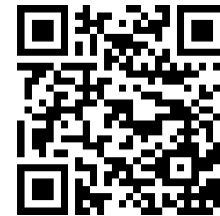# Threshold Analysis of Fiscal Policy Variables and Private Investment in Nigeria

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ABSTRACT: This paper investigates the relationship between fiscal policy variables and private investment in Nigeria for the period 1970 – 2019 with a view to establishing the threshold level of each of the key fiscal policy variables in relation to private investment. The study employed annual and quarterly time series data covering the period 1970:1 to 2019:4 which were sourced in part from the Central Bank of Nigeria's Statistical Bulletin and National Bureau of Statistics (NBS). Data collected were analyzed using econometric techniques. The variables used were private domestic investment, budget deficit, recurrent and capital government expenditure, oil and non-oil government revenue and public debt. The main findings are: First, there is an evidence of a double threshold effects of the fiscal balance. When exceeding a budget deficit level of 3.98 per cent of GDP or a fiscal surplus level of 3.2 per cent of GDP, private investment is negatively affected. Also, increase in government total expenditure beyond the third regime made private investment to become less productive. As regards public debt, the results revealed that private investment had the most positive impact on economic growth in the first regime of public debt. A resort to public debt beyond this level will make private investment less productive thereby inhibiting growth. The study therefore, concludes that government should be cautious in resulting to debt instruments to finance its deficit. It should also make a concerted effort to increase its expenditure especially in the provision of infrastructural facilities as this directly influence private investment decision positively.

1   INTRODUCTION

There is general consensus in literature justifying interrelationship between economic growth and private investment. Indeed, studies have shown that change in economic growth is explained majorly by changes in private investment (Alesina and Perotti, 1997; Alesina, Perotti and Jose, 1998; Iyoha, 2007 and Oke and Sulaiman, 2012; Omojolaibi, Okenesi, Tochi-Nze and Mesagan, 2016). For instance, Collier and Gunning (1999a and 1999b) argued that for African countries to achieve economic recovery and accelerate growth, emphasis must be placed on private investment. Also, World Bank (2010), observed that GDP growth rate is higher for those countries with relatively higher investments/GDP ratios.

There are several factors that influence private investment decisions in any economy. They include the level of profit, interest rate, availability of internal fund, political climate and infrastructural facilities (Blejer and Khan 2001; Atukeren, 2005). Incidentally, most of these determinants could be influenced by fiscal policy instruments such as government revenue (oil and non-oil), public expenditure (capital and recurrent), fiscal deficit and public debts (domestic and foreign) (Arestis and Sawyer, 2003; Laubach, 2009; Abderrahim, Sha-Abdul and Parrel, 2010). Private investments may also respond directly to changes in these policy instruments. Governments, especially in developing countries therefore do manipulate these policy instruments in order to attract both domestic and foreign investments.

Basically, the effect of fiscal policy on private investment is multifaceted. For instance, increase in public revenue through increase in tax rate reduces profit and disposable income which in turn reduces investment and consumption expenditure as well as savings. Low level of consumption and savings consequently discourages private investors as the economy's capacity to produce goods and services falls due to the fall in aggregate demand (Krugman, 1988; Favero, Carlo, and Francesco Giavazzi. 2009). On the other hand, a fall in public revenue due to lower taxes (which is an incentive to private investment) increases the profit available for ploughing back for further investment. Lower taxes also increase households' disposable income, thereby allowing consumers to increase their consumption and savings which further encourages private investment as aggregate demand increases. However, lower taxes may dampen the amount of revenue accruable to the government and consequently results in budget deficit (Gale and Peter, 2005).

In addition, public borrowing which is usually adopted as a means of bridging the gap between revenue shortages compared to expenditure could also portend serious danger on an economy if it is excessive. Empirically, studies such as; Premchand, (1984); Blejer and Khan, (2001); Voss, (2002); Saleh, (2003); Chakraborty, (2006) and Falade *et, al* (2016) observe that financing

government expenditure through public borrowing leads to increase in the supply of government bonds. In order to improve the attractiveness of these bonds, the government offers them at lower price, which leads to higher interest rates. The increase in interest rates, however, discourages the issue of private bonds (private investment) which in turn contributes to the financial crowding out of the private sector. Thus, a resort to public debt as a way of financing public sector spending beyond a particular level would be at the expense of the private sector and can adversely affect economic growth (Ganelli, 2003; Choong, Lau, Liew and Puah, 2010).

Also, government spending especially capital component is very crucial in stimulating private investment since infrastructure investment is usually associated with huge positive externalities. Yet, raising expenditures after some point may retard investment and growth, as such excess spending may become inefficient (Nurudeen and Usman, 2010; Carter, Craigwell, and Lowe, 2013; Cakerri, Petanaj, and Muharemi, 2014). Also on recurrent expenditure, no doubt, the central government needs sufficient number of personnel in order to offer public services efficiently. After attaining a level of personnel engagement, the efficiency of services rendered may reduce, suggesting there is an optimal number of civil servants and government recurrent spending. This broad range of possible consequences suggest that the relationship between fiscal policy variables and private investment may be nonlinear as reliance on some of these instruments further than a particular threshold level may be inimical to private investment drive.

