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Research Article

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Disaggregated Government Expenditure and Economic Development in Nigeria: An Econometric Analysis. (1981-2020)

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Abstract

This study empirically examined disaggregated government expenditure and economic development in Nigeria using data spanning between the periods 1981 to 2020 by employing the use of Augmented Dickey Fuller test, Co integration test and Vector Error Correction technique (VECM) as the statistical techniques of analysis. From the study, the error correction model is -0.709 and it shows that about 70.9 percent of the short run shocks in Human Capital Development (HDI) in Nigeria are adjusted annually and such high speed of adjustment is very fundamental in the process of policy conception, formulation and implementation. This aforementioned finding revealed that there is a long run equilibrium relationship between human development index and various government expenditures variables as shown by the error correction model which is very high, rightly signed and significant. Also, the results show that in the long run that government expenditure on social security, government expenditure on education, health expenditure and agricultural expenditure have a positive and significant impact on human development index while government expenditure on infrastructure has a negative but significant effect on human development index in Nigeria. Furthermore, the short run estimates show that government expenditure on infrastructure (GEI) has a significant effect on HDI at lag period one and two while government expenditure on education and government expenditure on agriculture were found to be significant at lag period one respectively. Conversely, government expenditure on social security and government expenditure on health have a direct and insignificant effect on human development index in Nigeria. By implication, the findings indicate that government spending play a crucial role in the development of human capital in Nigeria. The study therefore concludes that there is need for federal government to be consistent in allocation and redistribution of government spending to various key sectors of the economy such as education, health, agriculture and defence which will invariably contribute positively and significantly to the human development in the country. Finally, there is need to ensure that federal government appropriate more funds to these key sectors annually.

Keywords: Disaggregated government expenditure, human development index, VECM, Nigeria.JELclassification code:C22,H50,O15.

Introduction

The economy of Nigeria has been forecast to become a developed economy by 2050 (Obi et al., 2016). One of the major ways to actualizing this goal is to pursue a sustained economic development through government intervention in executing roles of allocation, distribution and stabilization of resource, especially when market is not efficient or outcome is not acceptable socially [1].Government expenditure plays a crucial role in stimulating the economy. The system in which government expenditure is needed to affect economic development depends largely upon the size of total government expenditure distributed to the development projects in the economy [2]. Government expenditure is basically divided into capital and recurrent expenditure. The recurrent expenditure are government spending on administration such as wages, salaries, interest on loans, maintenance etc., while spending on capital projects like roads, health, education, infrastructure can be classified under capital expenditure [3].

Evidence has shown that rise in government spending over the years tends to improves economic development. For example, it is believed that spending on education and health will raise the level of national output. Furthermore, expenditure on infrastructures such as roads, communications, electricity, water and so on will cause decrease in costs of production and raiseproductivity, thereby improving economic development (Taiwo & Agbatogun, 2011).In Nigeria, report shows that government spending has been on the increase over the years. Statistically, government recurrent expenditure which stood at N4.85b in 1981 rose to N579.3 billion

in 2001 and N147 billion in 2010. It further rises to N221.5 billion in 2015 up to N1720.490 billion in 2020. Government capital expenditure on the other hand experienced an increase from N6.57 billion in 1981 to N438.7 billion in 2001 and N883.87 by 2010. Also, it decreases to N818.35 billion in 2015 and further decreaseto N622.13 in 2020 (CBN, 2020). However, the increasinggovernment expenditure has not translated into meaningful economic development, as Nigeria ranks among the poorest countries in the world [4].

Nigeria is currently witnessing economic setbacks due to dwindling oil revenue, upon which the country relies for its sustenance. According to Trading Economics (2016), the GDP growth rate of Nigeria shows a declining trend of -2.06% and -1.5% for 2016 and 2015, respectively, due to decreasing oil revenue. Similarly, total government expenditure in Nigeria has moved from N14,968 billion in 1980 to N60,268.20 billion in 1990 and rose N3,452,990m in 2009 and to N17,461,350billion in 2017 [5].

Several studies have been examined on the relationship between government expenditure and economic growth (Abu & Abdullahi, 2010; Tajudeen & Ismail, 2013; Agbonkhese & Asekome, 2014; For instance, the works of Ighodaro and Oriakhi, Tajudeen and Ismail, (2013), Agbonkhese and Asekome (2014) found a negative relationship between government expenditure and economic growth.Conversely, the findings of Oni, Aninkan and Akinsanya, Robinson, Eravwoke and Ukavwe and Udoffia and Godson established that government expenditure and economic growth are positively related. Also, there are still those with mixed results such as the works of and Modebe, Okafor, Onwumere, and Ibe (2012). The difference in their findings calls for further investigations [4, 6-13]. It is against this background that this study seeks to ascertain the effect of government expenditure on economic development in Nigeria. In other words, the study aim at examining the effect of disaggregated variables (government expenditure on social security, government expenditure on education, government expenditure on health, government of agriculture and government expenditure on infrastructure) on economic development in Nigeria.

