

The Keynesian-Ricardian Dichotomy on Budget Deficits in Nigeria

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Abstract: This research work takes its motive from recent literature concerning the debate on the Keynesian proposition and the Ricardian equivalence, employing data from the Nigerian economy and applying cointegration analysis, Granger causality tests and impulse response functions (IRF). The aim of the econometric methodology is to derive robust results by means of using alternative quantitative techniques. Both the shortrun empirical findings using VEC and IRF and the longrun empirical findings using Johansen technique are in line with the Keynesian proposition. The Granger causality test using pair-wise Granger causality was also employed to test if there is causality between interest and budget deficit and to know the direction of causality (if it exists) the result reveals the independence of BD and RIR in both the regressions except at lag 6 and 8 where there is a unidirectional causality from RIR to BD. The message that a change in budget deficit implies no effect on the rate of interest supports the theoretical grounds of the Ricardian equivalence hypothesis. Overall, the empirics are in accord with both the logic of the Keynesian proposition and that of the Ricardian equivalence hypothesis

Keywords: Budget Deficit, National Debt, National Savings and Real Interest rate

I. Introduction

In the pre-keynesian era, a tradition of balance budget which has prevailed for years helped in guiding on the spending tendencies of government and invariably, keeping expenditures within the revenue limits imposed by the size of collectible taxes. This standard pattern of behaviour ceased among many governments following the American depression of the 1930s which was particularly large, painful, and intellectually significant. During that period, the United States and many other countries experience massive unemployment and greatly reduced incomes. In 1936 precisely, the British Economist, John Maynard Keynes in his book, "The General Theory of Employment, Interest and Money", proposed a new theory to analyze the economy. Keynes proposed that low aggregate demand was responsible for the low income and high unemployment that characterized economic downturn. Keynes, 1936).

He attributed the "problems" of under-spending or under-consumption as underlying the prevailing unemployment problem then. Subsequently, the under-consumption nation dominated the thinking among many mainstream economists up to the 1970s. The under-spending or demand side thinking argues that unemployment is a consequence of inadequate or low aggregate demand for goods and services; and if the spending level and consequently, the demand level increases, employers of labour will hire more workers. Keynes, therefore, advocated for the running of budget deficits by increasing government spending and/or reducing taxes and by so doing adduced that the market solution would be ineffective because, the price mechanisms and wages that have to respond to the existence of unemployment do not adjust with sufficient speed or effectively. So in line with Keynes reasoning, contrary to the norm which prevailed before his under-spending and deficit budget solution, economic depression will most likely continue for a very long time unless government spending was increased sufficiently and as (Oluba, 2008) puts it, the Keynesian doctrine spending was sufficient justification for politician to spend beyond the means of their respective countries without the hitherto existing discipline of balanced budgets. Nigeria is no exception. The justifications always appear right yet, dead wrong.

The Nigeria government has addicted to fiscal deficits since the early days of independence. During the post independent era, Nigeria depended on fiscal deficits to expand the economy up till 1970, the country ran fiscal deficits and sustained public sector spending boom. This was further justified by the 1966-68 war financing expenditures. The fiscal deficits of the 1970 were justified on the grounds that it was largely for post-war reconstruction, but the extra-budgetary spree (extravagant spending) was halted primarily because the oil boom which occurred at the time, presented an alternative spending source. The unearned resources were quickly mismanaged, thus, requiring an immediate return to deficits in 1975. Having inherited massive

bureaucracy and wasteful project in the course of the boom, the return to deficit spending became justified on the grounds that the bureaucracy and uncompleted projects needed to be complete.

Problem Statement

Bhatia (2003) posits that when a government spends more revenue than it collects in form of taxes, it leads to a deficit budget which is financed either through borrowing from the local or international market or through an increase in the taxes levied on the citizens. The issue of budget deficit has been one of the great debates among economists due to the observations that a lot of countries seem to run more of budget deficits than surpluses, mainly following the postulations by Keynes in 1936 (during economic meltdown that low aggregate demand was responsible for high unemployment rate which characterized the downturn. More so, the consequence or end results of these budget deficits have different implications as the stability and balance in the economy can be disrupted.

