Source: Researcher's calculations from Eviews 9, 2020.

Table 7 accounts for an error correction of -0.14331. Having a negative sign attached to this term explains how the disequilibrium gradually disappears between the short to the long-run. As a result of this, the short run values of output will gradually converge to the long run path by 14% level of adjustment yearly. However, the result further reveal that the coefficient of forgone education expenditure has a significant positive relationship with education growth in the second lag which is in line with the Apriori expectation. The result indicate that a 1% increases in LFEDXP will increase LEDGDP by 0.53% in the second lag. The first lag of real education expenditure(LREDXP) have a significant negative relationship with education growth which is not in line with our Apriori expectation. The result indicate that a 1% increases in LREDXP will decrease LEDGDP by -0.20% in the first lag. In the second lag of inflation (INF), a 1% increase in INF will decrease education growth by -0.002% which is in line with our Apriori expectation. From the first difference of LGDI up to the third difference show an insignificant negative relationship with education growth during the year of study. Also, the first, second and third lags of human capital has aninsignificant negative relationship with education growth which is not in line with our Apriori expectation. Furthermore, R^2 measures the joint statistical influence of explanatory variables in explaining the dependent variable as shown by the coefficient of determination value of 0.713744, which account for 71% of the variation in LRLGDP between the year 1981 to 2019 are explained by the variables controlled in the model, while the remaining 29% percent is explained by other variables not captured in the model i.e. error term.

4.7 Simultaneous Equation Short-Run Simulation and Analysis

The results of the short-run test are presented below:

Dependent Variable: DLEDGDP			
Variables	Chi-square test	Prob.	Relationship
D(LFEDXP)	8.83	0.03	Short-run causality
D(LREDXP)	4.22	0.24	No short-run causality
D(INF)	4.19	0.24	No short-run causality
D(LGDI)	3.37	0.34	No short-run causality
D(LHCAP)	2.66	0.45	No short-run causality
ALL	34.41	0.00	Short-run causality

Table 8: Wald Tests and Short-run Test
Source: Researcher's calculations from Eviews 9, 2020.

Table 8, According to our findings, there exist a short-run relationship between the explanatory variables and the independent variable, as indicated by the Chi-square joint statistics probability values. The p-value of chi-square test for forgone education expenditure (LFEDXP) is less than 0.05, the null hypotheses (*H*0): β5=0 will be rejected, therefore LFEDXP cause LEDGDP in the short run. The rest of independent variables don't cause LEDGDP in the short run. The next step is to conduct exante forecasting involving impulse response and variance decomposition tests.

4.8 Impulse Response Function

The impulse response function serves the pivotal role in assessing how and to what extent shocks on independent variables influence education growth. Table 9 displays the dynamic effects of one standard deviation shock from the independent variables in Nigeria over a range of 5 years period to shock on LEDGDP.

Response of LEDGDP:						
Period	LEDGDP	LFEDXP	LREDXP	INF	LGDI	LHCAP
SHORT-RUN	0.065784	0.003444	-0.01165	0.002257	-0.00815	0.00287
LONG-TERM	0.057827	0.005695	0.003062	-0.0023	-0.01306	0.000191

Table: 9: Impulse Response Analysis
Source: Researcher's calculations from Eviews 9, 2020.

In Nigeria, education growth forecast indicate both positive & negative trend through shocks and innovations with fluctuations. Results in table 9 indicate that education growth own shock (LEDGDP); forgone expenditure (LFEDXP) and human capital proxied by number of years spent in secondary school (LHCAP) will account for increasing education growth in the country while inflation(INF) and gross domestic investment (LGDI) will account for a decreasing growth. Real education expenditure (LREDXP) will account for decreasing education growth in the short-run. The result is further explained in figure 3.

