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Fiscal Variables and Economic Growth in Oil-Rich Developing Countries (1981-2013)

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Abstract: This study examined the growth effect of fiscal variable specifically government expenditure in the oil-rich developing countries of Nigeria, Indonesia and Saudi Arabia. The study covered the period 1981 to 2013. The secondary data used for the study were fetched from World Development Indicators (WDIs) 2014 edition and Pen World Tables version 8.1. The variables included in the analysis include GDP, aggregate government expenditure, imports and exports of goods and services all in US dollar. Others include broad money as a percentage of GDP, annual inflation rate, annual growth rate of population and total population. We employed Time Series Econometric techniques of analysis. Long-run equilibrium relationships were found to exist between government expenditure and economic growth in all the three countries. The result also shows that government expenditures have positive and significant effects on economic growth. However, the magnitude of these effects varies across the three countries. This finding therefore called for the support for fiscal space hypothesis in these countries to boost economic growth. We therefore concluded that government expenditure among other variables enhanced economic growth in the oil-rich developing countries of Nigeria, Indonesia and Saudi Arabia during the period under investigation.

Keywords: Fiscal Variables, Oil-Rich Developing Countries, Long-Run Equilibrium, Economic Growth

1. Introduction

The study of how economic growth is influenced by government fiscal variables in general and government spending in particular is not new. What seems unusual in the comparative analysis of this phenomenon in oil rich developing countries is the likely differing impact of this in these countries. Two schools of thought have emerged from the study of fiscal policy impact on growth. One upholds the fact that it stifles the dynamism of economic growth because of government spending inefficiency which is always apparent and manifested in anomalies like inflated contract prices, lack of good supervision and the use of inferior materials. These are often captioned by the concept of "corruption". On the other hand, there is the view that growth can only be promoted through government provision of public goods and infrastructural facilities which the private sector will not provide.

In their discussion of fiscal growth, Miller and Rusek (1997) discovered that for developing countries, debt financed increases in government expenditure retard growth. These have opposite effects in developed countries where tax financed government expenditure increases lower growth while increasing debt financed government expenditures have detrimental effect on growth.

While these claims may be generalized for developing countries, differences in their effects may exist and that is what this paper sets out to establish especially in oil rich developing countries. Another area of interest is that reactions of oil providing states to oil gluts and shocks may differ. This differing fiscal behaviour might trigger into differing impact of fiscal variables particularly government expenditure on growth in these countries. This study is considered expedient now that crude oil prices are dwindling in the world market. We expect that the results will reveal more features of government spending in the three countries of interest that is Indonesia, Saudi Arabia and Nigeria and such will extend further the frontier of knowledge.

Some stylized facts about the economy of the oil-rich developing countries of Indonesia, Saudi-Arabia and Nigeria

The information presented in Table 1 shows the position of the economy in each of the countries during the period under investigation. Nigeria with about (USD70.00) annual average government expenditure per capita has an annual average GDP per capita of about (USD664.00). Indonesia with about (USD107.00) annual average government expenditure per capita has an annual average GDP per capita of about (USD1,228.00). Saudi-Arabia with about (USD2,814.00) annual average government expenditure per capita has an annual average GDP per capita of about (USD11,632.00). Nigeria recorded a double-digit inflation on the average while Indonesia and Saudi-Arabia experienced single-digit inflation. This provides unquestionable evidence for classifying Nigeria as one of the high-inflation economies in the world. The annual inflation rate in Nigeria on the average was about (20%), for Indonesia, it was about (8%) while in Saudi-Arabia it was about (1%). The information on inflation implies that prices are more stable in Saudi-Arabia and Indonesia compared with Nigeria. Also, Saudi-Arabia recorded higher growth rate in population compared with Nigeria and Indonesia. The annual average growth rate of population in Saudi-Arabia was about (3.3%) that of Nigeria and Indonesia was about (1.6%) and (2.6%) respectively. Saudi-Arabia also had the largest money sector compared with Nigeria and Indonesia. The size of the money sector in Saudi-Arabia was about (46%), in Nigeria, it was about (25%) while in Indonesia, it was about (40%). Examining the volume of trade in these countries, Saudi-Arabia had the highest trade volume of about (75%) while Nigeria and Indonesia had about (59%) and (54%) respectively.