Nigeria seems to run more of deficits than surpluses. For the sample period of 1970-2007, 31 years out of 37 years clearly shows that Nigeria's overall fiscal balance had been in deficits. Some of the years actually declared as surpluses were years of fiscal deficits which were so converted through arithmetic manipulations by the ministry of finance (Oluba, 2008). However, even if we take only the recorded years, the fact that over 84% of our fiscal disposition is tilted in favour of deficit spending clearly shows an addiction. How long can we live beyond our means? Commonsense is clear that one who continuously lives beyond his means, unless he is an astute entrepreneur who turns those extras around, would definitely run into trouble. There are a number of reasons which are responsible for this persistent fiscal disposition. First is the huge and increasing oil-shock induced public spending, which seems to have come to stay as such trend has persisted after the oil-based revenue profile fell. Another reason is the highly bloated public sector, which in turn grew on the wings of the indigenization policy of 1972 and the increasing oil earnings. The third reason was the huge debt burden, which grew beyond the debt-service capability of the nation. There is yet another reason which can be interpreted and understood in terms of legitimized profligacy by the state. The traditional constitutional checks and balances sometimes appear to be weak in checking it and may brazenly endorse it. The problem with Nigeria is not that of budget deficit but the source of the deficit. If the funds are being invested in infrastructures, social amenities, healthcare, etc that will improve the welfare of the citizenry, then it is not a problem but if the funds are being taken care of by political parties, extravagant spending by politicians giving the funds to their girlfriends, concubines, and unaccredited contractors, then this constitutes a problem. I quote verbatim, few lines from Omorotionmwan (2008:p18)

"...There is something strange in this land. We are simply walking the budgetary process on its head. It is most ludicrous that the President would be asking for say N1.8 trillion and the National Assembly say we must approve N1.9 trillion for you. In most economies, the exact opposite is usually the case: The President's proposal is usually higher than what the legislature approves for him... the reason for our abnormal action is not farfetched, though... At the National Assembly end, some nebulous items are soon introduced into the budget proposals. One such item is 'take-home haulage' that goes by the name of Constituency projects. You put some money into the hands of the legislator and ask him to go and execute some amorphous projects in his Constituency. Quite often, the money gets into his pocket but no serious project gets executed. This accounts for the lack of development in spite of the colossal sums we appropriate annually"

Different schools of thought have demonstrated their opinions based on budget deficits. Most common are the Keynesian and the Ricardian school of thought. While the Keynesian posits that budget deficit affects main macroeconomic variables, Ricardian school refutes the proposition (by the Keynesian school) and posits that budget deficits do not affect main macroeconomic variables.

Unfortunately, this empirical evidence has been one of the less heavily subjects in the literature of the developing countries like Nigeria. More concentration has been on the economics of the developed countries like United States of America, Japan, Britain, etc. A country like Nigeria is worth investigating considering its vision to be among the top twenty countries of the newly industrialized countries come 2020 (vision 2020). Thus, this research work shall be guided by the following research question:

1. What are the key determinants of budget deficit in Nigeria?
2. Do changes in interest rate respond to movement in budget deficits?
3. Is the relationship between interest rate and budget deficits sustainable in the long run?
4. Is there casual link between budget deficits and interest rate ?

Objectives of the Study

The main objective of this study is to explore between government deficits and interest rate employing data from the Nigerian economy in relation to testing which of the two paradigms (Keynesian and Ricardian) holds in Nigeria. Thus, from the aforementioned research questions, the research objectives are:

1. To determine the key determinants of budget deficits in Nigeria.

2. To determine the response of interest rate to movement in budget deficits.
3. To determine if the relationship between budget deficits and interest rates are sustainable in the long run.
4. To test if there exist causality between budget deficits and interest rate.

Research Hypotheses

From the research objectives, the following hypotheses are to be tested:

1. H_0 : The National savings, real interest rate, national debt and current account balance are not the determinants of budget deficits in Nigeria.
2. H_0 : Interest rates do not respond to movements in budget deficits.
3. H_0 : There is no long run relationship between interest rates and budget deficits.
4. H_0 : There is no causal relationship between interest rates and budget deficits.

Literature

There are basically two major schools of thought on budget deficit that are highly controversial (though there is a third model called the small open economy view).

The Keynesian Proposition

The Ricardian Equivalence Hypothesis (REH)

2.1.1. The Keynesian proposition

The Keynesian Proposition which is the standard theory of budget deficit or the conventional view posits that households respond to an increase in current disposable income which is equal to the tax cut partly with higher desired private savings and partly with higher consumer demand and because of this increase in desired national savings declines. National saving is the sum total of private saving and public saving. This theory further suggests that a decision to finance government spending by budget deficit as a result of tax cut instead of current taxes reduces national saving and that the reduction in national savings is partly reflected in lower domestic investment and partly increases borrowing from abroad, both of which reduces future national income and future domestic production. The reduction in domestic investment is as a result of increases in interest rate, thereby, establishing a connection between budget deficit and interest rate.

A tax cut financed by government borrowing would have many to stimulate consumer spending. Higher consumer spending affects the economy in both the short run and long run.

In the short run, higher consumer spending would rise the demand for goods and services and thus rise output and employment. Interest rate would also rise; however, as investors competed for a smaller flow of saving and according to Mundell- Fleming model of an open macro economy, higher interest rates would discourage investment and would encourage capital to flow in from abroad. The naira would rise in value against foreign currencies, and Nigerian firms would become less competitive in world markets.

In the long run, the smaller National saving caused by the tax cut would mean a smaller capital stock and a greater foreign debt. Therefore, the output of the nation would be smaller, and a greater share of that output would be owed to foreigners.