The remaining of this paper is structured as follows; Section two review theoretical and empirical literatures. The third section focuses on methodology. Section four looks at the presentation and analysis of results while the final section provides conclusion and recommendations.

Literature Review

Theoretical Framework

The theoretical framework for the study is based on Keynesian theory on public expenditure. In 1936, John Maynard Keynes (1883-1946) work on "General Theory of Employment, Interest and Money" criticized the classical economists for putting too much emphasis on the long run. According to Keynes, "we are all dead in the long run". Keynes believed depression needed government intervention as a short term cure. Increasing saving will not help but spending. Government should increase public spending giving individuals, purchasing power and producers would produce more, creating more employment. This is the multiplier effect that shows causality from public expenditure to national income.

Keynes categorized public expenditure as an exogenous variable that can generate economic growth instead of an endogenous phenomenon. Keynes believed the role of government to be important as it can avoid depression by increasing aggregate demand. Government spending is a tool that brings stability in the short run but need to be done cautiously as too much of public expenditure would lead to inflationary situation while too little of it would lead to unemployment. From the perspective of Keynes, in an effort to understand the depression, GDP is thought of as being determined by aggregate demand. The components of aggregate demand are consumption, investment, government purchases, and net exports respectively. Let's denote aggregate demand by AD. Thus we have,

$$AD=C+I+G+X \quad \ldots\ldots (1)$$

In the Keynesian model, aggregate supply, denoted AS, is just equal to the actual value of GDP that we observe. Thus:

$$AS=GDP \quad \ldots\ldots (2)$$

Setting aggregate supply equal to aggregate demand, we have,

$$GDP=C+I+G+X \quad \ldots\ldots (3)$$

The consumption component of aggregate demand can, in turn, be expressed as a function of disposable income which we called Y. Let's write disposable income as,

$$Y=GDP-T \quad \ldots\ldots (4)$$

In the simplest version of the Keynesian model presented here, we treat 'T' as a lump sum amount, not as a function of GDP. A more sophisticated model would allow 'T' to be a function of GDP, so that we could study the effect of a change in the tax rate. The consumption function is the

$$C=(a+b)Y=(a+b)\ (GDP-T) \quad \ldots\ldots (5)$$

Substituting for C in the expression for GDP we get;

$$GDP=(a+b)(GDP-T)+I+G+X \quad \ldots\ldots (6)$$

Which we can solve for GDP, the result is;

GDP= 1/(1-b)=[a+1+G+X]-b/(1-b)(T)
……. (7)

This equation tells us how the level of GDP will change in response to a change in any of the autonomous components of spending, those that do not depend on GDP, at least according to the assumptions of this model. We can see that a one dollar change in either a, I, G, or X will result in a change of 1/(1-b) dollars in GDP. Of course, this is just the spending multiplier again, but we see that it applies not just to government spending but also to any increase in spending by any sector. The tax cut multiplier is still b/(1-b), keeping in mind that a tax cut is a negative increase in T.

Generally, government expenditure can contribute positively to economic development. Hence, an increase in the government consumption is likely to lead to an increase in employment, profitability and investment through multiplier effects on aggregate demand. As a result, government expenditure augments the aggregate demand, which provokes an increased output depending on expenditure multiplier. Hence, the Keynesian analysis of government expenditure formed the bases for this paper.