Table 1: *Some stylized facts about the economies of the oil-rich developing countries of Nigeria, Indonesia and Saudi-Arabia between (1981-2013).*

Countries/variables of interest	Nigeria	Indonesia	Saudi-arabia
GDPPCUSD	664.031	1,228.046	11,631.811
GEXPPCUSD	69.640	106.581	2,813.590
ANNINFRT	20.392	8.155	1.454
ANNPOPGRT	2.597	1.639	3.256
M2PCGDP	25.295	39.663	46.169
DGRTROPN	0.586	0.543	0.750

Source: Authors' own computation

Similarly, figures 1.1 - 1.6 also reveal the behaviour of some of the key macroeconomic variables in these countries. We can see clearly how the variables concerned moved over time in each of the countries. This enables us to comment on whether the variables follow similar pattern across the three countries or if they diverge.

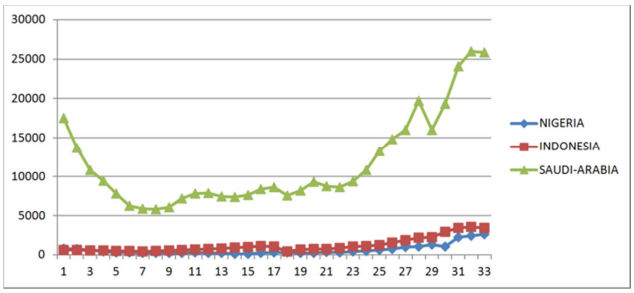


Figure 1.1. *Distribution of countries by GDP per capita in US dollar.*

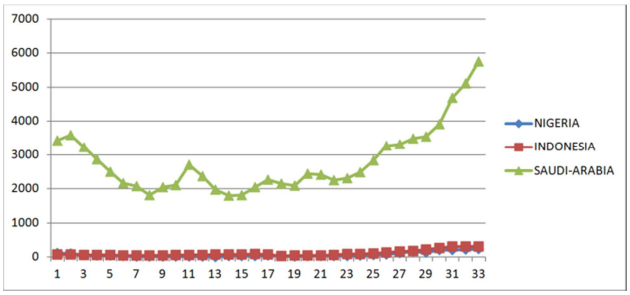


Figure 1.2. *Distribution of countries by government expenditure per capita in US dollar.*

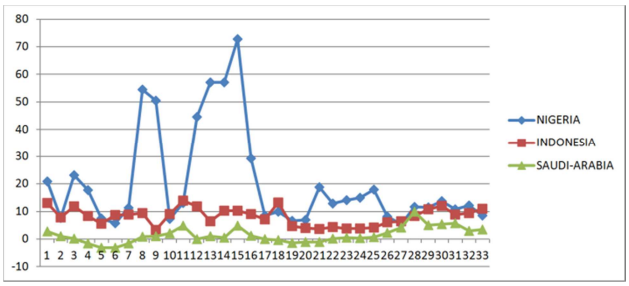


Figure 1.3. *Distribution of countries by annual increase in the rate of inflation.*

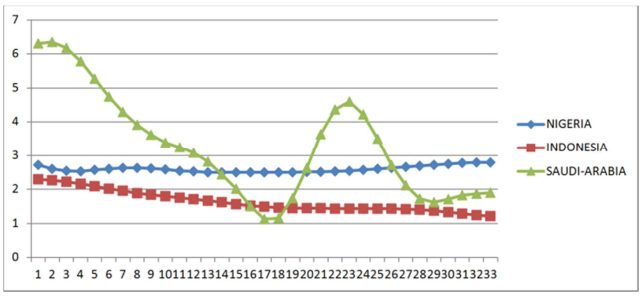


Figure 1.4. *Distribution of countries by annual growth rate of population.*

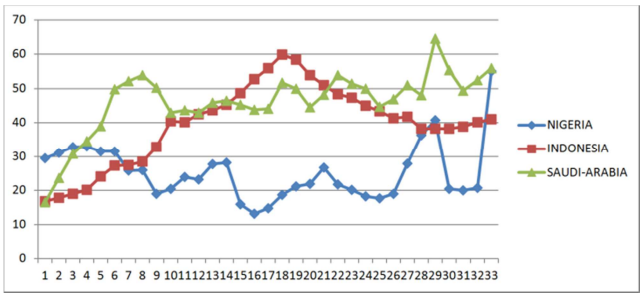


Figure 1.5. *Distribution of countries by annual growth in the size of the money sector.*

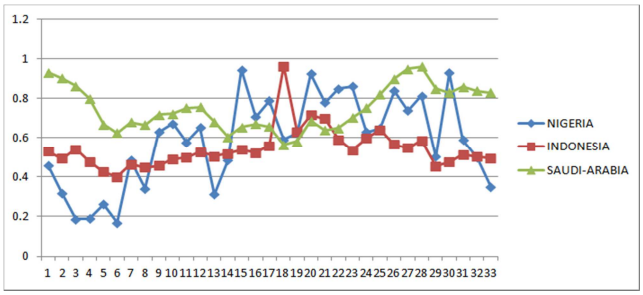


Figure 1.6. *Distribution of countries by annual growth in trade volume.*

The remaining parts of this paper are scheduled as follows: section two presents a brief review of theoretical and empirical literature. Section three provides the data and econometric methodology adopted to achieve the study objectives. Section four presents the empirical findings while section five concludes.