Several empirical studies have investigated the effects of fiscal policy instruments on economic growth through their effects on private investments with varying results (Khan and Reinhart, 1990; Coutinho and Gallo, 1991; Khan and Kumar, 1997; Atukeren, 2004; Onwioduokit, 2011; Khalid and Sajida, 2013; Akosah, 2013; Agu, Idike, Okwor, and Ugwunta, 2014; Ogunsakin and Lawal 2015). The conflict in findings in the previous studies may only be resolved by finding the exact point at which each of the key fiscal policy instruments can actually stimulate private investment as linear relationship may not exist amongst these variables as assumed by various studies which may have accounted for disparity in their findings (Asogwa, 2005; Onyeiwu, 2012; Folorunso and Falade, 2013; Umaru, Aminu and Musa, 2013; Dantama, Gatawa and Galli, 2017). In the literature, only a few have examined the threshold level of each of the key fiscal variables in relation to private investment stimulation especially in Nigeria.

This paper therefore examines the threshold relationship between each of the key fiscal policy instruments and private investment in Nigeria for the periods, 1970 to 2019. The rest of the paper is organized as follows: The next section will briefly examine the theoretical and empirical studies around the subject matter. Section three outlines the methodological approach and the data employed in the study. Section four presents the estimation results of the models. This estimates the effects of each of the fiscal policy variables on private investment. The threshold analysis was carried out by considering sequentially, government expenditure (recurrent and capital), government revenue (oil and non-oil), fiscal deficit and public debt (domestic and foreign). Section 5 concludes the paper.

2   LITERATURE REVIEW

The theoretical literature on the relationship between fiscal policy and economic activities has grown substantially. Prior to Keynesian theory (1936), fiscal balance was a goal that every government strived to achieve. This idea was however questioned by the Keynesian theory who argued that increase in each of the fiscal policy variables such as government spending, budget deficit and public debt will help to stabilize and stimulate growth. Conversely, the liberal theory argued in the opposite centering their argument on the crowding out effect of fiscal policy instruments.

Since the advent of endogenous growth models as championed by Barro (1991), an explicit link between fiscal policy variables and long-run economic growth has been established. Also, the determination of optimal fiscal policy instruments beyond which an increase in the value of the variables may affect economic growth via their negative effects on private investment have been highlighted. Examples of endogenous growth via private investment models incorporating the role of fiscal policy are King and Rebelo, 1990; Rebelo, 1991; Barro and Sala-i-Martin, 1992; Chhibber and Dailami, 1993 and Alesina *et al.,* 1998. The exact nature of the impact of fiscal policy variable, however, depends on the type of fiscal variable used and the extent of the usage.

Specifically, Vamvoukas (2000) examined the linkage between budget deficits and interest rates in Greece over the time periods 1949-1994, 1953-1994 and 1957-1994. Within the methodological framework of cointegration, ECM strategy, and several diagnostic and specification tests, the empirical findings support the Keynesian model of a significant and positive relationship between budget deficits and private investment. This was in line with Serven and Salimano (1990) who reveal that a reduction in the fiscal deficit which involves cutting back public investment will bring about a decline in private investment.

In his own part, Greiner and Semmler (2000) employed Barro's (1990) model by removing the balanced budget assumption and analyzed different budgetary regimes. They claimed that the impact of deficit financed increase on private investment and economic growth depends on the budgetary regime the government operates within. Thus, governments can generate positive growth effects of a public deficit on the growth rate only for a given debt/capital ratio and if the deficit is used primarily for public investment.

In advancing the frontier of knowledge on the subject matter, Alesina *et al*., (2002) decompose public spending and revenues into subcategories. They used data for 18 OECD member countries from 1960 to 1986 to estimate how an increase in primary government spending and its major components: government employee compensation, transfer payments, and government

consumption would affect private investment as a percent of GDP. The authors found that an increase in primary government spending equal to one percentage point of GDP would decrease private investment by 0.15% of GDP. They also found that an increase in government employee compensation equal to one percentage point of GDP would decrease investment by 0.48% of GDP. The authors further found that an increase in government transfer payments equal to one percentage point of GDP would decrease private investment by 0.21% of GDP.

Furthermore, Brauninger (2002) examined the interaction among budget deficit, public debt and endogenous growth. The study found that if the deficit-GDP ratio fixed by the government stays below a critical level, then there are two steady states where capital and public debt grow at the same constant rate, and an increase in the deficit-GDP ratio reduces the growth rates. Therefore, if the deficit ratio exceeds the critical level, then there is no steady state. Capital growth declines continuously and capital is driven down to zero in finite time.

In the same vein, Ghosh and Mourmouras (2004) extended the Greiner and Semmler framework to include welfare analysis. Their main objective is to analyze the growth and welfare implications of the golden rule of public finance. They showed that optimal fiscal policy depends on the particular budgetary regime considered. Also, Gali, David and Javier, (2004) demonstrated that a persistent expansion in government spending causes an increase in household consumption with an attendant positive effect on private investment, The study however, conclude that the responses of different macroeconomic variables to an exogenous spending shock will depend, under some conditions, on the composition and level of the expenditure.

More recently, analysis of threshold level of fiscal policy variables in relation to private investment has been given prominence. For instance, Adam and Bevan (2005) identify thresholds effects of fiscal deficit on growth for a panel of 45 developing countries for the period 1979 - 1999. The study indicates that fiscal deficits are associated with robust non-linear effects on growth and finds evidence of a threshold effect at a level of the deficit around 1.5% of GDP. When reducing deficits to this level, there appears that governments enjoy faster growth expansion; this effect reverses itself when exceeding the determined threshold.

In examining public debt threshold level, Abbas and Christensen (2007) analyze optimal domestic debt level in low-income countries (including 40 sub Saharan African countries) and emerging markets between 1975 and 2004 found out that moderate level of marketable domestic debt as a percentage GDP have significant positive effect on economic growth. The study also provided evidence that debt level exceeding 35 percentages of total bank deposits have negative impact on the economic growth as it crowd-out private investment.