In buttressing the Keynesian proposition, Ball and Mankiw (1995) gave a deep insight on the immediate effects of budget deficits have many effects which follow from a single initial effect: national saving. Deficits reduce national saving. National saving is the sum of private saving (the after – tax income that households save rather than consume) and public saving (the tax revenue that the government saves rather than spends). When government runs a budget deficit, public saving is negative which reduces national saving is most likely less than one – for – one, for a decrease in public saving produces a partially offsetting increase in private saving. For example, consider a #1 tax cut. This tax cut reduces public saving by #1, but also rises household's spend part of this windfall but fall in public saving.

2.1.2 The Ricardian Equivalence Hypothesis (REH)

The second but more controversial school of thought on budget deficit is known as the Ricardian Equivalence Hypothesis (REH). Despite its theoretical appeal, the conventional view of the relationship between budget deficits and interest rate is not broadly shared. Ricardian economists argue that the above seemingly sensible assumption is incorrect. Although a debt-financed tax cut would increase current disposable income, it would also imply that at some point in the future, the government must raise taxes to pay off the debt and accumulated interest. As a result, the tax cut would merely give consumers a transitory increase in income that would eventually be taken back. If consumers understand this, then they would know that their permanent, or lifetime, resources had not changed. Hence, the tax cut would have no effect on consumption, and households would save all of their extra disposable income to pay for the future tax liability. Because there would be no effect on consumption, there would also be no effect on national saving. If national saving did not change, then the budget deficit would not have the effects the Keynesian economists listed. In particular, output, employment, foreign debt, and interest rates would be unaffected in both the short run and the long run. The tax cut would have no effect on economic wellbeing. Many researchers have invoked the Ricardian equivalence hypothesis to

argue that budget deficits mainly result from tax cuts that tend to reduce both public revenues and public savings. While these tax cuts have the effect of reducing public savings and enlarging the budget deficit, they increase private savings by an equivalent amount. Proponents of this view argue that alterations in the composition of public financing i.e, debt versus taxes have no effect on real interest rates, aggregate demand and private spending.

The Ricardian Equivalence Hypothesis states that a deficit financed tax cut will lead to a decrease in public savings and an increase in private saving. Such decline in public savings is fully offset by increase in private saving and thus, national income is unaffected i.e, remains the same. In other words, budget deficit has no effect on national saving, interest rate, current account balance, future domestic production, or future national income. Gale and Orszag (2004). The general principle is that government debt is equivalent to future taxes, and if consumers are sufficiently forward-looking, future taxes are equivalent to current taxes. Hence, financing the government by debt is equivalent to financing it by taxes. This view is called Ricardian Equivalence after the famous nineteenth-century economist David Ricardo, because he first noted the theoretical argument.

To illustrate the Ricardian equivalence, let us assume that government purchases remain constant and that the government decides a cut in taxes. The Ricardian equivalence states that lump-sum changes in tax revenues will not affect the level of total consumption, total savings, the rate of interest, money demand, national debt, current account balance and other important macroeconomic variables. Suppose that the government reduces taxes by N1. The tax cut should lead people to increase consumption, because the current tax cut increases their current incomes. However, given that the government has not changed its expenditures for goods and services, the N1 tax cut today must also increase current borrowing by N1. Because the additional debt of N1 will be repaid in the future, tax revenues will be higher in the future implying lower future disposable incomes for the people. The decline in future disposable incomes will cause people to consume less today, offsetting the positive effects on consumption of the N1 current tax cut. In this way, the total effect of a current tax cut on desired consumption is zero, because the positive effects of increased current disposable income and the negative effects of declined future disposable income cancel each other out. Also considering that government deficits do not influence total consumption and savings, the level of interest rate remains constant and the demand for money is not affected. Within the IS-LM model, the rationale of the Ricardian theorem indicates that budget deficit increases do not affect the equilibrium point of the IS and LM curves. Thus, government deficits do not influence the equilibrium level of interest rate and other key macroeconomic variables such as consumption, savings, inflation etc. The argument raised by the Ricardian equivalence is that government bonds are not net wealth. According to Barro (1974, 1987) and other advocates of the Ricardian equivalence, public debt financing by bond issue postpones taxation imposition for the future. Consequently, future taxation is equivalent to current taxation and therefore people realize that their government bonds will be paid off with increases in future taxes.

The implication of Ricardian equivalence is that debt-financed tax cut leaves consumption unaffected. Households save the extra disposable income to pay the future tax liability that the tax cut implies. This increase in private saving exactly offsets the decrease in public saving National saving- the sum of private and public saving – remains the same. The tax cut therefore has none of the effects that the traditional analysis predicts.

The Ricardian Equivalence Hypothesis (REH) also postulates that a deficit financed spending by a tax cut has the same present value as the initial tax cut. This means that taxes do not change unless government decides to change the present value of its expenditure. The notion behind the above postulate is that economists hold that there is no such thing as a free meal. Thus, if government decides to cut down taxes today to finance spending (deficit), that tax will be paid for sooner or later in future.

