Value Added Tax and Performance of Real Sector of Nigerian Economy: A Macro Econometrics Approach

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Abstract

The debate on the 50% hike Value Added Tax's (VAT) rate in Nigeria recently has been tense, while supporters of the policy are quick to point out that; Nigeria is among the lowest tax collection rates economies in the world, the critics of the policy are of the view that; Nigerian economy is fragile, its consumer spending is weak, imposing tax rates up at this time would only exacerbate the already existing difficult situation. Against this backdrop, this study examines the VAT and performance of real sector of the Nigerian economy adopting a macro econometrics approach. Annual time series data spanning 1994 and 2018 were sourced from the Central Bank of Nigeria, National Bureau of Statistics, Federal Inland Revenue Services and World Development Indicators Statistical Bulletins. The study employed Autoregressive Distribution Lag (ARDL) Model for estimation and further established a scenario to simulate 50% adjustment in VAT on the real sector of Nigerian economy to predict the impact of the policy for the period of 2020 to 2023. The estimated result reveals that, the actual figures of VAT have positive relationship with real sector variables included in the model except for Whole sale and Retail output in Nigeria. However, the simulated results indicated an adverse relationship between 50% increase in VAT and the real sector's variables included in the model. In line with these findings, the study recommends for conscious effort in the implementation of new minimum wage by the public and the private sectors; and investment in the public utilities to improve the purchasing power of the citizens and to reduce the cost of doing business in Nigeria.

Keywords: ARDL, Macro Econometrics, Simulation, Real Sector and Value Added Tax.

Introduction

The success or otherwise of any economy, whether developed, developing or underdeveloped, is a function of the availability of revenue to match the cost of governance. It is a conventional wisdom that government can only function effectively when there is adequate revenue to finance its expenditure. In Nigeria, government revenue has been sourced majorly from oil and other petroleum products. Hence, the Nigerian economy has been adjudged to be overly dependent on petroleum and petroleum products (Okoror & Onatuyeh, 2018). Against the backdrop of the negative implications of this overly dependence on oil revenue, there has been the serious need to diversify the economy of Nigeria through non-oil revenue, without which the economy will collapse (Okonjo-Iweala, 2012).

Tax revenue is a key component of non-oil revenue in Nigeria and it exists in different forms; either as direct taxes (levied on income, profits, wealth) or indirect taxes (levied on commodities, transactions, rights etc.). The National tax policy has emphasized indirect taxation with emphasis on Value Added Tax. The reform of the tax system in the early 90s established the basic framework of the current VAT system, and the effect of VAT on Nigeria's economy has been a major concern of academics and policy makers (Onwucheka & Aruwa, 2014). One important reason for this interest in VAT is that, value added tax is a major tax in the country's tax system, and it has even become more important in view of the current need to improve the revenue base of the government through other sources owing to the fluctuating oil prices in the international market which has affected government revenue and developmental projects, resulting in austerity measures as oil has been the major source of government earnings and foreign exchange for decades.

VAT was introduced in Nigeria following a study group set up by the federal government in 1991 to review the nation's tax system. It was this group that proposed VAT and in that same manner, a committee was set up to conduct feasibility study on the implementation of the VAT. The introduction of VAT in Nigeria through Decree 102 of 1993 marks the phasing out of the Sales Tax Decree No. 7 of 1986. The Decree took effect on 1st December, 1993 and became operational in Nigeria on the 1st of January 1994 (Nasiru, Haruna & Abdullahi, 2016). VAT is administered centrally by the federal government using the existing tax machinery of Federal Inland Revenue Services (FIRS) in close cooperation with the Nigeria Customs Service (NCS) and the State Internal Revenue Services (SIRS). Evidence so far supports the view that VAT revenue is already an important source of revenue in Nigeria (Nasiru, Haruna & Abdullahi, 2016).

Nevertheless, the current Nigerian VAT rate of 5% is considered among the lowest in the world (Nairametrics, 2019). A cursory look at VAT rate for some countries in the world shows that; Iceland is 24%, Portugal is 23%, Australia is 20%, Italy is 22%, Russia is 18%, Japan is 8%, Germany is 19%, Ukraine is 20%, Belarus is 20%, Singapore is 7%, France is 20%, United Kingdom is 20%, Hungary is 27%, South Korea is 10%, Spain is 21% and China 17%. Among some African countries, VAT rate for Cote d'Ivoire is 17-20%, Tunisia is 19%, Morocco is 20%, South Africa is 15%, Senegal is 18% and Algeria is 14-19% (United States Council for International Business [USCIB], 2019).