In a study to examine whether fiscal deficit financed through additional government debt "crowds out" private investment through a higher real interest rate, Traum and Yang (2010) found limited systematic relationship among public debt, the real interest rate, and private investment. However, their result revealed that in the short run the additional government debt may either crowd in or crowd out private investment depending on what caused government debt as a percentage of GDP to increase. However, in the long run higher government debt as a percentage of GDP reduces private investment since the government increase taxes so as to service the debt as a percentage of GDP thus leading to a reduction in private investment.

In Nigeria, despite the fact that fiscal policy has been accorded prominent position in macroeconomic stabilization process, threshold analysis of the relationship between fiscal policy variables and private investment has remain very scanty and not exhaustive. A quite related area where research efforts have been focused on has been the analysis of linear relationship between fiscal policy variables and economic growth.

For instance, Ekpo (1999) examined the contributions of public expenditure to economic growth in Nigeria over the periods 1960 to 1992. The findings from the study provided support for fiscal policy-led growth through its positive effect on private investment resulting from government expenditure on infrastructure. The author in the same year again reexamined the impact of government expenditure particularly the capital component on private investment and economic growth by disaggregating public capital expenditure into sectoral basis and found that capital expenditure on transport, communication, agriculture, health and education positively influence private investment in Nigeria, which invariably enhanced the growth of the overall economy. This study however was silent on the effect recurrent expenditure may have on private investment and economic growth.

This probably influence Ogiogio (1995) to examine the relationship between government expenditure and economic growth in Nigeria by disaggregating government expenditure into its two major components (capital and recurrent) using Ordinary Least Square Technique and found that government recurrent expenditure exerts more influence on economic growth than capital expenditure. The major shortcoming of this study is the fact that it failed to identify the channel through which recurrent expenditure exert such a positive influence on economic growth.

Being inspired by the major conclusion drawn from earlier studies, Olawunmi and Ayinka (2007) examined the contribution of fiscal policy in the achievement of sustainable economic growth in Nigeria using Solow growth model estimated with the use of ordinary least square method. It was found that fiscal policy has not been effective in the area of promoting sustainable economic growth in Nigeria. They however, stated that factors such as wasteful spending, poor policy implementation and lack of feedback mechanism for implemented policy evident in Nigeria which are indeed capable of hampering the effectiveness, of fiscal policy have made it impossible to come up with such a conclusion.

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This finding was in line with the results of Omitogun and Ayinla (2007) who examined the impact of fiscal policy on Nigerian economic growth in line with Solow Growth Model using Ordinary Least Square Method. The study found that fiscal policy has not been effective in promoting sustainable growth in Nigeria. Their study also invalidated the existence of Keynesian postulation due to high level of corrupt practices in Nigeria.

Onwioduokit (2011) and Akosah, (2013) investigated the threshold level effect of fiscal deficit on economic growth without considering other key fiscal policy instruments. These studies indicate that fiscal deficits are in general associated with strong non-linear effects on growth. In high debt contexts, growth drops off sharply and inversely, for low debt values, growth remains high.

On their own part, Kenechukwu, Chidi-Okeke, Chris-Ejiogu and Awe (2019) investigated the causal relationship between fiscal policy and private investment in Nigeria between 1986 and 2019. Using the Granger Causality and VAR techniques, the study found that fiscal policy instruments granger causes private investment in Nigeria within the period of the study. The study therefore suggests that government should increase its spending on infrastructure, especially capital projects in the economy in order to bridge infrastructure gap in the country. The authors also advocate tax incentives to private sectors by the government as this is expected to spur the growth of private investment in the country.

The review of the literature shows that, numerous studies have been done on the causal and threshold relationship among fiscal policy variables, private investment and economic growth in developed and developing countries. However, in the case of Nigeria, there is a dearth of empirical findings as regards the relationship among fiscal policy variables and private investment particularly as regards the determination of the threshold level of each of the instruments. Indeed, this has not attracted the needed attention of researchers in Nigeria. Hence, this paper aims to investigate fiscal policy from the perspective of a non-linearity by using the threshold regression technique proposed by Hansen (1999).

3 METHODOLOGY

The main objective of this paper is to determine the threshold level of fiscal policy instruments at which private investment is most stimulated thereby enhancing economic growth in Nigeria. Taking after the work of Hansen (1999), the model relating fiscal policy and private investment with economic growth is implicitly specified as follows:

$$\log(X_t) = \alpha_0 + \alpha_1 \log(Y_t) + \alpha_2 D\big[(Y_t - 1)I_{(Y_t \leq 1)} + \{\log(Y_t) - \log(Y^*)\}I_{(Y_t>1)}\big] + u_t \qquad (3.1)$$

Where X_t is the vector of private investment, $Y_t's$ vector of fiscal policy variables, Y^* is the vector of threshold level of fiscal policy variables of interest (that is, the value of each fiscal policy instruments at which structural break occurs)
u_t is the random error term, which represents measurements error in the explanatory variables. The dummy variable D is defined in the following way:
$D = 1$ if $Y_t > Y^*$ and $D = 0$ if $Y_t \leq Y^*$; I is the indicator variable.
The coefficients of the dummy variable α_2 measures the effects of each of the fiscal policy variables Specifically, using the threshold framework represented by equation (3.1) above, this study examines effects of fiscal policy variables on economic growth through private investment channel by estimating the equation below:

$$y = (lexp, lgdp, lpinv, lrev, ldbt, int)' \qquad (3.2)$$

where:
lngdp represents log of Gross Domestic Product; lpinv is the log of private investment; lexp captures log of government expenditure (disaggregated into its current and capital components); lrev represents log of government revenue (disaggregated into its oil and non-oil components); ldbt is the log of government debt (also disaggregated into domestic and foreign components) and int represents interest rate which is the average bank lending rate