2.2 Empirical Literature

Several economists have looked into the approaches on budget deficits taken by a renowned economist, John Maynard Keynes and a millionaire stockbroker, David Ricardo using various methodologies and data from different countries and under different economic conditions. Several empirical studies by Bovenberg (1988), Laumas (1989), Dua (1993), Knot and De Haan (1995), and Reinhart and Sack (2000), among others, have provided evidence in line with the rationale of the Keynesian proposition. On the other hand, other authors such as Barro (1974, 1987), Evans (1987), Darrat (1990), Beard and McMillin (1991), and Cheng (1998), support the Ricardian equivalence that government deficits have no impact on key macroeconomic variables. A look at the study by Jose and Loukas (1995) where an investigation was made of the relationship between (1995) where an investigation was made of the relationship between nominal and real long term interest rates and budget deficit reveals that long term interest rates increase with larger budget deficits. The study also made a point to show the specific contribution of the budget deficit to the variations of long term interest rates on top of monetary policy and other determining factors. It was concluded from observations made that indeed budget deficits push long term interest rates higher than they would otherwise be. This result contradicts the Ricardian theory because, the

positive link between long term interest rate and budget deficits show that private savings do not fully compensate for the increase of the budget deficits.

Normandin (1999) based on his assessment of the data from the United States infers that a tax increase would directly decrease the external deficit due to reduced imports induced by the decline of private after-tax incomes". Gale and Orszag (2004) employed data from the United States economy and provided new evidence that sustained budget deficits reduce national saving and raise interest rates by economically and statistically significant quantities. They used a series of econometric specifications that nest Keynesian and Ricardian models, obtained evidence that projected future deficits affect long term interest rates but current deficits do not. This suggests that the Ricardian view is not a reasonable approximation to reality but that the conventional view is a better description of reality for the United States. Vamvoukes (2008) uses data of the Greek economy over the time frame of 1948-2001 and applies co-integration analysis, Granger Causality tests and impulse response function (IRFs) explores the sensitivity and robustness of the Keynesian proposition and the Ricardian Equivalence. His empirical analysis shows the existence of dynamic relationships between budget deficit and interest rate, indicting a two-way causality between deficits and interest rates. The findings of his Granger tests and IRFs contradict the view of the Ricardian Equivalence that government deficits do not influence the behaviour of interest rate. He experimented with the four-variable system (R, D, Y and P) and IRF results show that in the case of Greece, budget deficit positively affects inflation rate. This evidence that budget deficit exerts positive effects on interest rates and inflation is in consistent with the rationale of the Keynesian Proposition.

A study by Darrat (2003) refutes the result by Vamvoukas (2008). Darrat made deductions from system estimates of error correction models that there is no casual impact of the deficits on interest rates in the Greek economy. Instead, his study supports a notion of reverse causality, whereby, movements in interest rates play an important role in shaping the budgetary process. Another study by Romeo and Sampson (2003) on the effect of budget deficits on long term interest rates using expected deficit data from the council of economic advisers and congressional budget office in the USA employed the fair model-a macro econometric model developed by Ray Fair of Yale university used to make predictions and support the relationship between the economic variable that if a budget deficit is not completely offset by a rise in private savings, private domestic investment or net foreign investment must decrease. It was concluded that a decrease in budget deficit by 1% of GDP per year indeed lowers both short term and long term interest rates in the United States. Writing on the relationship between budget deficit and trade deficit, also known as the "Twin Deficits", Hashemzadeh and Wilson (2006) findings suggest that the correlation between the two deficits is both complex and ambiguous. That is to say that the dynamic relationship between the two deficits is subject to change depending on the and a complex host of internal and international forces that help to shape a country's economic status in the global setting. Their methodology was based on causality test and vector autoregression (VAR) technique on annual budget deficit and current account deficit for nine selected countries in the Middle East and North Africa. These countries are: Egypt, Iran, Jordan, Kuwait, Morocco, Oman, Syria, Turkey and Yemen.

II. Methodology

We employed the Vector Autoregressive (VAR) analysis. The term 'autoregressive' is due to the appearance of the legged values of the dependent variable on the right hand side and term; 'vector' is due to the fact that we are dealing with a vector of two (or more) variables. The VAR analysis is superior to simultaneous equation analysis that has the defect of simultaneity bias. The VAR model considers every variable in the model as endogenous, thus checking feedback problem. The general form of VAR model is:

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + B X_t + u_t$$

Where Y_t represents a 'k' vector of endogenous variables and represent and X_t represent the (d) vector of exogenous variables. A_1, \dots, A_p , and B represent matrices of coefficients to be estimated. u_t is a vector of innovations that may be contemporaneously correlated with each other but are uncorrelated with all the exogenous variables.