2. A Brief Review of Literature

In this section, the study considers the review of the theoretical and empirical literature on the relationship between fiscal variables particularly government expenditure and economic growth. This provides the theoretical ground upon which this study is rested.

The study really hangs on Keynesian theory which states that government expenditure is an exogenous factor which determines the growth of an economy. The theory believes that an increase in government spending will enhance economic growth. The reason for this is given both from demand and supply side of the economy. From the demand side, an increase in government spending raises the purchasing power of the people boosting demand for goods and services. This produces a positive effect on the economy by creating what is generally known as an effective demand. This is in line with the balanced growth theory which believes that the output is low in developing countries because of deficiency in demand for goods and services.

On the supply side, the positive effect of an increase in government expenditure on demand will produce the same effect on the supply of goods and services. An increase in supply will generate more employment opportunity raising the level of national income. Another important supply side growth-accelerating power of government expenditure is the increase in the provision of infrastructure which will encourage domestic production and reduction in the cost of production of goods and services. This will make product prices to be more competitive especially in the local markets. It is a common knowledge that developing countries are still confronted with the problem of infrastructural deficit which an increase in government spending is believed to address so that production of goods and services will become more feasible in such countries. Similarly, the critical minimum efforts otherwise known as Big-Push theory suggests that developing countries required an injection of a level of investment often referred to as critical such that anything lower, will yield no effect on economic growth. Unless the developing countries are able to meet up with this investment requirement they may remain in their state of underdevelopment for a very long time. Governments of the developing countries can therefore engage in massive investment spending to accelerate the process of economic development in the developing countries.

Recent literature has provided some empirical evidence on the effect of fiscal variables particularly government expenditure on economic growth.

Gregoriou and Ghosh, (2007), attempted to examine the impact of government expenditure on economic growth using heterogeneous panel. The study employed the GMM technique, and discovered that countries with large government expenditure tend to experience higher growth, but the effect varies from one country to another.

Ansari (1997) conducted a study on three African countries (Ghana, Kenya and South Africa). His finding provides no evidence in support of long-run relationship between government expenditure and economic growth in these countries.

Kolluri et al (2000) found in their own study a long-run relationship between total government expenditure and economic growth for G7 countries.

Mitchell, (2005), argued that the American government expenditure has grown too much in the last couple of years and has contributed to the negative economic growth. The author suggested that government should cut its spending, particularly on projects/programmes that generate least benefits or impose higher costs.

Peter, (2003), attempted to find out the relationship between government expenditure and economic growth in Sweden during the period 1960-2001. The study underscored that government spends too much and it might slow down economic growth.

Barro and Sala-i-Martin, (1992), Easterly and Rebelo , (1993), Brons, de Groot and Nijkamp , (1999), in their separate studies emphasized that government activity influences the direction of economic growth.

Norman et al (2014) in their own study came up with a finding that spending towards infrastructure and education has positive relationship with long-run income levels in the OECD countries. This implies that government spending has a positive relationship with economic growth in these

countries.

However, despite the fact that the literature has well documented both positive and negative growth effects of government expenditures across countries and regions, it is still very likely to have more positive growth effects of government spending than negative especially in the developing countries than in the developed countries. The literature has also documented the varying magnitude in the growth effects of government expenditure across countries. This implies that whether the growth effect is positive or negative, the magnitude still vary from one country to another. Also, the fact still remain that government spending would yield more positive growth effects than negative in the developing countries where most of the assumptions underlying positive growth effects of government spending are met.

This study shed more light on these controversies by examining the growth effects of fiscal variables particularly the like of government expenditure in the selected oil-rich developing countries.

3. Data and Econometric Methodology

This study employed secondary data in its analysis. These are Time Series data covering the period of 1981 to 2013. The data on the variables of interest for this study were sourced from World Development Indicators (WDIs) of the World Bank Data base, the 2014 edition and the Penn-World Table version 8.1. The variables include GDP, aggregate government expenditure, imports and exports of goods and services all in current US dollar. Others include broad money as a percentage of GDP, annual inflation rate, annual growth rate of population and total population.