The inclusion of fiscal deficit as a variable in the model stems from the growing amount of research on the effects of government deficit on interest rates and the controversy regarding the relationship. One view holds that higher government deficit leads to an increase in the long-term interest rate, crowding out the private investment and thus a lower economic growth, while the proponents of the Ricardian equivalence contend that the effect of government deficit may be offset by private saving. Thus, government deficit does not affect the capital accumulation, and the interest rate remains intact. However, there is little empirical consensus about the magnitude of the effect. Nigeria's ballooning budget deficit and ever-rising public debt have renewed anxieties about the country's future solvency. Hence the need to examine the threshold level of fiscal deficit.

4. DISCUSSION OF RESULTS
4.1 Unit Root Test

This study employs both Augmented Dickey Fuller (ADF) and Phillips-Perron methods of unit roots tests using automatic lag length selection based on Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC). The results of the unit roots are presented in Table 4.1 and 4.2. Table 4.1 presents the results of the unit root using ADF test with intercept only and with intercept and trend term. The results showed that all the variables were non-stationary at level without a trend term except fiscal deficit which was stationary at 5% level of significance. However, the results of the unit root test with a trend term indicated that

all the variables were stationary at first difference; that is I(1), except private investment which appears to be non-stationary at first difference when trend was included using ADF.

Table 4.2 presents the results of the unit root test using Phillips-Perron (PP) technique with and without a trend. Without a trend term, all variables were non-stationary at level using 5% level of significant. With a trend term, fiscal deficit was confirmed to be stationary at level using 5% level of significance. However, all variables were stationary at first difference for both with and without a trend term at 5% significance level, including private investment that was not stationary at first difference using ADF technique. Hence, the study concludes that all the variables are I (1) series.

Table 4.1: Unit Root Test Using Augmented Dickey Fuller (ADF) Technique

Variable	Level		First Difference		Order of Integration
	Intercept	Intercept with Trend	Intercept	Intercept with Trend	
LnPINV	-0.5827	-2.2506	-3.8090*	-2.7638	I(1)
LnRGDP	-1.2968	-1.1606	-3.8000*	-3.8866*	I(1)
LnTREV	-1.3962	-1.3958	-4.2731*	-4.4316*	I(1)
LnOREV	-1.4900	-1.6795	-4.2344*	-4.4164*	I(1)
LnNREV	-0.7333	-1.9848	-5.7550*	-5.7462*	I(1)
LnTEXP	-1.5322	-1.4161	-2.9908*	-3.2164*	I(1)
LnCEXP	-1.6874	-3.0666	-2.1521*	-2.3933*	I(1)
LnREXP	-1.0497	-1.6963	-5.0743*	-5.1066*	I(1)
LnTDBT	-1.7599	-0.2470	-4.1418*	-4.4761*	I(1)
LnDDBT	-2.1918	-0.8269	-4.3608*	-4.7798*	I(1)
LnEDBT	-1.6739	-0.7839	-10.0017*	-10.1439*	I(1)
FDEF	-2.5151	-3.4808**	-3.7726*	-3.7051*	I(1)
INTR	-2.1704	-2.9268	-7.5408*	-7.5281*	I(1)
Critical Values: 1% 5% 10%	-3.4699 -2.8788 -2.5761	-4.0143 -3.4371 -3.1427	-3.4699 -2.8788 -2.5761	-4.0143 -3.4371 -3.1427	

Note: *, (**) and * implies 1%, 5% and 10% level of significance respectively.**

Table 4.2: Unit Root Test Using Phillips-Perron (PP) Technique

Variable	Level		First Difference		Order of Integration
	Intercept	Intercept with Trend	Intercept	Intercept with Trend	
LnPINV	-0.4160	-1.6704	-6.2346*	-6.2169*	I(1)
LnRGDP	-1.2465	-1.2397	-6.8792*	-6.8852*	I(1)
LnTREV	-1.5073	-2.0652	-6.1804*	-6.1811*	I(1)
LnOREV	-2.5602	-2.8589	-7.1306*	-7.2081*	I(1)
LnNREV	-0.7370	-2.1019	-7.1635*	-7.1458*	I(1)
LnTEXP	-1.4644	-1.5489	-7.1028*	-7.0512*	I(1)
LnCEXP	-1.5446	-1.1696	-7.4189*	-7.3955*	I(1)
LnREXP	-0.7874	-2.1106	-6.8155*	-6.8215*	I(1)
LnTDBT	-1.6766	-0.2812	-6.6542*	-6.58112*	I(1)
LnDDBT	-0.1893	-2.3364	-8.1610*	-22.7000*	I(1)
LnEDBT	-1.8094	-0.7066	-10.0931*	-10.1981*	I(1)
FDEF	-1.2770	-2.2759	-5.9970*	-5.9122*	I(1)
INTR	-1.9030	-2.7038	-14.42588	-14.4118*	I(1)
Critical Values: 1% 5% 10%	-3.4679 -2.8779 -2.5756	-4.0114 -3.4357 -3.1419	-3.4681 -2.8780 -2.5756	-4.0117 -3.4359 -3.1420	

Note: *, (**) and * implies 1%, 5% and 10% level of significance respectively**

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Having realized that all the variables for this study are of unit root and therefore non-stationary, a cointegration test is thereafter carried out.