We now specify our vector autoregressive model of order k as follows:

$$\begin{aligned} BD_t &= \alpha_0 + \sum_{j=1}^k \alpha_{1j} BD_{t-j} + \sum_{j=1}^k \alpha_{2j} NS_{t-j} + \sum_{j=1}^k \alpha_{3j} RIR_{t-j} + \sum_{j=1}^k \alpha_{4j} NDBT_{t-j} \\ &\quad + \sum_{j=1}^k \alpha_{5j} CA_{t-j} + \mu_{1t} \\ NS_t &= \beta_0 + \sum_{j=1}^k \beta_{1j} BD_{t-j} + \sum_{j=1}^k \beta_{2j} NS_{t-j} + \sum_{j=1}^k \beta_{3j} RIR_{t-j} + \sum_{j=1}^k \beta_{4j} NDBT_{t-j} \\ &\quad + \sum_{j=1}^k \beta_{5j} CA_{t-j} + \mu_{2t} \\ RIR_t &= \lambda_0 + \sum_{j=1}^k \lambda_{1j} BD_{t-j} + \sum_{j=1}^k \lambda_{2j} NS_{t-j} + \sum_{j=1}^k \lambda_{3j} RIR_{t-j} + \sum_{j=1}^k \lambda_{4j} NDBT_{t-j} \\ &\quad + \sum_{j=1}^k \lambda_{5j} CA_{t-j} + \mu_{3t} \\ NDBT_t &= \gamma_0 + \sum_{j=1}^k \gamma_{1j} BD_{t-j} + \sum_{j=1}^k \gamma_{2j} NS_{t-j} + \sum_{j=1}^k \gamma_{3j} RIR_{t-j} + \sum_{j=1}^k \gamma_{4j} NDBT_{t-j} \\ &\quad + \sum_{j=1}^k \gamma_{5j} CA_{t-j} + \mu_{4t} \\ CA_t &= \tau_0 + \sum_{j=1}^k \tau_{1j} BD_{t-j} + \sum_{j=1}^k \tau_{2j} NS_{t-j} + \sum_{j=1}^k \tau_{3j} RIR_{t-j} + \sum_{j=1}^k \tau_{4j} NDBT_{t-j} \\ &\quad + \sum_{j=1}^k \tau_{5j} CA_{t-j} + \mu_{5t} \end{aligned}$$

Where BD =Budget Deficit $NDBT$ =National Debt

NS = National Savings RIR = Real Interest rate CA = Current Account
 μ's= stochastic error terms called impulses or innovations or shocks in the language of (VAR).

Vector Error Correction Model (VECM).

The VECM is a restricted VAR that has co integration restrictions built into the specification. It is designed for use with non- stationary series that are known to be co-integrated. The VEC specification restricts the long – run behaviour of the endogenous variables to converge to their co-integrating relationships, while allowing a wide range of short- run dynamics.

The VECM is stated thus:

$$\begin{aligned} \Delta BD_t &= \alpha_0 + \sum_{j=1}^k \alpha_{1j} \Delta BD_{t-j} + \sum_{j=1}^k \alpha_{2j} \Delta NS_{t-j} + \sum_{j=1}^k \alpha_{3j} \Delta RIR_{t-j} + \sum_{j=1}^k \alpha_{4j} \Delta NDBT_{t-j} + \mu_{1t} \\ \Delta NS_t &= \beta_0 + \sum_{j=1}^k \beta_{1j} \Delta BD_{t-j} + \sum_{j=1}^k \beta_{2j} \Delta NS_{t-j} + \sum_{j=1}^k \beta_{3j} \Delta RIR_{t-j} + \sum_{j=1}^k \beta_{4j} \Delta NDBT_{t-j} + \mu_{2t} \\ \Delta RIR_t &= \lambda_0 + \sum_{j=1}^k \lambda_{1j} \Delta BD_{t-j} + \sum_{j=1}^k \lambda_{2j} \Delta NS_{t-j} + \sum_{j=1}^k \lambda_{3j} \Delta RIR_{t-j} + \sum_{j=1}^k \lambda_{4j} \Delta NDBT_{t-j} + \mu_{3t} \\ \Delta NDBT_t &= \gamma_0 + \sum_{j=1}^k \gamma_{1j} \Delta BD_{t-j} + \sum_{j=1}^k \gamma_{2j} \Delta NS_{t-j} + \sum_{j=1}^k \gamma_{3j} \Delta RIR_{t-j} + \sum_{j=1}^k \gamma_{4j} \Delta NDBT_{t-j} + \mu_{4t} \\ \Delta CA_t &= \tau_0 + \sum_{j=1}^k \tau_{1j} \Delta BD_{t-j} + \sum_{j=1}^k \tau_{2j} \Delta NS_{t-j} + \sum_{j=1}^k \tau_{3j} \Delta RIR_{t-j} + \sum_{j=1}^k \tau_{4j} \Delta NDBT_{t-j} + \mu_{5t} \end{aligned}$$

Data And Result

The result and interpretation of the Vector Auto-regression (VAR) for the specified model in chapter three is presented in this chapter. The various diagnostic tests are shown and interpreted as well.