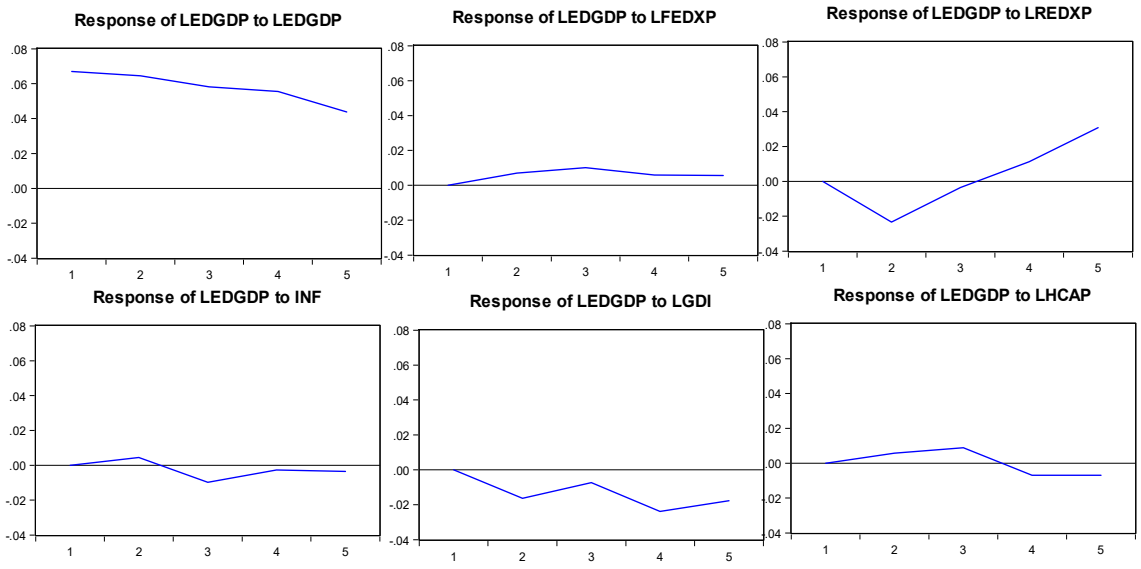


Figure 3: Impulse Response of LEDGDP to Dependent Variables

First, a one standard deviation positive own shock will cause a change from 0.07 in the short-run, and remain the same in the long-run. Second, forecast indicate positive impact from forgone education expenditure (LFEDXO) to education growth (LEDGDP) in both the short-run & long-run. According to the simulation, a one positive standard deviation shock from forgone education expenditure (LFEDXO) will cause education growth to increase by 0.003 in the short-run. The shocks will increase by 0.005 in the long-run, thus decreasing LFEDXO affects education growth negatively in the short run and long run. This means that UNESCO's recommendation of 15-20 percent is important for the nation to experience education growth throughout the five periods but does not accelerated education growth According to the third forecast, a one positive standard deviation shock from real education expenditure (LREDXP) will cause education growth to decrease by -0.01 in the short-run. The shocks will increase to 0.003 in the long-run. Fourth forecast indicate that inflation (INF) will be a concern for the nation, and that it will decrease. A one standard deviation INF negative shock leads LEDGDP to

decrease by -0.002 in the long-run. This means that, decreasing inflation will have negative impact on education growth in Nigeria in the short and long run. Fifth forecasts indicate that gross domestic investment (LGDI) will be a concern for the nation, and that it will decrease. A one standard deviation positive shock leads LGDI to decrease by -0.008 in the short-run, and by 0.013 in the long-run. This means that, increasing gross domestic investment (LGDI) will have a negative impact on education growth in Nigeria. Sixth, innovations for human capital proxied by number of years spent in secondary school (LHCAP) cause education growth to be positive in the short-run. Simulations indicate that a one positive standard deviation shock to LHCAP will cause education growth to increase at 0.003 in the short-run and improve in a decreasing rate in the long-run to 0.001. This means that the number of years spent in secondary school is important for the nation to experience education growth throughout the five periods but it does not accelerate education growth.

4.9 Variance Decomposition

Variance decomposition is adopted to forecast the error variance effects for each endogenous variable within a system. In a simple linear equation, for any change in x at time (t) there is a corresponding change in y as a dependent variable [21]. In this study, based on the Monte Carlo procedure and ordering by Cholesky, the forecast is comprised of short-run (two years), medium-term (five years) and long-run (ten years).