Empirical Review

Ighodaro and Oriakhi used time series data for the period 1961 to 2007 and applied co integration test and Granger causality test to assess government expenditure disaggregated into general administration and community and social services in Nigeria [6]. The results show that negative impact of government expenditure on economic growth. Taiwo and Agbatogun, (2011) analyzed the implications of government spending on the growth of Nigeria economy over the period 1980 – 2009. Using Johansen Cointegration, unit root test and error correction model, the findings shows that total capital expenditure, inflation rate, degree of openness and current government revenue significantlyimpact on economic growth in Nigeria. Nworji and Oluwalaiye assess the effect of government expenditure on road infrastructure development on economic growth in Nigeria for the period 1980-2009. The study employed multiple regression analysis model specified on the basis of hypothesized functional relationship between government spending on infrastructure development and economic growth [8]. Indicators used for government spending are values for defense, transport/communication, and inflation rate as the explanatory variables, while gross domestic product constituted the explained variable. The model for the study was estimated using the Ordinary Least Square (OLS) technique. The outcomes showed that transport and communication, including defense, individually have asignificant effect on economic growth. Tajudeen and Ismail, (2013) examined the impact of public expenditure on economic growth in Nigeria during the period 1970 to 2010 making use of annual time series data. The study employed the bounds testing (ARDL) approach to examine the long run and short run relationships between public expenditure and economic growth in Nigeria. The bounds test suggested that the variables of interest put in the framework are bound together in the long-run. The associated equilibrium correction was also significant confirming the existence of long-run relationships. Our findings indicated the impact of total public spending on growth to be negative which is consistent with other past studies. Recurrent expenditure however was found to have a positivebut insignificant impact on growth. Agbonkhese and Asekome (2014) studied the impact of public expenditure on the growth of the Nigerian economy from 1981 to 2011. They employed Ordinary Least Square (OLS) method of econometric technique and found that although there is a positive relationship between the dependent and independent variables, the adjustment of economic growth was a fair one which made it difficult to reject the null hypothesis which according to them implies that government over the years appears to be bad managers of resources and have failed to play their role in the process of economic growth and development. Oni, Aninkan and Akinsanya (2014) studied the effects of government capital and recurrent expenditures on the economic growth of Nigeria from 1980-2011, using the ordinary least square method for estimating multiple regression models. The regression results showed that both capital and recurrent expenditures impacted positively on economic growth during the period of study. The recurrent expenditure has a stronger and more accelerating effect on growth than capital expenditure. Robinson, Eravwoke and Ukavwe examined the relationship between government expenditure and economic growth [11].

Their study disaggregated government expenditure into public debt expenditure, expenditure on health and government expenditure on Education. Augmented Dickey Fuller (ADF) test was conducted and ordinary least square (OLS) was employed in the study. And it was discovered that government expenditure in Nigeria could increase both foreign and local investments, the study encouraged government to spend more on key macro-economic variables. Udoffia and Godson investigated the impact of federal government expenditure on the Nigerian economy between the periods 1986 to 2014 using the OLS estimation technique and found that federal government capital and recurrent expenditure have a positive effect on real GDP [12]. In summary, the empirical studies reviewed on the actual relationship between government expenditure and economic growth is mixed and inconclusive. Their results and evidence differ by analytical method employed, and categorization of public expenditures.

Methodology

Model Specification

Given a theoretical autoregressive model that combines a set of nth time series variables

$Y^t = F(Y_{t-i} X_{1t}, X_{2t} \ldots\ldots X_{nt}$
……. (8)

Following the Keynes theory stated in the above equation(s) and taking a cue at the works of Adewara and Oloni (2012) empirical study, then the functional modification;

$HDIt = F(\lambda t)$

……. (9)

Where, F = Functional dependent

$\lambda_t=(HDI_{t-1}, GESS_t, GEE_t, GEH_t, GEA_t, GEI_t,)$

……. (10)

Thus, equation (10) also becomes

$HDI_t = F(HDI_{t-1}, GESS_t, GEE_t, GEH_t, GEA_t, GEI_t)$

……. (11)

From the foregoing, Equation (9) can be rewritten in a VECM structural form as follows;

$$\Delta y_t = \beta_0 + \sum \eta_i \Delta y_{t-i} \pm \sum_{i=1}^{n} \varphi_i \Delta \mathbf{h}\ \lambda_t - \pi ECM_{t-1} + \mu_t$$

……. (12)

Equation (12) therefore, becomes an essential modification to Keynes theoretical framework discussed above, due to the inclusion of the influence of other macroeconomic factors into the modeling framework of this study.

Based on the theoretical framework of the study and equation (12) which is the major model specified to analyze the objective of establishing the impact of disaggregated government expenditure on economic development in Nigeria, the estimated dynamic models derived in Equation (13a to 13d) are represented in a VECM multivariate framework of order p (VECM(p)) below:

$$\Delta Y_t = \delta + \sum_{i=1}^{j} \phi_i \Delta Y_{1t-i} + \sum_{i=1}^{k} \alpha_i \Delta X_{1t-i} + \sum_{i=1}^{l} \psi_i \Delta X_{2t-i} + \sum_{i=1}^{m} \beta_i \Delta X_{3t-i} + \pi ECM_{t-1} + \mu_t \ldots (13a)$$

$$\Delta X_{1t} = \delta + \sum_{i=1}^{j} \phi_i \Delta Y_{t-i} + \sum_{i=1}^{k} \alpha_i \Delta X_{1t-i} + \sum_{i=1}^{l} \psi_i \Delta X_{2t-i} + \sum_{i=1}^{m} \beta_i \Delta X_{3t-i} + \pi ECM_{t-1} + \mu_t \ldots (13b)$$