Table 4.1.1: Unit Root Test

Variable Δx	UNIT ROOT IN ΔX		DECISION
	ADF	ADF Critical value (5%)	ADF Critical
Δ (BD)t	-5.104797	-2.6300	I(1)
Δ(NDBT)t	-5.876679	-2.6300	I(1)
Δ(NS)t	3.072090	-2.6300	I(1)
Δ(CA)t	-5.104797	-2.6300	I(1)
Δ(RIR)t	-5.239252	-2.6300	I(1)

NOTE: Δ represents the first difference operator. I (1) means integrated of order one.

4.1.2 Cointegration Test

Test 4.1.2 present the Johansen cointegration test results based on λtrace and λmax. When the Johansen procedure is performed, the level data have linear deterministic trends and the cointegrating equations have intercepts. The Max-Eigen value test and Trace statistic test show that there is one (1) cointegrating equation in the analysis. Thus, the null hypothesis of at most zero cointegrating relationship will be rejected in this five-variable system. Therefore, the variables tend to move together in the long-run and, hence, share a long-run component and do not drift apart over time. Table 4.1.2 below reports the results from the cointegration test.

Table 4.1.2 Testing for the Number of Co-integrating Vector(s) Assuming Linear Deterministic Trend

H ₀ : Null hypothesis	H ₁ : Alternative hypothesis	Maximal Eigen value	0.05 critical value	Prob*	Trace Statistics	0.05 critical value	Prob.**
r = 0*	r = 1	66.07428	33.87687	0.0000	113.8544	69.81889	0.0000
r <= 1	r = 2	23.01502	27.58434	0.1728	47.78019	47.85613	0.0508
r <= 2	r = 3	17.85544	21.13162	0.1353	24.76518	29.79707	0.1700
r <= 3	r = 4	6.638676	14.26460	0.5327	6.909737	15.49471	0.5882
r <= 4	r = 5	0.21061	3.841466	0.6026	0.271061	3.841466	0.6026

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

**MacKinnon-Haug-Michelis (1999) p-values.

Both the t statistic and the max-eigen value indicates 1 cointegrating equation(s) at 5% level.

4.1.3 Granger Causality Analysis

Under the null hypothesis that RIR does not Granger Cause BD and BD does not Granger Cause RIR, the result of the pair-wise Granger Causality test is illustrated in table 4.1. 3 below:

Table 4.1.3 Causality Between Budget Deficit (BD) and Real Interest Rate (RIR) in Nigeria (1970-2013)

DIRECTION OF CAUSALITY	NUMBER OF LAGS	F- VALUE	PROB.	DECISION
RIR _t → BD _t	2	0.39222	0.67886	ACCEPT

BD_t	RIR_t	2	1.77898	0.18561	ACCEPT
RIR_t	BD_t	4	0.75444	0.56458	ACCEPT
BD_t	RIR_t	4	1.39645	0.26394	ACCET
RIR_t	BD_t	6	3.36919	0.01961	DO NOT ACCEPT (AT 1%)
BD_t	RIR_t	6	0.81177	0.575753	ACCEPT
RIR_t	BD_t	8	2.53880	0.06551	DO NOT ACCEPT (AT 6%)
BD_t	RIR_t	8	0.72462	0.66875	ACCEPT

These result suggest the independence of BD and RIR because the sets of BD and RIR coefficients (F-value) are not statistically significant at 5% level of significance in both the regressions. Thus, we accept the null hypotheses that RIR does not Granger Cause BD and BD does not Granger Cause RIR. But at lag length 6 and 8, there is unidirectional causality from RIR to BD because their F- values are statistically significant at 1% and 6% levels of significance respectively. Thus, at such lag lengths, we do not accept the hypotheses that RIR does not Granger Cause BD and BD does not Granger Cause RIR.