3.1. Theoretical Models

The study got motivation from the production function of the form

$$q_t = \mathrm{A}\, f(K_{PR}, K_{PU}) \quad (1)$$

$$\mathrm{K_{PR}} + \mathrm{K_{PU}} = \mathrm{k}$$

Where

$$\mathrm{K_{PR}} = \text{private capital}$$

$$\mathrm{K_{PU}} = \text{public capital}$$

$$\mathrm{k} = \text{aggregate capital}$$

The study strongly assumes that there exists a perfect complementarity between private capital and public capital. Therefore an increase in public capital will enhance the private capital positively and this will raise the level of aggregate capital in the production function and this makes the capital accumulation process a more sustainable one.

The aggregate production function therefore is expressed as

$$q_t = Af(\mathrm{k}) \quad (2)$$

Equation (2) can be expressed as

$$q_t = Ak_t{}^{\alpha} \quad (3)$$

By decomposing aggregate capital into two namely private and public capital, equation (3) thus become

$$q_t = AK_{PR}{}^{\alpha}K_{PU}{}^{1-\alpha} \quad (4)$$

Note: α is the contribution of private capital to the total output while 1- α is the contribution of public capital to the total output, A represents the remaining output that are not attributed to both private and public capital.

Assuming K_{PU} increased by say ΔK_{PU}, this will increase the aggregate capital in the production function. Such increase will have positive effect on the aggregate output in the production function.

Linearising equation (4), we have

$$\mathrm{In}q_t = \mathrm{In}A + \alpha \mathrm{In}K_{PR} + (1\text{-}\alpha)\mathrm{In}K_{PU} \quad (5)$$

Taking partial derivative with respect to public capital

$$\frac{\Delta \mathrm{In}q_t}{\Delta \mathrm{In}K_{PU}} = (1\text{-}\alpha)$$

Let (1-α) = β such that $\frac{\Delta \mathrm{In}q_t}{\Delta \mathrm{In}K_{PU}} = \beta$

β therefore represents the output effect of public capital in the production function. The study also assumed that there is constant return to scale which suggests that public capital retains its quality and does not suffer any depletion over time ruling out the general impression of diminishing return to scale. There is a minimum quality of such capital that must be maintained to ensure its desirable growth effect. Hence, $\alpha + \beta = 1$

3.2. Empirical Models

Our empirical models begin with linear specification where output is a function of government spending which enters the output model as a private capital. We also consider the degree of trade openness, population growth rate, size of the money sector and inflation as complementary explanatory variables.

$$Y = f(GEXP, DRTOPN, POPGRT, MPR, INFR) \quad (6)$$

The linear model describing the relationship between government spending and economic growth is therefore specified econometrically as

$$LY_t = \beta_0 + \beta_1 LGEXP_t + \beta_2 DRTOPN_t + \beta_3 POPGRT_t + \beta_4 MPR_t + \beta_5 INFR_t + e_{1t} \quad (7)$$

Where

LY=natural logarithm of GDP per capita in US dollar

LGEXP=natural logarithm of government expenditure per capita in US dollar
DRTOPN=degree of trade openness
POPGRT = population growth rate
MPR = money sector size
INFR = annual inflation rate

Since this study is mainly focusing on the impact of fiscal variables particularly government expenditure on economic growth in the oil-rich developing countries of Nigeria, Indonesia and Saudi Arabia. We are interested in how variations in government expenditure affect economic growth in these countries.

By differentiating equation (7) partially with respect to government spending, we have

$$\frac{\partial}{\partial GEXP}(LY) = \beta_1 \quad (8)$$

By a prori expectation, $\beta_1 \gtrless 0$, if $\beta_1 > 0$, then, it signifies that government expenditure has positive effect on growth. If $\beta_1 < 0$, then, it implies that government expenditure has negative effect on growth.