The Federal Government of Nigeria (FGN, 2019) constituted a committee comprising competent and leading economists from both the public and private sectors chaired by a Lagos-based Economist and Managing Director/Chief Executive Officer of Financial Derivatives Company Limited, Bismack Rewane. The committee was mandated to proffer advice on ways to realise alternative sources of raising funds for the implementation of the new minimum wage by the government (International Center for Investigative Reporting [ICIR], 2019). The committee submitted its report on March 21 with the increase in the

VAT rate from 5 per cent to 7.5 per cent representing 50% increases as one of its key recommendations to government to handle the issue (Premium Times, 2019).

Meanwhile, there is tense debate on the 50% (5%-7.5%) hike VAT rate in the economy. Supporters of the current administration's VAT policy are quick to point out that; Nigeria is among the lowest tax collection rates economies in the world. The country's VAT is also dwarfed by the amounts charged in other regions. But critics say that these comparisons ignore Nigeria's peculiar context. According to them, the country's economy is fragile, its consumer spending is weak, and the average real income of its citizens is dropping. Forcing tax rates up at this time would only exacerbate an already- existing difficult situation. They also note that businesses will have to pass on the cost of the increase to their consumers by raising their prices. This could, in turn, lead to a shrinking of demand for goods. This, coupled with the insistence that wages be boosted in the private sector as in the public, may be a bit much for a lot of enterprises to bear (Nairametrics, 2019). Against this backdrop, this study examined VAT and performance of real sector of Nigerian economy and simulates the 50% hike in VAT rate to empirically examine and predict its impact on the real sector of the Nigerian economy.

Literature Review

Empirical evidences from literatures have been relatively polarized in relation to values added tax and performance of Nigerian macroeconomic variables; with negative as well as positive relationship. Alarudeen (2019) investigated how government can implement an increase in the rate of VAT to ensure that the final rate of 15% is achieved in a way that satisfies the public (households and business community) and also ensures maximum revenue generation for the government. A recursive dynamic CGE model was used to address the study's objective, and the model was solved and simulated for 10 years. It was found that the best policy option is to increase the rate by 2.5% yearly for the next 4 years.

Okoror and Onatuyeh (2018), Yelwa, Awe and Mohammed (2018), John and Suleiman (2014) and Madugba and Azubike (2016) investigate the nexus between value-added tax and economic growth using time series data and employed Ordinary Least Square regression technique. The result of the analysis shows that value-added tax is negatively related to economic growth. On the other hand, John and Suleiman (2014), Izedonmi and Jonathan (2014), Nasiru, Haruna and Abdullahi (2016), Ifurueze and Ekezie (2014), Ezeji and Peter (2014), and Fredrick and Okeke (2013) investigated the impact of value added tax on the economic growth of Nigeria. The studies found evidence of a significant positive impact of VAT on economic growth. All the studies employed Ordinary Least Square regression technique with exception of Nasiru, Haruna and Abdullahi (2016) who adopted Jahansen co-integration and Ezeji and Peter (2014) who adopted Engle-Granger two steps co-integration method to establish a long run relationship between VAT and economic growth in Nigeria.

These inconsistencies mean that the value-added tax-growth dynamics in Nigeria has not been foreclosed. Therefore, this current contribution will help to expand the existing body of literature on the nexus between value-added tax and performance of real sector of Nigerian economy. In addition, this study simulates the current 50% hikes in Value Added Tax on the real sector of the Nigerian economy.

The theoretical framework for the study provides a structure for understanding the key variables that drives the real sector, and the linkages among the key macroeconomic variables as well as other sectors of the economy. Theoretically, models of the real sector largely transcend demand side approaches as in the traditional closed economy Keynesian framework to the Mundell-Flemming open economy macroeconomic models and supply side based production and cost function approaches. Several modifications in recent times have resulted in the widespread applications of the real business cycle and new Keynesian models with micro foundations. Quite importantly, the overriding structure of these models leads to the reflection of supply, demand price evolution processes within the real sector model. The characterization of these processes has been in the context of several theoretical underpinnings and intuition.