The results of variance decomposition forecast for endogenous variables are education growth, forgone education expenditure, real education expenditure, inflation, gross domestic investment and human capital proxied by number of years spent in secondary school.

PERIOD	LEDGDP	LFEDXP	LREDXP	INF	LGDI	LHCAP
SHORT-RUN	95.25	0.25	2.84	0.11	1.39	0.17
MEDIUM-TERM	90.52	0.75	4.36	0.49	3.25	0.63
LONG-RUN	71.26	0.75	15.79	0.66	3.83	7.71

Table 10: Variance Decomposition
Source: Researcher's calculations from Eviews 9, 2020.

In the short-run, impulses, innovations or shocks to education growth account for 95.25% of fluctuations in education growth own shock. However, the education growth own shock fluctuations continuously decline to 71.26% in the long-run. Meanwhile, shocks to forgone education expenditure account for 0.25% of fluctuations of education growth in the short-run. The fluctuations of education growth due to forgone education expenditure increase in the long-run to 0.75%. In the short-run, shocks to real education expenditure account for 2.84%, inflation account for 0.11%,gross domestic investment 1.39% and human capital, proxied by number of years spent in secondary school accounts for 0.17%. In the long-run, shocks to real education expenditure account for 15.79%, inflation accounts for 0.66%, gross domestic investment 3.83% and human capital, proxied by number of years spent in secondary school accounts for7.71%. Shocks to education growth will account for the highest fluctuations in Nigeria's education growth, followed by real education expenditure.

4.10 VAR Model Checking

Employing VAR, the model was estimated via VECM procedure using three lags, where the endogenous variables were transformed to first difference via the error correction term. The error correction term which indicates the long-run equilibrium has been reported in Table 7, while the short-run relationship is reported in Table 8. Before discussing the findings, the VECM model will be validated for normality, serial correlation and stability.

4.10.1 Test for Normality

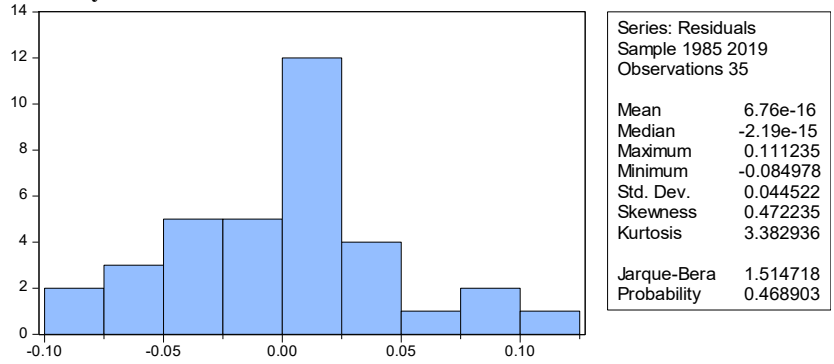


Figure 4: Test Results for Normality

According to our results in figure 4, skewness is 0.47 while the kurtosis indicates 3.38. The JB is indicated by 1.51, with a corresponding probability value not significant at 5% critical value. Based on this test, our model is normally distributed.

Autocorrelation Residual LM Test

The LM Test is commonly used to test for serial correlation in autoregressive model-one $[AR(1)]$. LM Test statistic computes lag order p based on an auxiliary regression of the residuals of the estimated regression under the hypothesis that there is no serial correlation from lag three. The results of the LM are indicated below.

F-statistic	0.059342	Prob. F(3,12)	0.9802
Obs*R-squared	0.511653	Prob. Chi-Square(3)	0.9163

Table 11: Breusch-Godfrey Serial Correlation LM Test
Source: Researcher's calculations from Eviews 9, 2020.

The results of Table 11 shows that the null hypothesis of no serial autocorrelation will be accepted for Godfrey LM test for 3 lags since their p-values are greater than the significance values of 0.05 and 3 lags rejects the null hypothesis that there is serial autocorrelation. Hence we can conclude that there is no serial autocorrelation since the majority of the lags accept the null hypothesis.