4.2 Co-integration Test and Error Correction Model

Having established the order of integration of our series, the study determined the number of long-rung equilibrium relationships or co-integrating vectors between the variables. Since the variables are found to be integrated of the same order of I(1) as shown in Tables 4.1 and 4.2 using Augmented Dickey-Fuller and Phillips-Perron tests results, it implies that an equilibrium relationship exists among the variables. However, since the main focus of the study is to examine the effect of fiscal policy on private investment in Nigeria, we conducted a co-integration test in line with Johansen test. The following variables were included in the model for estimating co-integration test, total expenditure, private investment, output, total revenue, total debt and interest rate leaving out fiscal deficit. The results of the co-integration test revealed that there were two co-integrating vectors based on Trace statistic and Engen values since the hypotheses of no-integration were rejected at 5% level of significance for both test using Mackinnon-Haug Michelis (1999) p-values as shown in Table 4.3.

Table 4.3: Johansen Maximum Likelihood Test for Co-integration (PINV, GDP, TEXP,TREV, TDBT, and INTR)

Hypotheses	Trace Test	5% Critical Values	Max-Eigen Statistic	5% Critical Values
$R = 0$	165.3156	95.7537	58.4079	40.0776
$R \leq 1$	106.9077	69.8189	50.9335	33.8769
$R \leq 2$	55.9742	47.8561	29.9086	27.5843
$R \leq 3$	26.0656	29.7971	18.2390	21.1316
$R \leq 4$	7.82660	15.4947	5.46070	14.2646
$R \leq 5$	2.36600	3.84150	2.36600	3.84150

Source: Author's Computation

In addition, after establishing the long-run relationships among the variables of interest, the study investigated the short-run dynamics of the model using Error Correction Mechanism (ECM). This shows the speed of convergence towards equilibrium among the variables. The coefficient of the ECM is negatively signed and statistically significant as expected. Thus, this indicates that the speed of convergence among the variables towards equilibrium exists. This is shown in Table 4.4.

The empirical results in table 4.3 was analyzed with the use of the two-step Engle and Granger (1987) model which suggests that any set of co-integrated time-series has an error-correction representation which reflects the short-run adjustment mechanism. The motive of the analysis is to discover whether the short-run dynamics are influenced by the estimated long-run equilibrium condition that is, the co-integrating vectors or not.

A crucial parameter in the estimation of the short-run dynamic model is the coefficient of the error-correction term which measures the speed of adjustment between fiscal policy variables, private investment and economic growth in Nigeria to equilibrium level. The results of the two co-integrating equations show that the parameter of the error-correction terms in the models are statistically significant and correctly signed. This confirmed that the relationship among fiscal policy, private investment and economic growth in Nigeria has automatic adjustment mechanism and the economy responds to deviations from equilibrium in a slow but balancing manner. The value of 0.41 for the coefficient of error correction term is significantly negative at 1 percent level of significance. This suggested that the fiscal policy variables and private investment will converge towards its long-run equilibrium level in a moderate speed after the fluctuation in fiscal policy variables. The results also reveal that the coefficient of past error correction mechanism term of 0.37 is rightly signed and statistically significant at 1 percent level of significance for the relationship among economic growth, private investment and fiscal policy indicating that economic growth and fiscal policy variables will converge towards its long-run equilibrium level in a slow speed after the fluctuation in fiscal policy variable.

Table 4.4: Parsimonious Dynamic Regression Result
Model 1: Private Investment as Dependent Variable

Variables	Coefficients	Standard Error	t-statistic
ΔLPINV(-1)	0.47	0.07	6.79*
ΔLPINV(-2)	0.15	0.06	2.18**
ΔLRGDP	0.27	0.07	3.90*
ΔLTEXP	0.23	0.06	4.14*
ΔLTEXP(-1)	0.08	0.06	1.35***
ΔLTDBT	-0.17	0.06	2.91*

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ΔLTDBT(-1)	-0.11	0.06	1.68***
ECM1(-1)	-0.41	0.02	-5.61*
Adjusted R-square	**0.56**		
Durbin-Watson stat	**1.98**		
F-statistic	**10.09**		

Model 2: RGDP as Dependent Variable

Variables	Coefficients	Standard Error	t-statistic
ΔLRGDP(-1)	0.58	0.06	9.27*
ΔLPINV	0.10	0.04	2.61*
ΔLTREV	0.34	0.03	10.78*
ΔLTREV(-1)	-0.20	0.04	-5.43*
ΔLTDBT(-1)	-0.05	0.04	-1.29
ΔINTR	0.03	0.01	2.11**
ECM2(-1)	-0.37	0.02	-3.74*
Adjusted R-square	**0.61**		
Durbin-Watson stat	**2.07**		
F-statistic	**39.61**		

Note: * (**) * implies 1 percent, (5 percent) and 10 percent level of significance respectively.**

4.3   Evaluating the Threshold levels of Fiscal Policy Variables in Relation to Private Investment and Economic Growth

In this section, this study reports the threshold level of fiscal policy variables in relation to private investment and economic growth. The task of identifying a precise level of some key fiscal policy variables such as government expenditure, fiscal deficit, and public debt (domestic and foreign), which have implications for private investment and economic growth involves estimating the threshold level of these key fiscal policy variables, beyond which they begin to have positive or adverse (crowd-in or crowd out) effect on private investment and economic growth in Nigeria. The optimal threshold is the level of these variables or point at which there is a break point. It should be noted that all the variables are in log form except interest rate. The summary of the threshold result for the variables examined is presented in Tables 4.5 to 4.8