Aggregate Supply

The theoretical foundation of the aggregate supply embodies the view that the accumulation of savings is pertinent to enhancing capital formation that can boost productivity and economic growth. According to Meiselman (1982) the fiscal operations of government alters investment incentives, allocative efficiency and growth through adjustments to relative prices. In other words, Matlanyane (2005) underscores that the analysis of factor supply decisions can be useful in the evaluation of policies that are meant to bring about higher levels of capital formation. In the context of the neo-classical flexible accelerator model, investment decisions are determined mainly by the cost of capital, influenced by the tax policy and other incentives that may include a favourable macroeconomic environment. However, public and private investment demand must be accompanied by a concomitant supply of financial capital; otherwise, as noted by Boskin (1982), interest rates will go up to levels that will undermine further investment. In the literature, modelling the supply side output determination process depends on two approaches, namely, the production and the cost structure approaches. A typical specification of the production function follows a Cobb-Douglas production function of the form:

$$Y = Ak^{a} l^{1-a} \quad \text{......} 1$$

Where ***y*** is output, ***k*** and ***l*** are the capital stock and the level of employment, respectively. ***A*** represents the level of factor efficiency or technological progress, while ***a*** and ***1- a*** are the relative factor contributions of the stock of capital and employment, respectively.

Aggregate Demand

On the demand side, the open economy Keynesian income-framework has been the benchmark model in the output determination process. It underscores four main economic agents, namely, household, businesses, government and the rest of the world. The aggregate demand, therefore, sums up consumption, investment, government expenditure and trade balance associated with these economic agents and is represented by:

$Y_t = C_t + I_t + G_t + (X_t - M_t)$…………………………………………………..…2

Where Y_t represents the real GDP, C_t represents the real private consumption expenditure. It represents the real gross domestic investment, G_t represents the real government expenditure on domestic goods, X_t represents the real exports and M_t represents the real imports.

Materials and Methods

The Structure of the Model

This study builds a real sector model of Nigeria in line with the Central Bank of Nigeria's specification. The model comprises of fourteen behavioural equations and four identities with fourteen endogenous variables and seventeen exogenous variables. The Autoregressive Distribution Lag (ARDL) framework is used to estimate the behavioural equations in the model using annual time series data sourced from Central Bank of Nigeria Statistical (CBN) Bulletin, National Bureau of Statistic (NBS) bulletin, Federal Inland Revenue Services (FIRS) and World Development Indicators (WDI) for the period between 1994 and 2018. The study further established a scenario to simulate 50% adjustment in VAT on the real sector of the Nigerian economy. The validity of the model is checked through both within-sample and out-of-sample forecasts.

Model Specification

The study adopted a CBN (2013) Model for the Nigerian real sector. The modelling follows the Keynesian paradigm with structuralist modifications reflecting peculiar characteristics of the Nigerian economy. Modelling the real sector captures aggregate consumption, investment, income, and prices. Government fiscal activities are captured as exogenous variables to fully account for its relevance as an enabler of growth especially since it constitutes a significant part of gross output. The five major components of output – agriculture, industry, building and construction, wholesale and retail trade and services – were modelled to aid the forecasting of the real sector variables. In line with the CBN (2013) model for Nigerian real sector, stochastic models of the study are specified for estimation as thus;

$CONEX_t = ß_0 + ß_1 CONEX_{t-1} + ß_2 RGDP_{t-1} + ß_3 CPI_{t-1} + ß_4 INVEX_{t-1} + ß_5 RMT_{t-1} + ß_6 RER_{t-1} + ß_7 VAT_{t-1} + w_t$ …3

Where; $ß_0$ is the intercept, $ß_1 - ß_7$ are the parameter estimates and w_t is the error term

A'priori expectation is that; $ß_2$, $ß_3$ and $ß_4 > 0$ while $ß_1$ $ß_5$ $ß_6$ and $ß_7<0$

$CPI_t = ά_0+ά_1CPI_{t-1} + ά_2RER_{t-1}+ά_3PLR_{t-1}+ά_4CONEX_{t-1}+ά_5M2_{t-1}+ ά_6ASI_{t-1} + ά_7VAT_{t-1} +u_t$ ……,,,,,,,…..4

Where; $ά_0$ is the intercept, $ά_1 – ά_7$ are the parameter estimate and u_t is the error term

a'priori expectation is that, $ά_1 – ά_7 > 0$

$INVEX = ƕ_0 + ƕ_1INVEX_{t-1} + ƕ_2 RGDP_{t-1} + ƕ_3 PLR_{t-1}+ ƕ_4NER_{t-1} + ƕ_5CPI_{t-1}+ ƕ_6VAT_{t-1} + μ$ ………5