Equation (7) is a static long-run regression model, for the regression of this type to be appropriate, all variables in the model should be individually found to be stationary that is, they should follow a I(0) process. However, if variables are found to be individually non-stationary but they are found to be jointly cointegrated, the long-run static regression is no longer spurious but appropriate. The study employed a multivariate cointegration technique of Johansen and Juselius (1990) to determine if the group of individually non-stationary time series variables converges to a long-run equilibrium. In order to deal with problem of serial correlation that might be associated with the specified long-run static model, we derive such equation which contains the lags of the dependent variable. Equation (7) thus become

$$LY_t = \Omega_0 + \sum_{i=1}^{n} \phi_{i-1} LY_{t-i} + \Psi_1 LGEXP_t + \Psi_2 DRTOPN_t + \Psi_3 POPGRT_t + \Psi_4 MPR_t + \Psi_5 INFR_t + e_{2t} \quad (9)$$

By differentiating equation (9) partially with respect to government spending, we have

$$\frac{\partial LY}{\partial GEXP} = \Psi_1$$

By a priori expectation, $\Psi_2 \gtrless 0$, if $\Psi_2 > 0$, then, it signifies that government expenditure has positive effect on growth. If $\Psi_2 < 0$, then, it implies that government expenditure has negative effect on growth.

It should be noted that Durbin-Watson statistic may no longer be appropriate to detect the presence of serial correlation in equation (9). In order to find out whether the model presented in equation (9) suffers from serial correlation problem, we test the hypothesis of serial correlation using the Durbin h-statistic since Durbin-Watson statistic has become inappropriate for this kind of model.

The Durbin h-statistic is given by

$$h = \left(1 - \frac{d}{2}\right)\sqrt{\frac{n}{1 - n\sigma^2 Y}} \quad (10)$$

Where
$\sigma^2 Y$ = variance of the co-efficient of the lagged dependent variable.

If $h < z -$ critical value of 1.96, we fail to reject the null hypothesis and conclude that our model does not suffer from serial correlation. It should be noted that the Durbin-h test stated in equation (10) is only applicable if and only if $n\sigma^2 Y$ is less than one. Its application also depends on the sample size. It is only applicable in a large-sample; its application in small samples is not strictly justified (Damodar, 2009; pp 705). In this case, the Breusch-Godfrey (BG) test, also known as the Lagrange multiplier test was used to test for serial correlation. It is believed to be statistically more powerful not only in the large samples but also in finite or small samples as the case is in this study.

3.3. The Unit Root Model

In order to ascertain the stationarity properties of the time series data used in this study, we test for the existence of unit root in each of the variables. The unit root test is conducted in order to identify the order of integration of each of the variables in the VAR system; the study employed Augmented Dickey Fuller (ADF). The study specified Augmented Dickey-Fuller (ADF) unit root regression equation of the form

$$G_t = \eta_0 + \eta_{1t} + \Omega_1 G_{t-1} + \sum_{j=1}^{p} \phi_j \Delta G_{t-j} + \mathcal{E}_t \quad (11)$$

The equation regressed the first differences of the series on a constant, time trend, one lag of the series at level and lags of the series at first differences.

In equation (11), Δ represents the first difference operator, G_t represent the time series under examination, η_0 is constant terms, η_{1t} is time trend, $\mathcal{E}_t$ is a covariance stationary random error terms, p is the lag length used in the estimation. The lag length was chosen based on Schwarz Information Criterion (SIC). The null hypothesis of unit root was tested using the t-statistic with critical values calculated by Mackinnon (1991). The null hypothesis of unit root is rejected in equation (11) if Ω_1 is less than zero that is, if it is statistically significant.

3.4. The Models of Cointegration

The study employed a multivariate cointegration model developed by Johansen and Juselius (1990) to determine the long-run equilibrium relationship between government expenditure and economic growth. This is done by estimating the regression equation of the form

$$\Delta Y_t = -Y_{t-1} + \psi_1 \Delta Y_{t-1} + \psi_2 \Delta Y_{t-2} + \ldots + \psi_j \Delta Y_{t-j} + \epsilon_t \quad (12)$$

In a more compact form equation (12) can be expressed using sigma notation of the form

$$\Delta Y_t = -Y_{t-1} + \sum_{j=1}^{n-1} \psi_j \boldsymbol{\Delta Y_{t-j}} + \boldsymbol{\epsilon_t} \quad (13)$$

Where

Y represents vector of variables in the cointegration model

$$= \left[I - \sum_{j=1}^{n} A_j\right] \text{ and } \psi_j \models -\left[\sum_{i=j+1}^{n} A_j\right] = -A^*(L)$$

4. Empirical Results

4.1. The Unit Root Test Result

The result of the unit root test revealed that most of the variables are individually non-stationary meaning that they followed a random walk process. The presence of unit root indicates that variables do not follow a I(0) process. In order to know the order of integration of the variables, we proceeded by testing the unit root hypothesis on the first difference of each of the non-I(0) variables involved in the analysis. The result showed that most of the variables involved in the analysis exhibit a I(1) process except inflation and population growth rate in case of Indonesia. In case of Saudi-Arabia, only money sector and population growth rate are stationary. However, only inflation rate is stationary in the case of Nigeria. For all the I(1) variables, the hypothesis of unit root on the first differences of the variables were rejected within the acceptable critical values. For the I(0) variables, we reject the hypothesis of unit root on the level of the variables within the acceptable critical values. The result of unit root test is presented in Table 4.1