$$\Delta X_{2t} = \delta + \sum_{i=1}^{j} \phi_i \Delta Y_{t-i} + \sum_{i=1}^{k} \alpha_i \Delta X_{1t-i} + \sum_{i=1}^{l} \psi_i \Delta X_{21t-i} + \sum_{i=1}^{m} \beta_i \Delta X_{3t-i} + \pi ECM_{t-1} + \mu_t \ldots (13c)$$

$$\Delta X_{3t} = \delta + \sum_{i=1}^{j} \phi_i \Delta Y_{t-i} + \sum_{i=1}^{k} \alpha_i \Delta X_{1t-i} + \sum_{i=1}^{l} \psi_i \Delta X_{2t-i} + \sum_{i=1}^{m} \beta_i \Delta X_{3t-i} + \pi ECM_{t-1} + \mu_t \ldots (13d)$$

Where the $\delta_i, \phi_i, \alpha_i, \psi_i$ and β_i are (nxn) coefficient matrices,

$\sum_{i=1}^{j} \psi_i \Delta X_{2t-i} = \psi_1 \Delta X_{2t-1} + \psi_2 X_{2t-2} + \psi_3 X_{2t-3} \ldots\ldots\ldots \psi_j X_{2t-j}$ and so on.

$\delta_i = \delta_1, \delta_2, \delta_3, \ldots\ldots\ldots\ldots \delta_n$; the intercepts in the VECM system.

t = 40 (the estimation period) and $\mu_{1t}, \mu_{2t}, \mu_{3t}, \ldots\ldots\ldots \mu_{nt}$ are the unobservable error terms with zero means and constant variances. These stochastic disturbance terms are fusions of the structural innovations from the simple equations.

π denotes the speed of adjustments to long run equilibrium or fraction of error corrected after adjustments.
Hence, substituting the necessary variables into the above equations yields the following;

$$\Delta HDI_t = \beta_0 + \sum_{i=1}^{k} \eta_i \Delta HDI_{t-i} + \sum_{i=1}^{l} \psi_i \Delta GESS_{t-i} + \sum_{i=1}^{o} \phi_i \Delta GEE_{t-i} + \sum_{i=1}^{n} \omega_i \Delta GEH_{t-i} + \sum_{i=1}^{m} \alpha_i \Delta GEA_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta GEI_{t-i} + \pi ECM_{t-1} + u_t \ldots\ldots (14a)$$

$$\Delta GESS_t = \beta_0 + \sum_{i=1}^{k} \eta_i \Delta HDI_{t-i} + \sum_{i=1}^{l} \psi_i \Delta GESS_{t-i} + \sum_{i=1}^{o} \phi_i \Delta GEE_{t-i} + \sum_{i=1}^{n} \omega_i \Delta GEH_{t-i} + \sum_{i=1}^{m} \alpha_i \Delta GEA_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta GEI_{t-i} + \pi ECM_{t-1} + u_t \ldots\ldots\ldots\ldots (14b)$$

$$\Delta GEE_t = \beta_0 + \sum_{i=1}^{k} \eta_i \Delta HDI_{t-i} + \sum_{i=1}^{l} \psi_i \Delta GESS_{t-i} + \sum_{i=1}^{o} \phi_i \Delta GEE_{t-i} + \sum_{i=1}^{n} \omega_i \Delta GEH_{t-i} + \sum_{i=1}^{m} \alpha_i \Delta GEA_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta GEI_{t-i} + \pi ECM_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots (14c)$$

$$\Delta GEH_t = \beta_0 + \sum_{i=1}^{k} \eta_i \Delta HDI_{t-i} + \sum_{i=1}^{l} \psi_i \Delta GESS_{t-i} + \sum_{i=1}^{o} \phi_i \Delta GEE_{t-i} + \sum_{i=1}^{n} \omega_i \Delta GEH_{t-i} + \sum_{i=1}^{m} \alpha_i \Delta GEA_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta GEI_{t-i} + \pi ECM_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots (14d)$$

$$\Delta GEA_t = \beta_0 + \sum_{i=1}^{k} \eta_i \Delta HDI_{t-i} + \sum_{i=1}^{l} \psi_i \Delta GESS_{t-i} + \sum_{i=1}^{o} \phi_i \Delta GEE_{t-i} + \sum_{i=1}^{n} \omega_i \Delta GEH_{t-i} + \sum_{i=1}^{m} \alpha_i \Delta GEA_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta GEI_{t-i} + \pi ECM_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots (14e)$$

$$\Delta GEI_t = \beta_0 + \sum_{i=1}^{k} \eta_i \Delta HDI_{t-i} + \sum_{i=1}^{l} \psi_i \Delta GESS_{t-i} + \sum_{i=1}^{o} \phi_i \Delta GEE_{t-i} + \sum_{i=1}^{n} \omega_i \Delta GEH_{t-i} + \sum_{i=1}^{m} \alpha_i \Delta GEA_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta GEI_{t-i} + \pi ECM_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots (14f)$$