Where; $ƕ_0$ is the intercept, $ƕ_1 – ƕ_6$ are the parameter estimate and μ is the error term

A priori Expectation: $ƕ_1 – ƕ_2 > 0$ while, $ƕ_3 – ƕ_6 < 0$

$OINV_t = Þ_0 + Þ_1OINV_{t-1} + Þ_2 OIGDP_{t-1} + Þ_3FDI_{t-1} + Þ_4COP_{t-1} + Þ_5VAT_{t-1} +v_t$…………………………6

Where $Þ_0$ is the intercept, $Þ_1 – Þ_{54}$are the parameter estimates and v_t is the error term.

a'priori expectation is that, $Þ_1$- $Þ_5$ >0 while $Þ_5$ <0

$NOINV_t = ý_0 + ý_1 NOINV_{t-1} + ý_2INVEX_{t-1} + ý_3 GOVEX_{t-1} + ý_4 PLR_{t-1} + ý_5VAT_{t-1} + x_t$…………….... 7

Where; $ý_0$ is the intercept, $ý_1 – ý_4$ are the parameter estimate and x_t is the disturbance term

a'priori expectation is that, $ý_1$ - $ý_3$ >0 while $ý_4$- $ý_5 < 0$

$OEX_t = \hat{a}_0 + \hat{a}_1 OEX_{t-1} + \hat{a}_2RER_{t-1} + \hat{a}_3COP_{t-1} + \hat{a}_4WDOGDP_{t-1} + \hat{a}_5VAT_{t-1} + r_t$…………………..… 8

Where; $\hat{a}_0$ is the intercept, $\hat{a}_1$- $\hat{a}_5$ is the parameter estimate and r_t is the disturbance term

a'priori expectation is that; $\hat{a}_1$- $\hat{a}_3 > 0$ while $\hat{a}_4$ and $\hat{a}_5 < 0$

$NOEX_t = å_0 + å_1 NOEX_{t-1} + å_2CONEX_{t-1}+ å_3RER_{t-1} + å_4AGDP_{t-1} + å_5INDGDP_{t-1} + å_6VAT_{t-1} + z_t$…… 9

Where; $å_0$ is the intercept, $å_1 – å_6$ is the parameter estimate and z_t is the error term.

a'priori expectation is that; $å_1$- $å_5$> 0 while $å_6 < 0$

$OIMP_t = Ω_0+ Ω_1OIMP_{t-1} + Ω_2WDOGDP_{t-1} + Ω_3NER_{t-1} + Ω_4COP_{t-1} + Ω_5VAT_{t-1} + μ$…………….…10

Where; $Ω_0$ is the intercept, $Ω_1$- $Ω_5$ is the parameter estimate and $μ_t$ is the error term.

A priori Expectation: $Ω_1$ and $Ω_2 > 0$ while $Ω_3 – Ω_5 < 0$

$NOIMP_t = æ_0 + æ_1 NOIMP_{t-1} + æ_2CONEX_{t-1} + æ_3FDI_{t-1} + æ_4GCEX_{t-1}$ $æ_5VAT_{t-1} + h_t$………………..11

Where; $æ_0$ is the intercept, $æ_1$- $æ_5$ is the parameter estimate and h_t is the error term.

a'priori expectation is that, $æ_1 - æ_4$ >0 while $æ_5< 0$

$AGDP_t = ÿ_0 + ÿ_1 AGDP_{t-1}+ ÿ_2\mathit{CREPRIV}_{t-1}+ ÿ_3CONEX_{t-1} + ÿ_4GCEX_{t-1} + ÿ_5OIGDP_{t-1} + ÿ_6VAT_{t-1} + d_t$ ….12

Where; $ÿ_0$ is the intercept, $ÿ_1 – ÿ_6$ is the parameter estimate and d_t is the error term.

a'priori expectation is that; $ÿ_1$- $ÿ_4$> 0 while $ÿ_5$- $ÿ_6$ <0

$INDGDP_t=l_0+l_1INDGDP_{t-1}+l_2ENGCON_{t-1}+l_3CREPRIV_{t-1}+l_4INVEX_{t-1}+l_5VAT_{t-1}+l_6NER_{t-1}+c_t$ ……………………………………………………….………...13