Table 4.1. *Result of Augmented Dickey-Fuller unit root test.*

Country	Variable	Unit Root Statistic		Order of Integration
		Level	First Difference	
Indonesia	LY	-1.982	-5.759*	I(1)
	LGEXP	-1.681	-5.849*	I(1)
	MPR	-1.502	-3.345**	I(1)
	INFR	-3.642*	-	I(0)
	POPGRT	-6.488*	-	I(0)
	DRTOPN	-3.235	-8.618*	I(1)
Saudi-Arabia	LY	-3.527	-4.441*	I(1)
	LGEXP	-0.983	-4.933*	I(1)
	MPR	-3.737*	-	I(0)
	INFR	-3.183	-6.769*	I(1)
	POPGRT	-6.027*	-	I(0)
	DRTOPN	-2.352	-4.149*	I(1)
Nigeria	LY	-1.617	-6.931*	I(1)
	LGEXP	-2.570	-7.408*	I(1)
	MPR	-1.798	-3.325**	I(1)
	INFR	-3.634**	-	I(0)
	POPGRT	-1.124	-8.857*	I(1)
	DRTOPN	-3.122	-8.608*	I(1)

LY = natural lograthm of GDP per capita in US dollar, LGEXP = natural logarithm of government spending per capita in US dollar, MPR = size of the money sector, INFR=inflation rate, POPGRT=population growth rate, DRTOPN = degree of trade openness.
* and ** denotes 5% and 10% significant level based on Mackinnon's Critical Values

Source: Authors' own computation

4.2. The Result of the Johansen Multivariate Cointegration Test

We adopted the Johansen and Juselius multivariate cointegration technique to test for the possibility of individually non-stationary variables to converge to a long-run equilibrium. The result from both the trace statistic and maxima eigen value test statistic as presented in Table 4.2 shows that variables converged to a long-run equilibrium. This implies that there is long-run equilibrium relationship between government expenditure and economic growth. This finding corroborates those of Loizides and Vamvoukas (2005) for Ireland and the United Kingdom, Kolluri et al (2000) for G7 countries and Dada (2013) for Nigeria. However, it conflicts with the finding of Ansari (1997) for three African countries (Ghana, Kenya and South Africa), Komain and Brahmasrene (2007) for Thailand.

Table 4.2. *Result of Johansen and Juselius Multivariate Cointegration Test.*

Country	VAR(d)	Null Hypothesis	Maxima Eigen-value Statistic	5% Critical Value	Trace Statistic	5% Critical Value
Indonesia	VAR(1) based on SIC	r = 0	81.18*	40.08	185.33*	95.75
		r ≤ 1	35.98*	33.88	104.14*	69.82
		r ≤ 2	32.18*	27.58	68.17*	47.86
		r ≤ 3	24.71*	21.13	35.98*	29.80
		r ≤ 4	11.14	14.26	11.28	15.49
		r ≤ 5	0.14	3.84	0.14	3.84
Saudi-Arabia	VAR(1) based on SIC	r = 0	90.11*	40.08	161.35*	95.75
		r ≤ 1	24.88	33.88	71.25*	69.82
		r ≤ 2	19.41	27.58	46.37	47.86
		r ≤ 3	16.44	21.13	26.96	29.80
		r ≤ 4	9.75	14.26	10.52	15.49
		r ≤ 5	0.77	3.84	0.77	3.84
Nigeria	VAR(1) based on SIC	r = 0	83.46*	40.08	210.23*	95.75
		r ≤ 1	54.34*	33.88	126.77*	69.82
		r ≤ 2	39.11*	27.58	72.43*	47.86
		r ≤ 3	22.90*	21.13	33.32*	29.80
		r ≤ 4	10.06	14.26	10.42	15.49
		r ≤ 5	0.36	3.84	0.36	3.84

*denotes rejection of the null hypothesis at 5% significant level.