Table 4.1.4 Vector Error Correction Model Parameter Estimates and Diagnostics

VARIABLE	$\Delta(BD)_t$	$\Delta LOG(NDBT)_t$	$\Delta(CA)_t$	$\Delta LOG(NS)_t$	$\Delta(RIR)_t$
$(BD)_{t-1}$	-0.792186*	4.18E-06 *	8.995122*	2.49E-08	3.18E.05
$(BD)_{t-2}$	-0.859986*	1.03E-07	6.183234*	- 6.91E-07	-9.49E-05
$LOG(NDBT)_{t-1}$	9295.718	0.064339	-314749.7*	- 0.006910	13.20320
$LOG(NDBT)_{t-2}$	-27593.77*	0.177108	-53597.79	- 0.015043	2.904775
$(CA)_{t-1}$	0.022838	-5.09E-08	0.434831*	1.49E-08	-1.80E-06
$(CA)_{t-2}$	0.167200*	- 1.33E -07	1.339411*	7.48E-08	-1.47E-05
$LOG(NS)_{t-1}$	90129.47	0.263117	-12013.66	0.502480*	-88.04791*
$LOG(NS)_{t-2}$	-149720.6	0.119844	-781113.0*	- 0.421942	48.34067
$(RIR)_{t-1}$	32.45007	-0.007275	4719.805	-0.000590	-0.114481
$(RIR)_{t-2}$	-1375.282*	-0.002816	-884,8828	2.24E-05	-0.124401
C	3770.864	-0.115345	34036.90	0.211415*	11.18711
R- squared	0.678125	0.490839	0.937181	0.45020	0.606584
Adj. R- squared	0.491776	0.196062	0.900812	0.076347	0.378817
F - statistic	3.639006	1.665120	25.76882	1.225430	2.663178
Akaike AIC	24.38710	1.073939	27.09610	-0.875034	8.250609
Schwarz SC	24.94219	1.629031	27.65119	-0.319942	8.805701

From the table above, we observe that the researcher introduced a constant term and two lagged values of each variable in each equation. The five variables considered are: the budget deficit (BD), national debt (NDBT), current account (CA), national savings (NS) and real interest rate (RIR). The numbers of parameters estimated in each equation were ten (10) plus a constant term, making it a total of eleven (11) parameters. The F-tests given in this table are to test the hypothesis that collectively, the various lagged coefficients are zero. For example, the F test for the BD variable is 8.3242 and it shows that both the lagged terms of BD are statistically different from zero. All other F statistics are to be interpreted similarly. The R-Square value of about 0.79 means that 79% of the variation in BD is explained by the combined effects of all the determinants.

4.2 Econometric Criteria for Evaluation of Result

Table 4.2.1 VEC Residual Correction LM tests:

LAGS	LM-STATISTIC	PROB.	DECISION
1	26.42181	0.3854	ACCEPT
2	26.08926	0.4028	ACCEPT
3	23.97833	0.5206	ACCEPT
4	22.92412	0.5820	ACCEPT
5	22.92412	0.5820	ACCEPT
6	16.67085	0.8934	ACCEPT
7	39.99452	0.0292	REJECT
8	29.82115	0.2311	ACCEPT
9	33.24684	0.1250	ACCEPT
10	32.54944	0.1427	ACCEPT
11	52.07776	0.0012	REJECT
12	45.33850	0.0076	REJECT

The result from above table 4.2.1 suggests that there is no obvious residual autocorrelation problem for the model because all the P-values are larger than the 0.05 level of significance expect at lag 7,11 and 12 where the p-values are less than 0.05.

Table 4.2.2 White Residual Heteroskedasticity Test

	Chi-sq	Df	p-value	Decision
No Cross terms	327.8095	330	0.5237	Accept

NOTE: Df means degrees of freedom. P-value means probability value

4.2.3 VEC Residual Normal Test

Although normality is not a necessary condition for the validity of many of statistical procedures to VEC models, deviations from the normality assumption may indicate that model improvements are possible. Here, multivariate tests for nonnormality are used to check whether the third (Skewness) and fourth (kurtosis) moments of the residuals are conformable with those of a normal distribution. This approach extends ideas of Lomnicki (1961) and Jarque and Bera (1987) for univariate models. In the multivariate case, the residual VECM is transformed to make individual components independent.

Then the moments are compared with those of normal distributions. For given residuals U_t ($t = 1, \dots, T$) of an estimated VECM, the residual covariance matrix \sum_u is determined and a matrix P such that $PP' = \sum_u$ is computed. The tests for nonnormality can then be based on the skewness and kurtosis of the standardized residuals $U_t = P^{-1} U_t$.

Table 4.5 shows the result of the normality test, the result shows that the residuals are multivariate normal. This is because the P – value is greater than 0.05. in other words Jarque-Bera statistics is less than the critical value at 10 df.

Table 4.2.3 VEC Residual Normality Tests

COMPONENT	JARQUE-BERA	DF	PROB
1	2.741108	2	0.2540
2	3.028088	2	0.2200
3	4.984564	2	0.0827
4	3.086291	2	0.2137
5	4.349429	2	0.1136
Joint	18.18948	10	0.0519

Note: Cholesky (lutkepohl) is used for orthogonalization

4.3 Impulse Response

Impulse response functions show how the model variables respond to individuals shocks: changes in BD, NS, RIR, CA, and NDBT. The fig below show IRFs for the four-variable model (BD, NS, RIR, CA, NDBT). Considering that the models is cointegrated, in the estimation procedure the variables are used in levels. In all cases, IRFs are to a five-basis-point shock to BD. The residuals are orthogonalized by the Choleski decomposition. Impulse responses are plotted along with their respective two-standard-deviation confidence bounds. The results indicate the existence of dynamic causal effects between BD and RIR. In panel 3, it indicates that the responses of RIR to BD disturbances are both positive and negative in all horizons which appear to be strong and persistent. This is in line with the theoretical grounds of the Keynesian view. Other panels show a positive, negative and sometimes, relatively stable responses to budget deficit.