Where; l_0 is the intercept, l_1- l_6 are the parameter estimate and c_t is the error term.

a'priori expectation is that, $l_1 – l_4 > 0$ while $l_{45} – l_6 < 0$

$BCGDP_t = R_0 + R_1\ BCGDP_{t-1} + R_2GCEX_{t-1} + R_3NER_{t-1} + R_4PLR_{t-1} + R_5VAT_{t-1} + e_t$…………14

Where; R_0 is the intercept, $R_1 – R_5$ are the parameter estimate and e_t is the disturbance term.

a'priori expectation is that, R_1 and $R_2 > 0$ while $R_3 – R_5 < 0$

$WRGDP_t = Y_0 + Y_1\ WRGDP_{t-1} + Y_2RER_{t-1} + Y_3GREX_{t-1} + Y_4RGDP_{t-1} + {}_5VAT_{t-1} + m_t$…………15

Where; Y_0 is the parameter estimate, Y_1- Y_5 are the parameter estimate and m_t is the error term.

a' priori expectation is that; $Y_1 – Y_4 > 0$ while $Y_5 < 0$

$SVGDP_t = F_0 + F_1\ SVGDP_{t-1} + F_2CONEX_{t-1} + F_3\ GOVEX_{t-1} + F_4\ PLR_{t-1} + F_5VAT_{t-1} + q_t$ ……..16

Where; F_0 is the intercept, $F_1 – F_5$ are the parameter estimate s and q_t is the error term.

a' priori expectation is that, F_1 - $F_3 > 0$ while F_4 and $F_5 < 0$

Identities

CON = PCON + GCON

INVEX = PRINV + PUINV

EXP = OILX +NOILX

IMP = OILM +NOILM

Explanation of Variables

Endogenous Variables

CONEX: Aggregate Consumption
CPI: Consumer Price Index
INVEX: Aggregate Investment
OINV: Oil Investment
NOINV: NON-Oil Investment
OEX: Oil Export
NOEX: Non-Oil Export
OIMP: Oil Import
NOIMP: Non-Oil Import
AGDP: Agriculture Output
INDGDP: Industrial Output
BCGDP: Building and Construction Output
WRGDP: Wholesale and Retail Output
SVGDP: Services Output

Exogenous Variables

RGDP: Real Gross Domestic Product
RMT: Remittances
RER: Real Exchange Rate
VAT: Value Added Tax
PLR: Prime Lending Rate
M2: Money Supply
ASI: All Share Index
NER: Nominal Exchange Rate
OIGDP: Oil Output
FDI: Foreign Direct Investment
COP: Crude Oil Prices
GOVEX: Government Expenditure
WDOGDP: World Oil Output
GCEX: Government Capital Expenditure
CREPRI: Credit to Private Sector
ENCON: Energy Consumption
GREX: Government Recurrent Expenditure

Identities

CON = PCON + GCON: Consumption (CON) is made up of Private consumption (PCON) and Government Consumption (GCON)

INVEX = PRINV + PUINV: Investment (INVEX) is made up of private investment (PRINV) and public Investment (PUINV)

EXP = OILX +NOILX: Export (EXP) is made up of oil export (OILX) and non-oil export (NOILX)

IMP = OILM +NOILM: Import is made up of oil import (OILM) and non-oil import (NOILM)

Result of the Findings

Unit Root Test

To check for stationarity properties of the data, Augmented Dickey Fuller Unit Root Test was performed and the result is presented in Table 1.