Source: Authors' own computation

4.3. Result of the Linear Models

The result of the linear regression models presented in Table 4.3 indicates that there is significant and positive relationship between government expenditure and economic growth in each of the oil-rich developing countries of Indonesia (co-efficient = 0.876, t=26.25, p=0.000); Saudi Arabia (co-efficient = 0.483, t=2.42, p=0.023); and Nigeria (co-efficient = 0.449, t=4.87, p=0.000). This result shows that government expenditures among other variables such as degree of trade openness, population growth rate, money sector growth and inflation rate have positive effect on economic growth in these countries. However, the magnitude of this effect varies from one country to another**.**

The linear model for Indonesia reveals that government expenditure explains about 99.6 per cent of the variation in economic growth. The closeness of R^2 (99.59%) and adjusted R^2 (99.51%) shows the goodness of fit of the model. The Durbin-Watson statistic of (1.65) shows the absence of serial correlation. The robustness check reveals that normality assumption was met Jarque-Bera statistic‡→JB=0.825(p=0.662). The absence of serial correlation is also confirmed by the LM test statistic‡→F=0.739(p=0.399). The model is also confirmed to be homoscedastic (ARCH Heteroscedastic‡→F=0.0239(p=0.878) implying absence of heteroscedasticity, which implies that the model satisfied the classical assumption of homogeneity of variance.

The linear model for Saudi Arabia contains lags of the dependent variable to improve on the poor performance of the static linear regression model. The result shows that government expenditure explains about 96.0 per cent of the variation in economic growth. The closeness of R^2 (96.0) and adjusted R^2 (95.0) shows the goodness of fit of the model. The robustness check reveals that normality assumption was met Jarque-Bera statistic‡→0.4898 (p=0.783). Since Durbin-H statistic proved to be unrealistic in testing for the absence of serial correlation, we proceeded by using the BG test. The absence of serial correlation is confirmed by the LM test statistic‡→F=0.9127(p=0.561). The model is also confirmed to be homoscedastic (ARCH Heteroscedastic‡→F=1.404(p=0.246) implying absence of heteroscedasticity, which implies that the model satisfied the classical assumption of homogeneity of variance.

The linear model for Nigeria reveals that government expenditure explains about 89.0 per cent of the variation in economic growth. The closeness of R^2 (89.0%) and adjusted R^2 (86.9%) shows the goodness of fit of the model. The Durbin-Watson statistic of (1.50) shows the absence of serial correlation. The robustness check reveals that normality assumption was met Jarque-Bera statistic‡→JB=0.062 (p=0.969). The absence of serial correlation is also confirmed by the LM test statistic‡→F=1.944(p=0.175). The model is also confirmed to be homoscedastic(ARCH Heteroscedastic‡→F=3.8351(p=0.060) implying absence of heteroscedasticity at 5 per cent, which implies that the model satisfied the classical assumption of homogeneity of variance.

We equally confirmed the stability of the model for each country using the CUSUM square test of model stability. The result presented in the appendix shows that the model for each country satisfied the stability condition.

Our finding in this study agreed with those of Barro and Sala-i-Martin, (1992), Easterly and Rebelo , (1993), Brons, de Groot and Nijkamp (1999), Gregoriou and Ghosh (2007), Ranjan and Sharma (2008), Lamartina and Zaghini (2007) and Bakare and Olubokun (2011), Norman et al (2014). However, the study is in conflict with those of Miller and Rusek (1997), Mitchell (2005), Maku (2009), Abu and Abdullahi (2010) and Peter (2003). In a broader sense, the finding of this study conforms with fiscal space hypothesis calling for a jerked-up in government spending to boost economic growth particularly in the oil-rich developing countries of Indonesia, Saudi Arabia and Nigeria.