Where;
HDI= Human development index (as a proxy for economic development)
GESS = government expenditure on social security
GEE = government expenditure on education
GEH = government expenditure on health
GEA = Government expenditure on agriculture
GEI = government expenditure on infrastructure
U_t = stochastic error term
β_0 =constant term
β_1 to β_5 = coefficients of the variables
A Priori Expectation; $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$, $\beta_5 > 0$

Data and Sources

The study used time series secondary data sourced from the Central Bank of Nigeria (CBN) statistical bulletin between the periods 1981 to 2020.

Techniques of Data Analysis

This study employed Vector Error Correction Modeling (VECM) technique to explore the impact of disaggregated government expenditure on economic development in Nigeria. It has been revealed from literature that most time series data always fluctuate over time and using such non-stationary series in empirical analyses might yield spurious outcomes and misleading policy recommendations (Granger & Newbold, 1977). Therefore, the study adopted Augmented Dickey Fuller (ADF) test for our unit root in order to attain stationary. The study also employed the use of Johansen co-integration test so as to ascertain the long run relationship between variables employed for this study.

Furthermore, considering the lengthy period covered (1981-2020), the structural stability is examined, using the Forecast Error Variance Decomposition (FEVD) and the Impulse Response Function (IRF). Specifically, the forecast error variance decomposition indicates the percentage of unexpected changes in a variable that is linked to its own innovations as well as the shocks originating from other variables in the structural system while the Impulse Response reveals the dynamic responses/reactions of a variable to an innovation due to another variable over the estimation period.

Presentation and Analysis of Results

Preliminary Analysis

Descriptive Statistics

Table 1: Summary Statistics of Variables

	HDI	GESS	GEE	GEH	GEA	GEI
Mean	0.362273	123.0063	121.5457	78.19472	17.37532	38.49114
Median	0.43465	38.75851	50.78364	20.58052	7.30095	7.327092
Maximum	0.56329	427.421	394.2163	308.81	65.39901	195.9
Minimum	0	0	0.162154	0.041315	0.01277	0.094752
Std. Dev.	0.202665	150.0524	147.8417	104.4374	19.63919	50.29879
Skewness	-1.14351	0.837579	0.874444	1.111439	0.760546	1.12951
Kurtosis	2.566384	2.140633	2.083322	2.717863	2.266195	3.421306
Jarque-Bera	9.030793	5.907771	6.49818	8.367973	4.753654	8.801123
Probability	0.010939	0.052137	0.03881	0.015238	0.092845	0.01227
Sum	14.4909	4920.251	4861.828	3127.789	695.0129	1539.646
Sum Sq. Dev.	1.601846	878113.7	852429.8	425379.5	15042.21	98668.78
Observations	40	40	40	40	40	40
Source: Author's Computation using Eviews 10.0, 2021.						

The table 1 shows the detail account of the summary statistics for the explained and explanatory variables respectively. The average economic development as proxied by human development index is about 0.362 with standard deviation of 0.203. In respect of government expenditure on social security, the mean value is 123.01 with a standard deviation of 150.05. The analysis of government expenditure on education shows a mean value of 121.55 with the value of standard deviation of 147.84. Finally, the mean value of government expenditure on health, agriculture and infrastructure are 78.195, 17.375 and 38.491 respectively while their standard deviations are 104.44, 19.639 and 50.299 respectively. Skewness is a measure of asymmetry of the distribution of the series around its mean. From the above table we observe that GESS, GEE, GEH, GEA and GEI all have positive skewness and as such they have long right tails while HDI is found to be negatively skewed. Similarly, kurtosis measures the peakedness or flatness of the distribution of the series. From table 1 above, it is observed that HDI, GESS, GEE, GEH, GEA and GEI are all below three therefore this suggest that these variables are platykurtic. Finally, Jarque-Bera is a test statistic to test for normal distribution of the series. From the

table 1 above, the Jarque-Bera for HDI, GESS, GEE, GEH, GEA and GEI are 9.031, 5.908, 6.498, 8.368, 4.754 and 8.801 respectively. These results show that all the variables except GESS and GEA are not normally distributed.