4.10.2 Test for Stability

Stability is tested by conducting CUSUM of squares test and recursive coefficients stability test.

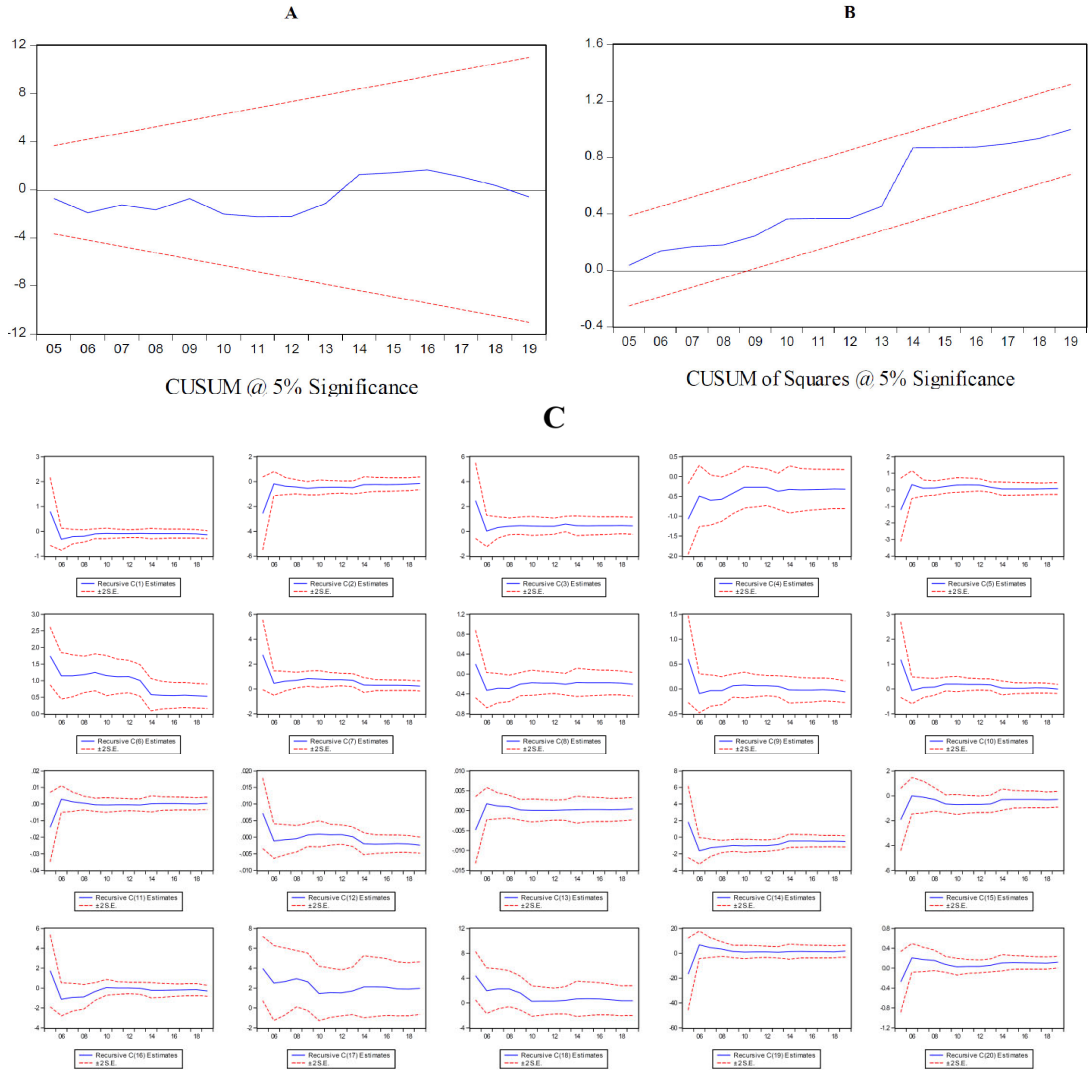


Figure 5 (A, B & C): Tests Results for Stability

The results are indicated in Figures 5A, 5B &5C. All tests indicated that the systems equation is valid and provides sufficient results for economic analysis. Recursive residual estimates was employed to check structural change instability. Findings indicate an absence of any instability because the Cusum and Cusum of squares plots test statistic and the recursive coefficients are confirmed within the 5% critical bounds of parameter stability. This means that we accept the null hypothesis and conclude that our parameters are stable, and as such are without misspecification. In conclusion, following the diagnostic tests conducted, normality and serial correlation, all probability values are greater than 5% critical values which suggests that our model is valid because all probability values for the tests are greater than 5%, meaning that our education output growth equation is valid for economic analysis.

V. DISCUSSION OF FINDINGS

To investigate the determinants of short- and long-run education growth in Nigeria, the study estimated a series of VECM specifications for the growth rate of the recommendation by UNESCO which we call forgone expenditure in this study together with other variables. The model specification is explained in the previous section III. Tables 6 and 7 presents the estimated short and long-run relations from the VECM. The study will only discuss the variables of interest, the forgone education expenditure and real education expenditure. Results from Table 7 illustrate that in the short-run the main driving force behind education growth could have been the UNESCO recommendation of 20 percent. The coefficient of its second lag is statistically significant and can grow education by 53%. The first lag coefficient of real education expenditure is statistically negative, a one percent increase in its first lag will reduce education growth by 21%. This findings show that the root causes of the decline in the education sector is inadequate funding and improper utilization of provided funds. Government spending in the sector is relatively small when compared with other African countries. In 2018, according to World Bank, Ghana spent 18.6% of its budget expenditure on education which shows its commitment to improving the sector, compared with Nigeria's 7.1% in the same year despite the fact that Nigeria has a larger population and even more resources. This is major reason why majority of our politicians and well to do in the society send their children to Ghana for studies.