Table 4.3. *The result of the linear regression models.*

Countries	Independent variable	Co-efficient Estimate	T-statistic	p-value
Indonesia	LGEXP	0.876247	26.24934	0.0000*
	MPR	0.005114	2.341529	0.0268
	DRTOPN	0.326295	3.024325	0.0054
	POPGRT	-0.292156	-2.771152	0.0100
	INFR	0.002412	0.872279	0.3907
	C	3.086941	7.615497	0.0000
	R^2 = 0.996; Adj.R^2 = 0.995; F=1303.54(P=0.000); DW = 1.65			
	Diagnostic Tests: Test of Normality → JB-Stat=0.825(p=0.662)			
	LM Serial Correlation→F=0.739(p=0.399)			
	ARCH Heteroscedastic→F=0.0239(p=878)			
Saudi Arabia	LY(-1))	0.6726	2.678	0.014
	LY(-2))	0.0009	0.003	0.997
	LY(-3))	-0.0587	-0.331	0.744
	LGEXP	0.3964	1.850	0.078***
	MPR	-0.0033	-0.829	0.416
	DRTOPN	0.3618	0.897	0.380
	POPGRT	-0.0285	-1.167	0.256
	INFR	0.0130	1.079	0.293
	C	0.4116	0.624	0.540
	R^2 = 0.963; Adj.R^2 = 0.949; F=97.11(P=0.000); DW = 1.23;			
	SD of DV = 0.453; DH =			
	Diagnostic Tests: Test of Normality → JB-Stat=0.1(p=0.943)			
	LM Serial Correlation→F=1.686(p=0.202)			
	ARCH Heteroscedastic→F=1.2558(p=0.272)			
Nigeria	LGEXP	0.449055	4.870378	0.0000*
	MPR	0.003086	0.388835	0.7004
	DRTOPN	-0.070066	-0.260834	0.7962
	POPGRT	3.139369	3.729466	0.0009
	INFR	-0.005382	-1.824707	0.0791
	C	-3.625556	-1.855969	0.0744
	R^2 = 0.89; Adj.R^2 = 0.87; F=43.54(P=0.000); DW = 1.50			
	Diagnostic Tests: Test of Normality → JB-Stat=0.0624(p=0.969)			
	LM Serial Correlation→F=1.944(p=0.175)			
	ARCH Heteroscedastic→F=3.835(p=0.060)			

LY = natural logarithm of GDP per capita in US dollar, LGEXP = natural logarithm of government spending per capita in US dollar, MPR = size of the money sector, INFR=inflation rate, POPGRT=population growth rate, DRTOPN = degree of trade openness.
[*], [**], [***] denote rejection of the null hypothesis at 1%, 5%, 10% significant level.

Source: Authors' own computation

5. Conclusion

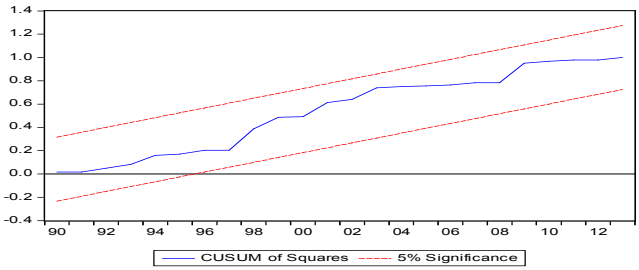
The result of the econometric analysis revealed that the variables used in this analysis are individually non-stationary. However, their linear combination converged to a long-run equilibrium. This suggests that a long-run equilibrium relationship was found to exist in all the three countries. The result also shows that fiscal variables, government expenditures in particular among other variables have positive effect on growth in each of the three countries. However, it is evidenced that the magnitude of the effect of government spending on growth varies from one country to another. This finding provides empirical evidence in favour of the fiscal space hypothesis calling for further increase in government spending to foster economic growth particularly in the oil-rich developing countries.

The study therefore concluded that government spending accelerated economic growth in the so-called oil-rich developing countries of Nigeria, Indonesia and Saudi Arabia during the period under consideration.

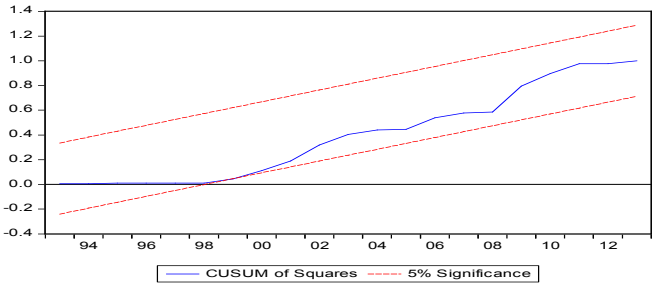
Appendix

The Result of the models stability for each country using CUSUM Square

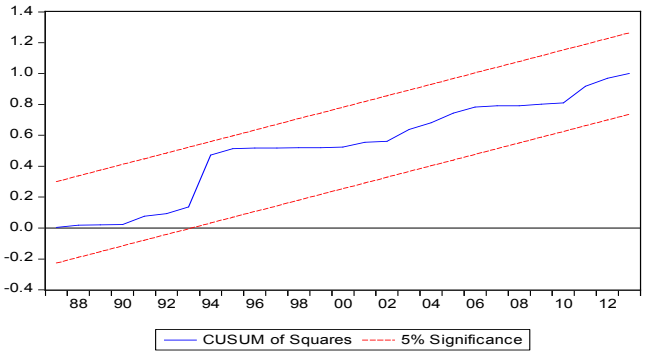
Indonesia



Saudi-Arabia



Nigeria



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