Table 1: Augmented Dickey Fuller Unit Root Test

Variables	T-Stat.	C-Values @5%	P-Values	I(d)	Variables	T-Stat.	C-Values @5%	P-Values	I(d)
CONEX	-6.94838	-2.99806	0.0000	I(1)	**VAT**	-5.59176	-2.99806	0.0002	I(1)
CPI	-5.08431	-2.99806	0.0005	I(1)	**NER**	-4.81473	-2.99806	0.0009	I(1)
INVEX	-4.42541	-2.99188	0.0029	I(0)	**PLR**	-3.57571	-2.99188	0.0144	I(0)
OINV	-3.07707	-2.99188	0.0420	I(0)	**M2**	-5.13923	-2. 99806	0.0005	I(1)
NOINV	-5.06034	-2.99806	0.0005	I(1)	**ASI**	-5.12563	-2.99806	0.0004	I(1)
OEX	-4.69927	-2.99806	0.0012	I(1)	**OIGDP**	-4.72372	-2.99806	0.0011	I(1)
NOEX	-3.24393	-2.99806	0.0302	I(1)	**INF**	-3.18939	-2.99188	0.0333	I(0)
OIMP	-3.61117	-2.99806	0.0137	I(1)	**FDI**	-5.48523	-2.99188	0.0014	I(0)
NOIMP	-5.36877	-2.99806	0.0003	I(1)	**COP**	-4.48354	-2.99806	0.0019	I(1)
AGDP	-3.13735	-2.99806	0.0377	I(1)	**GOVEX**	-3.1085	-2.99806	0.0439	I(1)
INDGDP	-5.12227	-2.99806	0.0004	I(1)	**RMT**	-3.89758	-2.99806	0.0072	I(1)
BCGDP	-4.11692	-2.99188	0.0052	I(0)	**WDOGDP**	-4.90941	-2.99806	0.0007	I(1)
WRGDP	-3.36811	-2.99188	0.0203	I(0)	**GCE**	-4.62762	-2.99806	0.0014	I(1)
SVGDP	-5.39472	-2.99806	0.0002	I(1)	**ENGCON**	-4.28072	-2.99806	0.0030	I(1)
RGDP	-3.15957	-2.99806	0.0399	I(1)	**CREPRI**	-3.00811	-2.99806	0.0490	I(1)
RER	-4.17919	-2.99806	0.0038	I(1)	**GREX**	-3.91156	-2.99806	0.0070	I(1)

Source: Author's computation using E-Views 9.0

The results of the Augmented Dickey-Fuller unit root test are presented in Table 1. The results show that, the first difference of most of the variables were taken before they became stationary thus they are integrated of order 1, that is, I(1). A few variables like Aggregate Investment (INVEX), Oil investment (OINV), Building and construction output (BCGDP) Wholesale and retail output (WRGDP), Prime lending rate (PLR), Inflation (INF) and Foreign Direct Investment (FDI) are found to be stationary without differencing their series, thus they are integrated at level, that is, I(0). Hence, it is necessary to check if long-run relationship exists among the variables. The autoregressive distributed lag (ARDL) Bounds test approach to co-integration is employed to investigate if these variables converge in the long-run. The choice of this approach is premised on the fact that, the series are a combination of I(0) and I(1) without the inclusion of I(2).

Autoregressive Distributed Lag (ARDL) Bounds Test Approach to Co-integration

The result of ARDL Bound test of Co-integration to determine the existence of a long-run relationship between the dependent and explanatory variables is presented in Table 2.

Table 2: Results of ARDL Bounds test approach to co-integration.

Endogenous Variables	Significance Levels	Lower Bound	Upper Bound	Computed F-Statistic	Cointegration Status
CONEX	10%	1.75	2.87	3.737298	Cointegrated
	5%	2.04	3.24		
CPI	10%	2.12	3.23	12.93527	Cointegrated
	5%	2.45	3.61		
INVEX	10%	1.81	2.93	1.987404	Inconclusive
	5%	2.14	3.34		
OINV	10%	1.9	3.01	5.258947	Cointegrated
	5%	2.26	3.48		
NOINV	10%	1.9	3.01	3.491282	Conintegrated
	5%	2.26	3.48		
OEX	10%	1.9	3.01	0.865332	Not Cointegrated
	5%	2.26	3.48		
NOEX	10%	1.81	2.93	7.429947	Cointegrated
	5%	2.14	3.34		
OIMP	10%	1.9	3.01	1.540355	Not Cointegrated
	5%	2.26	3.48		
NOIMP	10%	1.9	3.01	4.570667	Conintegrated
	5%	2.26	3.48		
AGDP	10%	1.9	3.01	2.111501	Inconclusive
	5%	2.26	3.48		
INDGDP	10%	1.81	2.93	2.637374	Inconclusive
	5%	2.14	3.34		
BCGDP	10%	1.9	3.01	8.357987	Cointegrated
	5%	2.26	3.48		
WRGDP	10%	1.9	3.01	8.110084	Cointegrated
	5%	2.26	3.48		
SVGDP	10%	1.9	3.01	3.311693	Inconclusive
	5%	2.26	3.48		