The forgone expenditure findings also show that the crucial factor in promoting human capital development and of course education outcomes in Nigeria is public education spending. Adhering to the UNESCO recommendation will be of immense importance because of the high level of poverty that exist in the country. Subsidizing education will improve the opportunity of individuals in attaining good education and thereby, exiting poverty and crime. Teachers and lecturers will be well remunerated, research materials will be more available, enrolment into primary and secondary schools will improve. Higher spending is associated with higher education outcomes.

Finally, the short-run causality findings of a short-run relationship between the forgone expenditure variable and education growth variable as indicated by the Chi-square statistics probability value is in line with [9] law, that an increase in the size of government expenditure is a natural consequence of economic growth. In other words, the Wagner's law pontificates that the share of the government expenditure in GDP will increase with intensified economic development. Also, the long-run causality from the independent variables to education growth indicate that there is causality. This is because the error correction term coefficient (ECT) of 0.143309 is negative and significant meaning that there is long-run causality from the dependent variables to education growth in Nigeria.

5.1 Conclusion and Recommendation

The objective of this research paper is to scrutinize through empirical observation the effect of forgone education expenditure on education growth in Nigeria covering the period of 1981-2019. The variables used such as forgone education expenditure is regarded as independent variable while education growth is regarded as dependent variable and the rest such as real education expenditure, inflation, gross domestic investment and human capital proxied by number of years spent in secondary school are regarded as controlled variables. The data tested for stationarity using ADF and PP; the results showed that they became stationary under both ADF and PP after converting them into the first difference. Also, the paper found lag order selection criterion and the results showed that the lag selection criterion was 3. Moreover, [20] Co-integration test and VECM were used to check long-run and the short-run relationship between variables and the results revealed long-run associations and short-run relationship running from independent variables toward education growth using Max-Eigen and Trace statistics values tests indicating 4 co-integrating equation(s) at the 0.05 levels and Wald test as well. Finally, we checked diagnostic test of the residuals and stability of the model. The results showed that the residuals were free from serial correlation, normally distributed and the model was stable as well. The paper recommends that government should increase the share of education expenditure to meet with the UNESCO recommendation of 15-20 percent. In addition, government expenditure on education should be properly managed in order to enhance education growth.

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