Empirical Analysis

Unit Root Test

Table 2A: Augmented Dickey Fuller Test at level and First Difference

VARIABLES	ADF TEST STATISTICS	ADF CRITICAL VALUE			ORDER OF INTEGRATION	REMARKS
		1% Level	5% level	10% level		
HDI	-1.577825	-3.610453	-2.938987	-2.607932	I(0)	Non-Stationary
GESS	2.386026	-3.621023	-2.943427	-2.610263	I(0)	Non-Stationary
GEE	0.438929	-3.621023	-2.943427	-2.610263	I(0)	Non-Stationary
GEH	2.365587	-3.626784	-2.945842	-2.611531	I(0)	Non-Stationary
GEA	-0.867089	-3.621023	-2.943427	-2.610263	I(0)	Non-Stationary
GEI	-0.253414	-3.621023	-2.943427	-2.610263	I(0)	Non-Stationary

Table 2B: Augmented Dickey Fuller Test at level and First Difference

VARIABLES	ADF TEST STATISTICS	ADF CRITICAL VALUE			ORDER OF INTEGRATION	REMARKS
		1% Level	5% level	10% level		
D(HDI	-6.218114	-3.610453	-2.938987	-2.607932	I(1)	Stationary
D(GESS)	-6.068898	-3.621023	-2.943427	-2.610263	I(1)	Stationary
D(GEE)	-5.577064	-3.610453	-2.938987	-2.607932	I(1)	Stationary
D(GEH)	-8.462712	-3.615588	-2.941145	-2.609066	I(1)	Stationary
D(GEA)	-7.435031	-3.621023	-2.943427	-2.610263	I(1)	Stationary
D(GEI)	-4.728704	-3.621023	-2.943427	-2.610263	I(1)	Stationary

Table 2A and 2B above shows the results of unit root test for Augmented Dickey Fuller Test. It shows that in the process of comparing the test statistic value against the Mackinnon critical value at 1%, 5% and 10% level of significance, it was noticed that D(HDI), D(GESS), D(GEE), D(GEH), D(GEA) and D(GEI) were found to be stationary at first differenced. Hence, having tested for the stationarity of the variables, we proceed to test for the long run relationships of the variables which give us the co integration result in table 3A and 3B below;

Cointegration Test Result

Table 3A: Johansen Cointegration Test Results (Trace value)

Hypothesized No of CE(S)	Eigen Value	Trace statistic	0.05critical value	Prob**
None *	0.950919	243.4470	95.75366	0.0000
At most 1 *	0.700780	128.9043	69.81889	0.0000
At most 2 *	0.569917	83.05448	47.85613	0.0000
At most 3 *	0.402447	50.99094	29.79707	0.0001
At most 4 *	0.367893	31.42428	15.49471	0.0001
At most 5 *	0.308061	13.99379	3.841466	0.0002

Table 3B: Johansen Cointegration Test Results (Max-Eigen value)

No of CE(S)	Eigen Value	Max-Eigen statistic	0.05critical value	Prob**
None *	0.832783	66.17306	40.07757	0.0000
At most 1 *	0.681220	42.30038	33.87687	0.0039
At most 2	0.393703	18.51423	27.58434	0.4530
At most 3	0.380172	17.69760	21.13162	0.1416
At most 4	0.316669	14.08870	14.26460	0.0533
At most 5 *	0.202589	8.376268	3.841466	0.0038

Source: Authors' Computations using Eviews 10.0, 2021.

Table 3A and 3B above depicts the results of Johansen Co integration test. It shows the estimated result of the long run relationship between the variables that is D(HDI), D(GESS), D(GEE), D(GEH), D(GEA) and D(GEi) using the Johansen co integration test. It was observed that the trace statistic in table 3A indicated 6 co-integrating equations at the 5% level of significance since the trace values are greater than critical values. Similarly, the maximum Eigen value statistic in table 3B also indicates 3 co-integrating equation at the 5% level of significance. These results suggest that there is co-integration or long–run relationship among the variables employed in this study.