4.3.1   Private Investment and Economic Growth – Government Expenditure Threshold
Point Estimates

In Table 4.5, the threshold points of government expenditure, both in aggregate and component forms at which private investment impact most on economic growth was examined. Panel (i) of the table indicates the threshold point of government total expenditure at which private investment became effective in stimulating economic growth. The panel indicates four regimes that are all significant at p = 0.05. In the first regime of government expenditure, a unit increase in private investment resulted in 0.92 percent increase in economic growth. The second regime revealed a 0.59 percent increase in economic growth with a unit increase in private expenditure. The third regime gave the lowest intercept with the highest slope, indicating that at this regime of expenditure, private investment became most effective (with a critical level of 14.48) in spurring economic growth as a unit increase in investment resulted in 1.05 percent increase in economic growth. The increase of government total expenditure beyond this regime to fourth regime made private investment to become less productive as the slope of private investment fell from 1.05 percent recorded in third regime to 0.85 percent in the fourth regime. This imply that although private investment had positive effect on economic growth at all regimes of government expenditure as observed by Nurudeen and Usman (2010) and Sikiru and Umaru (2011), a major insight, however, from this analysis is that beyond the third regime, a further increase in government expenditure, crowd-out productivity in private investment, that is, private investment became less productive with its attendant less positive effect on economic growth. Panels (ii) and (iii) of table 4.5 presents the threshold point of the two components of government expenditure in explaining the relationship between private investment and economic growth. The panel (ii) showed the threshold point of capital expenditure at which private investment became `most effective in spurring economic growth. Unlike total expenditure which had four regimes, capital expenditure recorded three regimes that are significant at 1 percent level of significance. In the first regime of capital expenditure, a unit increase in private investment increases economic growth by 1.0 percent. The second regime recorded the threshold point of capital expenditure with the least intercept but with the highest slope of 1.17 which implied that a unit increase in private investment increased economic growth by 1.17 percent. In other words, private investment became most productive with a critical level of 14.03 at the second regime which is the threshold point of capital expenditure than any other regime. It should be noted that although the third regime reported the highest intercept of 4.49 at 1 percent level of significance, a unit increase in private investment resulted in just 0.85 percent increase in economic growth. The implication of the results is that at all regimes of public

investment, private investment was crowded-in. However, beyond the second regime of public investment, private investment became less productive in accounting for economic growth.

Panel (iii) of the table presented the threshold level of recurrent expenditure in explaining the relationship between private investment and economic growth. The estimate also showed a 3-regimes of recurrent expenditure that are all significant at 1 percent level of significance. In the first regime of recurrent expenditure, a unit increase in private investment resulted in 1.01 percent increase in economic growth. The second regime gave the threshold point of recurrent expenditure as private investment became most productive in accounting for economic growth. It should be noted from the result however, that recurrent expenditure had more effect in stimulating productivity in private investment with critical level of 14.45 than capital expenditure as a unit increase in private investment brought about 1.27 increase in economic growth. This may be as a result of direct impact of recurrent expenditure in stimulating aggregate demand which is one of the important determinants of private investment.

Table 4.5:Private Investment and Economic Growth – Government Expenditure Threshold Point Estimates

Panel (i)

Threshold Variable: Total Expenditure (TEXP)	Dependent Variable: Economic Growth	
	Intercept	Regressor Variable: LPINV
First Regime: TEXP < 8.99	1.56**	0.92*
Second Regime: 8.99 <= TEXP < 9.69	16.33*	0.59**
Third Regime: 9.69 <= TEXP < 12.42	1.39***	1.05*
Forth Regime: 12.42 <= TEXP	4.49*	0.85*
Critical level of private investment	**14.48**	

Panel (ii)

Threshold Variable: Capital Expenditure (CEXP)	Dependent Variable: Economic Growth	
	Intercept	Regressor Variable: LPINV
First Regime: CEXP <8.61	0.97	1.00*
Second Regime: 8.61<= CEXP < 11.71	0.10	1.17*
Third Regime: 11.71<= CEXP	4.49*	0.85*
Critical level of private investment	**14.03**	

Panel (iii)

Threshold Variable: Recurrent Expenditure (REXP)	Dependent Variable: Economic Growth	
	Intercept	Regressor Variable: LPINV
First Regime: REXP <8.67	0.88	1.01*
Second Regime: 8.67<= REXP < 14.02	0.34	1.27*
Third Regime: 14.02 <= REXP	8.96*	0.55*
Critical level of private investment	**14.45**	

Note: * (**) * implies 1 percent, (5 percent) and 10 percent level of significance respectively.**

4.3.2   Private Investment and Economic Growth – Government Revenue Threshold Point Estimates

Among the fiscal policy variable that can influence the relationship between private investment and economic growth is government revenue. For the purpose of this study, this has been divided into two major components of oil and non-oil revenue. Table 4.6 showed the threshold point of government revenue in respect to the relationship between private investment and economic

growth. Panel (i) results revealed two threshold regimes of government total revenue. At the first regime of government revenue private investment becomes most productive with the critical level of 11.47. At this threshold point, a unit increase in private investment resulted in 1.08 percent increase in economic growth.