III. Summary of findings

According to Gujarati (2004), the success of any econometric analysis ultimately depends on the availability of the appropriate data. Thus, based on annual data of the Nigerian economy between 1970 and 2007, this research work has examined the four specific objectives expressed in chapter one. The first objective is to determine the key determinants of budget deficits in Nigeria. Second is to determine the response of interest rates to movements in budget deficits, while the third is to determine if the relationship between budget deficits and interest rates are sustainable in the long run, and the last but not the least is to test if there exist causality between budget deficits and interest in Nigeria.

The stated objectives were basically to empirically test whether the Keynesian or the Ricardian Equivalence Hypothesis holds for Nigerian. The examination was carried out by specifying the appropriate system variables which is based on the appropriate economic model technique. Annual data from Nigeria ranging from 1970-2007 were used in order to examine the relationship between budget deficits and interest rates in the context of the Vector Error Correction Model (VECM) framework. The VECM was chosen to tackle the problem of simultaneity bias.

From the empirical results, it was found that the results from the study show that the lag of National Savings, National Debt, Real interest Rate and Current Account significantly influence the dynamics of the co-integration test using Johansen technique, the result shows that there is 1 co-integrating equation which shows that in the long-run, current, national saving, real interest rate exert negative and significant influence on budget deficit but national debt does not exert any influence on budget deficit. In addition, the result from impulse-response function show that budget deficit in Nigeria is driven by real interest rates, current account national saving and national debt. Therefore Impulse response function demonstrates that the real interest rate is not neutral in determining budget deficit. Both the short run empirical finding using VEC and IRF and the long run

empirical finding using Johansen technique are in line with the Keynesian Proportion which states that households respond to an increase in current disposable income which is equal to the tax cut partly with higher desired private savings and partly with higher consumer demand and because of this increase in desired private savings by only a fraction of the budget deficit, desired national savings declines.

The Granger causality test using pair-wise Granger causality was also employed to test if there is causality between interest rate and budget deficit and to know the direction of causality (if it exists). The result reveals the independence of BD and RIR in both the regressions except at lag 6 and 8 where there is a unidirectional causality from RIR to BD. The message that a change in budget deficit implies no effect on the rate of interest supports the theoretical grounds of the Ricardian Equivalence Hypothesis.

Policy Implication and Recommendations

Faced with the reality that the orientation of our budgeting practice to deficits is like a man playing with the tail of a tiger, there is no question as to whether we need to jettison that addiction. It is really difficult to stop because even the public is not very much bothered as long as the deficits are not financed directly through increased taxes. But the resulting consequences over time are actually worse than the increased taxes. Five possible solutions are recommended namely:

1. Enhancement of tax revenue
2. Drastically slimming down government's participation in activity areas best suited for the private sector.
3. Reduction in the size of civil/ public service
4. Enactment of fiscal control law as well as
5. Development and tapping into non tax revenue areas.

Moreover, the transfer to the private sector of those responsibilities and activities which the private sector is best suited for is imperative as it will significantly drop the expenditure side of the budget. Our view is that the provision of all public infrastructures should be ceded to the private sector. The advantages include both the efficiency that will consequently arise from such decision as well as the minimized opportunities for public sector corruption and expenditure. Increased private sector profitability will equal lead to the expansion of many new enterprises that will equally add to the number paying the downwardly reviewed tax rates. Right sizing of the public sector continues serious drain on the purse of the government. Another option can be a legislation controlling budgeting. A fiscal control law which forces the Nigerian government to make balanced budget proposals and commit to its 100% implementation is extremely important. The importance of the suggested fiscal control law is that it can engender large scale prudence, transparency and robustness in the budgeting process. The reasons are that for any proposed expenditure there will be matching revenue source. By the end of the day, only the most important items of expenditure for which there are expected revenue to cover will be included in the overall budget proposal. Transparency will also be easier to achieve while the assessment of government's performance relative to the budget will equally be easier to track. To achieve this therefore, we expect the legislature to enact balanced budget as a law that is binding on the executive. By so doing, frivolous, unjustifiable and nebulous expenditure proposals will find it harder to make their way into the overall budget proposal. Identifying other non-tax revenue sources can equally be another possibility. There are however several reservations which are related to whether government should now go into business for which the answer is NO. However, government can identify unutilized, largely un-owned public property, largely untapped resource and develop an arrangement in which the private sector can totally own and operate and make some level of returns to government. Such returns can be a certain fraction of after-tax profit say 5%. This arrangement is however laddered with complexities and may stealthily bring back the government into many business ventures which they will eventually – in their characteristic way – damage. As a result of this possibility, this last option should be viewed cautiously before adoption or rejected altogether.

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