Vector Error Correction Lag Exclusion Wald Tests

In piloting a vector error correction analysis, it is very essential to evaluate the suitability of the length of lag reflected in the estimation process and this is accomplished with the help of vector error correction Lag Exclusion Wald Tests. The result of the test revealed that, the lag structure (1, 2) well-thought-out in our estimation was appropriate (optimal) as revealed by the probabilities (0.01744) and (0.00000) of the Chi-squared test statistics. This is further demonstrated in Table 4 below;

Table 4: VEC: Lag Exclusion Wald Tests

Chi-squared test statistics for lag exclusion:							
Numbers in [ ] are p-values							
	D(HDI)	**D(GESS)**	**D(GEE)**	**D(GEH)**	**D(GEA)**	**D(GEI)**	**Joint**
DLag 1	11.37554	333.0937	18.53924	312.2038	35.38078	77.05065	4105.777
	[0.01744]	[0.00000]	[0.00502]	[0.00000]	[0.00000]	[0.00000]	[0.000000]
DLag 2	22.94028	153.4367	44.48440	162.8641	14.48932	65.86336	1212.125
	[0.01630]	[0.00000]	[0.00000]	[0.00000]	[0.02462]	[0.00000]	[0.000000]
df	6	6	6	6	6	6	36

Vector Error Correction Estimates (Long run and Short run Estimates)

Table 5: VECM Results

Long run Estimates				**Short run Estimates**		
Variables	**Coef**	**Std error**	**t-stats**	**Error Correction:**	**Coefficients**	**t-stats**
GESS(-1)	0.058111	0.00854	6.80715	ECM (-1)	-0.70921	-4.19552
GEE(-1)	0.011003	0.00290	3.79668	D(HDI(-1))	-0.65494	-3.29408
GEH(-1)	0.056201	0.00785	-7.15916	D(HDI(-2))	-0.32878	-1.66692
GEA(-1)	0.027687	0.00757	3.65646	D(GESS(-1))	0.000311	0.18638

GEI(-1)	-0.082800	0.00875	-9.46744	D(GESS(-2))	0.000120	0.16311
				D(GEE(-1))	0.000148	2.69778
				D(GEE(-2))	1.341105	0.32111
				D(GEH(-1))	-0.00046	-0.17730
				D(GEH(-2))	-0.00032	-0.21124
				D(GEA(-1))	8.901205	2.76515
				D(GEA(-2))	0.00011	0.10733
				D(GEI(-1))	-0.00052	2.59342
				D(GEI(-2))	-8.871605	-2.87856
				C	0.000541	0.03472
				R-squared	0.731687	
				Adj. R-squared	0.70606	
				F-statistic	5.878077	

Source: Authors' Computations using Eviews 10.0, 2021.

From the Vector Error Correction results reported in Table 5 above, the long run estimates shows that government expenditure on social security, government expenditure on education, health expenditure and agricultural expenditure have a positive and significant impact on human development index at about 6%, 1%, 5% and 3% respectively in the long run while government expenditure on infrastructure has a negative but significant effect on human development index in Nigeria in the long run.

Furthermore, the coefficient of Error correction term (ECM) was correctly signed as well as statistically significant at 5 percent level. Specifically, the result from the human development index (HDI) model implies that about 70.9 percent of the short run shocks in HDI in Nigeria are adjusted annually and such high speed of adjustment is very fundamental in the process of policy conception, formulation and implementation. Also, the coefficient of determination (R2) is 0.732 which shows that about 73 percent variations in the HDI were explained by the independent variables. The F-stat is 5.878 shows that the overall test is significant.

The short run estimates show that government expenditure on infrastructure (GEI) has a significant effect on HDI at lag 1 and lag 2. This shows that a unit increase in government expenditure in infrastructure will result to about 8.87 unit decrease in HDI at lag 2. Also, government expenditure on education and government expenditure on agriculture were found to be significant at lag 1 respectively. On the other hand, government expenditure on social security and government expenditure on health have a direct and insignificant effect on human development index in Nigeria.

Structural Stability Analysis: Variance Decomposition and Impulse Response Function

Table 6: Variance Decomposition of Human Development Index in Nigeria

Period	S.E.	HDI	GESS	GEE	GEH	GEA	GEI
1	0.094589	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.099893	99.88856	0.000268	0.012793	0.017023	0.059747	0.021609
3	0.108355	99.78353	0.010624	0.034574	0.015193	0.137653	0.018425
4	0.121927	99.80526	0.008488	0.038538	0.011998	0.121154	0.014560
5	0.129474	99.79468	0.013045	0.034763	0.010644	0.132198	0.014672
6	0.137762	99.79092	0.013567	0.032561	0.010997	0.138176	0.013781
7	0.146168	99.79863	0.012411	0.033378	0.011815	0.129301	0.014463
8	0.153400	99.77356	0.013519	0.038520	0.011114	0.150091	0.013194
9	0.160553	99.77270	0.016710	0.037957	0.010958	0.149632	0.012047
10	0.167486	99.76783	0.015364	0.034888	0.019202	0.146795	0.015918
11	0.174008	99.76049	0.014980	0.044406	0.018551	0.146769	0.014803
12	0.180351	99.75367	0.014542	0.041682	0.017316	0.158195	0.014601
13	0.186474	99.75850	0.015773	0.042062	0.017398	0.152405	0.013856

14	0.192396	99.75838	0.014898	0.041633	0.016569	0.154597	0.013921
15	0.198137	99.75715	0.014766	0.041062	0.015679	0.158056	0.013286
Source: Authors' Computations using Eviews 10.0, 2021.							