Panel (ii) revealed exactly the same results for oil revenue as gotten for total revenue. This probably confirmed the fact that the bulk of what constitute government total revenue came through oil revenue over the year. The result revealed two regimes of oil revenue with the first regime contributing more to the nexus between government revenue and economic growth. At this threshold point of oil revenue, private investment with a critical level of 11.62 became more productive as a unit increase in private investment also resulted in 1.08 percent increase in economic growth. The influence of non-oil revenue on the relationship between private investment and economic growth as depicted in panel (iii) showed three regimes unlike total revenue and oil revenue. However, private investment became most productive at a critical level of 11.77 at the first regime of non-oil revenue as a unit increase in private investment contributed to 1.07 increase in economic growth. Beyond this regime of non-oil revenue private investment became less productive.

Table 4.6: Private Investment and Economic Growth – Government Revenue Threshold Point Estimates.
Panel (i)

Threshold Variable: Government Total Revenue (TREV)		**Dependent Variable**: Economic Growth	
		Intercept	**Regressor Variable: LPINV**
First Regime: TREV<9.26		-0.02	1.08*
Second Regime: 9.26<= TREV		9.06*	0.29*
Critical level of private investment		**11.47**	

Panel (ii)

Threshold Variable: Government Total Revenue (OREV)		**Dependent Variable**: Economic Growth	
		Intercept	**Regressor Variable: LPINV**
First Regime: OREV<8.89		-0.02	1.08*
Second Regime: 8.89<= TREV		9.06*	0.30*
Critical level of private investment		**11.62**	

Panel (iii)

Threshold Variable: Government Total Revenue (NREV)		**Dependent Variable**: Economic Growth	
		Intercept	**Regressor Variable: LPINV**
First Regime: NREV<8.00		0.07	1.07*
Second Regime: 8.00 <= TREV < 13.12		10.83*	0.15*
Third Regime: 13.12 <= TREV		8.93*	0.31*
Critical level of private investment		**11.77**	

Note: * (**) * implies 1 percent, (5 percent) and 10 percent level of significance respectively.**

4.3.3 Private Investment, Government Expenditure and Interest Rate – Budget Deficit Threshold Point Estimates

The relationship between private investment and government expenditure and the relationship between private investment and interest rate have been carefully examined and the results well documented in the literature. Our objective here is to examine the threshold point of budget deficit as a ratio of GDP within which government expenditure and its components have positive effect on private investment and the interest rate that has the least negative effect on private investment.

Table 4.7 panels (i) to (iv) showed the threshold point of budget deficits in relation to the effect of government expenditure on private investment and the effect of interest rate on private investment. In panel (i), the relationship between private investment

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and total government expenditure under different level of budget deficit was examined. The threshold analysis revealed two regimes of budget deficits. In the first regime of budget deficit of 3.97 percent of GDP, total expenditure was more productive in stimulating private investment as a unit increase in government expenditure resulted in 0.86 percent increase in private investment. A further increase in budget deficit beyond this threshold point of budget deficit made total expenditure to be less productive in influencing private investment.

Panel (ii) presented the relationship between private investment and capital expenditure under different levels of budget deficits. The panel revealed four regimes of budget deficits that are significant at 1 percent level of significance. The first and second regimes of budget deficit to the tune of 0.20 percent and 1.99 percent of GDP made the capital expenditure to be less productive in stimulating economic growth as a unit increase in capital expenditure resulted in 0.65 percent and 0.83 percent increase in private investment respectively. However, the third regime of budget deficit of 3.98 percent of GDP gave the threshold point of budget deficit as it recorded the highest intercept and slope as a unit increase in capital expenditure at a critical level of 8.75 increases private investment by 1.06 percent. An increase in budget deficit beyond this point of 3.98 percent of GDP made capital expenditure to be less productive in stimulating private investment.

Panel (iii) reported the threshold estimates of budget deficit influence on the relationship between private investment and recurrent expenditure. Unlike capital expenditure, two significant regimes of budget deficits were recorded. The results showed that the first regime of budget deficits of 4.36 exerted more influence on the relationship between private investment and recurrent expenditure as a unit increase in recurrent expenditure resulted in 0.84 percent in private investment. An attempt to raise budget deficits beyond 4.36 percent of GDP would make recurrent expenditure to be less productive in crowding in private investment.

In Panel (iv) the threshold of budget deficits with regard to the relationship between private investment and interest rate was examined and reported. The panel revealed three regimes of budget deficits. All the parameters in the three regimes were significant at 1 percent level of significance. In the first regime of 0.20 percent of fiscal deficits, a unit increase in interest rate increased private investment by 0.32 percent. In the second regime of deficits of 3.98 percent of GDP, interest rate had most positive influence on private investment. At this threshold point of budget deficit, interest rate at a critical level of 15.15 percent became most productive as a unit increase in interest rate resulted in 0.38 percent increase in private investment. Any further increase in budget deficit beyond this threshold level of 3.98 percent of GDP will result in higher interest rate above the critical level of 15.15 which would be inimical to private investment.

Table 4.7: Private Investment, Government Expenditure and Interest Rate – Budget Deficit Threshold Point Estimates
Panel (i)

Threshold Variable: Budget Deficit as a Percentage of GDP (DFGDP)	Dependent Variable: Private Investment	
	Intercept	Regressor Variable: TEXP
First Regime: DFGDP<3.97	1.75*	0.86*
Second Regime: 3.97<= DFGDP	2.47*	0.75*
Critical level of Total Expenditure	**6.55**	

Panel (ii)

Threshold Variable: Budget Deficit as a Percentage of GDP (DFGDP)	Dependent Variable: Private Investment	
	Intercept	Regressor Variable: CEXP
First Regime: DFGDP<0.20	4.24*	0.65*
Second Regime: 0.20<= DFGDP< 1.99	3.01*	0.83*
Third Regime: 1.99 <= DFGDP< 3.98	4.45	1.06*
Fourth Regime: 3.98<= DFGDP	2.88*	0.76*
Critical level of Capital Expenditure	**8.75**	

Panel (iii)

Threshold Variable: Budget Deficit as a Percentage of GDP (DFGDP)	Dependent Variable: Private Investment	
	Intercept	Regressor Variable: REXP
First Regime: DFGDP<4.36	2.34*	0.84*

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Second Regime: 4.36<= DFGDP		3.22*	0.71*
Critical level of Recurrent Expenditure		**6.77**	

Panel (iv)

Threshold Variable: Budget Deficit as a Percentage of GDP (DFGDP)		Dependent Variable: Private Investment	
		Intercept	Regressor Variable: INTR
First Regime: DFGDP<0.20		5.27*	0.32*
Second Regime: 0.20<= DFGDP< 3.98		6.18*	0.38*
Third Regime: 3.98 <= DFGDP		8.30*	0.12*
Critical level of Interest Rate		**15.15**	

Note: * (**) *** implies 1 percent, (5 percent) and 10 percent level of significance respectively.

4.3.4   Private Investment and Economic Growth – Government Debt Threshold Point Estimates

Another major fiscal policy variable that can have great influence on the relationship between private investments and economic growth is public debt which can be domestic or external. If excessively used, it reduces the credit which would otherwise be available to the private sector, putting pressure on domestic interest rate. At higher interest rate private investors are discouraged thereby affecting economic growth adversely. In table 4.8, the thresholds of government total debt including its components were estimated. Panel (i) presents the threshold effect of total government debt in explaining the relationship between private investment and economic growth. The table showed three regimes that are statistically significant at 1 percent level of significance. The results revealed that private investment had the most positive impact on economic growth in the first regime of public debt as a unit increase in private investment resulted in 1.07 percent increase in economy growth rate. A resort to public debt beyond this level will make private investment less productive thereby inhibiting growth.

Panel (ii) of Table 4.8 showed the threshold point of domestic debt at which private investment became most effective. This also presented three regimes that are significant at 1 percent level of significance with similar results. At the first regime of domestic debt, a unit increase in private investment also led to 1.07 percent increase in economic growth. A recourse to public debt beyond the first regime reduces the productivity level of private investment. The second regime of domestic debt for example made a unit increase in private investment at a critical level of 11.73 percent to contribute just 0.15 percent to economic growth. Panel(iii), also revealed the first regime as the threshold point of external debt as private investment at a critical level of 11.73 became most productive, contributing 1.07 percent to economic growth

Table 4.8: Private Investment and Economic Growth – Government Debt Threshold Point Estimates
Panel (i)

Threshold Variable: Government Total Debt (TDEBT)		Dependent Variable: Economic Growth	
		Intercept	Regressor Variable: LPINV
First Regime: TDEBT<9.51		0.07	1.07*
Second Regime: 9.51<= TDEBT< 13.99		10.82*	0.14*
Third Regime:13.99 <= TDEBT		8.68*	0.32*
Critical level of private investment		**11.63**	

Panel (ii)

Threshold Variable: Domestic Debt (DDEBT)		Dependent Variable: Economic Growth	
		Intercept	Regressor Variable: LPINV
First Regime: DDEBT<9.32		0.07	1.07*
Second Regime: 9.32.<= DDEBT< 13.97		10.79*	0.15*

Third Regime: 13.97<= DDEBT		9.22*	0.29*
Critical level of private investment		**11.73**	

Panel (iii)

Threshold Variable: External Debt (EDEBT)		Dependent Variable: Economic Growth	
		Intercept	**Regressor Variable: LPINV**
First Regime: EDEBT<7.75		0.07	1.07*
Second Regime: 7.75<= EDEBT		9.88*	0.23*
Critical level of private investment		**11.76**	

Note: * (**) *** implies 1 percent, (5 percent) and 10 percent level of significance respectively.

5   CONCLUSION

The concerted efforts by government to diversify the Nigerian economy with a view to achieving sustainable economic growth can be stimulated through the appropriate application of fiscal policy instruments. In the literature there is strong correlation between economic growth and private investment, therefore, countries were encouraged to adopt measures that stimulate private investment as an engine of growth. The examination of private investment spending behaviour in Nigeria revealed that the fiscal policy instruments that significantly affect private investment include, government expenditure and government debt. It was observed that private investment did not respond to shocks in government revenue, (both oil and non-oil) as much as it responded to government expenditure. It was also observed that budget deficit of up to 3.98 percent of GDP (though slightly higher than the recommended value of 3 percent by the IMF) can be accommodated as it made government expenditure, especially capital expenditure to boost private investment Nigerian economy.

It can be observed that private investment has not been growing at a desirable level despite the country's potential and the pre-requisite of a populous market. The low economic growth phenomenon that characterized Nigerian economy can only be reversed by massive private sector investment for employment generation and for stimulating economic growth. The study therefore concluded that Fiscal policy as a veritable means of spurring private investment should be explored and meticulously implemented. Also, considering the volatile nature of oil revenue, government needs to continue to intensify efforts towards rejuvenation its non-oil revenue generation as a way of financing its budget rather than resulting to fiscal deficit which is financed majorly through public debt as this has imposed huge debt service payments on the economy and contributing largely to perpetual runny of fiscal deficit.

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