From the table 6 above, the forecast error variance decomposition of human development index in Nigeria by own innovations accounts for 100% in the first year while expenditure on social security, expenditure on education, expenditure on health, expenditure on agriculture and expenditure on infrastructureaccounts for about 0.000% respectively.

Human development index in Nigeriaaccounts for about 99.795% of own shocks in the fifth year while government expenditure on social security, education, health, agriculture and infrastructure account for 1.3%, 3.3%, 1.1%, 1.3% and 1.4% in the same year correspondingly. This indicates that, the shocks of all the variables had only marginal effect on HDI in Nigeriain that year. Also, about 99.77% of own shocks in the tenth year while government expenditure on social security, education, health, agriculture and infrastructure account for 1.5%, 3.4%, 1.9%, 1.5% and 1.6% in the same year correspondingly. Furthermore, the forecast error variance decomposition of HDI in Nigeria by own innovations accounts for 99.757% in the fifteenth year, while shocks due to government expenditure on social security, education, health, agriculture and infrastructure are 1.4%, 4.1%, 1.6%, 1.6% and 1.3%. In addition, it is obvious that the highest innovation was due to expenditure on education, while the shock of expenditure on social security and agriculture to the shocks in HDI in Nigeriawere the lowest in that same year.

Table 7: Impulse Response of Human Development Index in Nigeria

Period	HDI	GESS	GEE	GEH	GEA	GEI
1	0.094589	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.031944	-0.00016	0.001130	0.001303	-0.00244	0.001468
3	0.041808	-0.00111	0.001668	-0.00029	-0.00319	-8.312205
4	0.055875	-0.00012	0.001292	7.352407	-0.00136	3.613405
5	0.043496	-0.00096	0.000314	-2.521005	-0.00204	0.000543
6	0.047006	-0.00062	0.000593	0.000550	-0.00202	0.000395
7	0.048819	0.000277	0.000975	0.000661	-0.00118	0.000689
8	0.046434	-0.00073	0.001390	-0.0003	-0.00277	0.000122
9	0.047334	-0.00106	0.000848	-0.00046	-0.0018	-2.741505
10	0.047621	-5.081205	4.745405	0.001601	-0.00162	0.001166
11	0.047117	-0.00048	0.001913	-0.00048	-0.00181	-0.00013
12	0.047328	-0.00044	0.000334	-0.00012	-0.00265	0.000517
13	0.047354	-0.00087	0.001034	0.000646	-0.00124	0.000263
14	0.047310	-0.00017	0.000886	0.000289	-0.00206	0.000579
15	0.047287	-0.00053	0.000842	-0.00015	-0.0022	0.000251
Source: Authors' Computations using Eviews 10.0, 2021.						

Table 7 shows results from the impulse response function of human development index in Nigeria as against its own shocks and the shocks of government expenditure on social security, government expenditure on education, government expenditure on health, government expenditure on agriculture and government expenditure on infrastructure over a fifteen year projection. The time length will facilitate the inclusion of both the short-run, medium-run and long-run responses of HDI in Nigeria to other variables employed in this study. The result of the impulse response function of HDI shows that HDI that has a positive relationship with its past values in over the fifteen years periods.

Conclusion

This study empirically examined disaggregated government expenditure and economic development in Nigeria using data between the periods 1981 to 2020 by the use of Vector Error Correction technique (VECM) as the major statistical technique of analysis. From the study, the findings revealed that in the long run that government expenditure on social security, education, health and agriculture have a positive and significant impact on human development index while government expenditure on infrastructure has a negative but significant effect on human development index in Nigeria. Furthermore, the short run estimates show that government expenditure on infrastructure (GEI) has a significant effect on HDI at lag period one and two while government expen-

diture on education and agriculture were found to be significant at lag period one respectively. Conversely, government expenditure on social security and health has a direct and insignificant effect on human development index in Nigeria.By implication, the findings indicate that government spending play a crucial role in the development of human capital in Nigeria. Based on the findings, the study concludes that there is need for government to be consistent in channeling of government expenditure to various key sectors of the economy such as education, health, agriculture, defence, etc. which will invariably contribute positively and significantly to human development in the country. Finally, high degree of transparency and accountability on government spending becomes a prerequisite at all sectors of the economy in order to prevent mismanagement or misappropriation of funds.

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