Source: Author's computation using E-Views 9.0

The rule of ARDL Bounds test of co-integration states that; the null hypothesis be rejected if the value of the computed F-statistic is greater than the upper bounds value and accepted if the F-statistic is less than the lower bounds value. The ARDL co-integration test will be said to be inconclusive should the computed F-statistic falls between the lower and upper bound. The estimated result shows that, the null hypothesis for Aggregate Consumption (CONEX), Consumer Price Index (CPI), Oil Investment (OINV), Non-oil Investment (NOINV) Non-oil Export (NOEX) Non-oil Import (NOIMP), Building and Construction Output (BCGDP) and wholesale and Retail output (WRGDP) models should be rejected since the value of their computed F-statistic is greater than the upper bound critical value at 10% and 5% level of significance. This implies that, there is a long-run relationship among the endogenous variables and their respective explanatory variables. Hence, a long run relationship exists among the endogenous variables and Value added Tax (VAT) in Nigeria. On the other hand, the null hypothesis for oil Export (OEX) and Oil Import (OIMP) models should be accepted since the value of their computed F-statistic is less than the lower bound critical value at 10% and 5% level of significance indicating that, a long-run relationship does not exist among the endogenous variable and its explanatory variables. However, the null hypothesis for aggregate investment (INVEX), Agricultural output (AGDP), Industrial Output (INDGDP) and Services Output (SVGDP) models indicated an inclusive result since their computed F-statistic falls between their lower and upper bound at 10% and 5% critical values respectively. The ARDL Error Correction Model for short –run coefficients and their long run coefficients are further estimated and presented in Table 3.

Presentation and Analysis of Pre- Forecast Impact of the Estimated Model

The pre-forecast estimated results of the autoregressive distribution lag (ARDL) model for each of the endogenous variables using the actual VAT data are presented and interpreted. Schwarz Criterion (SC) and Akaike Criterion (AC) were used to select the optimal lag for the models. The results of the Short- run Error Correction coefficients and long-run coefficients for each model are presented in Table 3.

Table 3: Result of the Short-Run and Long-Run ARDL Model Estimates

Regressors	**Short-Run Coefficients**	**Long-Run Coefficients**	**Regressors**	**Short-Run Coefficients**	**Long-Run Coefficients**
Aggregate Consumption Model			**Non-Oil Investment**		
C		3.000011	C		0.10638
RGDP(-1)	-0.460008	5.630008	GFCF(-1)	-3.140010	-3.12001
CPI(-1)	1.850011	1.710011	PLR(-1)	22.73888	0.21394
INVEX(-1)	0.321272	0.301447	GOVEX(-1)	-1.717530	-2.37464
RMT(-1)	0.177527	0.136927	VAT(-1)	0.429620	0.13728
RER(-1)	6.070010	8.920010	ECT(-1)	-0.612700	
VAT(-1)	0.877010	0.114001	Adj. R^2	0.902740	
ECT(-1)	-0.336880		D-W stat	1.854694	
Adj.R-squared	0.976610		**Oil Export Model**		
D-W stat	2.035374		C		-0.39142
Consumer Price Index Model			RER(-1)	0.43429	0.44941
C		7.996107	COP(-1)	-0.37458	-0.40714
RER(-1)	0.05510	-0.12325	WDOGDP(-1)	0.24651	0.26124
PLR(-1)	-0.14677	0.091106	VAT(-1)	0.27732	0.29887

CONEX(-1)	6.010013	-3.48014
M2(-1)	0.004592	-0.00152
ASI(-1)	4.720050	-1.43005
VAT(-1)	0.110500	0.023657
ECT(-1)	-0.549870	
Adj.R-squared	0.985060	
D-W stat	1.817299	
Aggregate Investment Model		
C		0.613001
PLR(-1)	0.159011	0.165001
RGDP(-1)	-0.295008	0.370000
NER(-1)	-0.402001	0.976000
CPI(-1)	-0.173001	0.616001
VAT(-1)	0.810010	0.103001
ECT(-1)	-0.392170	
Ad R-squared	0.750300	
D-W Stat.	2.540456	
Oil Investment model		
C		0.712412
OIGDP(-1)	0.26082	0.105360
FDI(-1)	-0.01018	-7.57006
COP(-1)	-0.18378	0.41566
VAT(-1)	0.13112	0.10408
ECT(-1)	-0.74224	
Ad R-squared	0.89732	
D-W Stat.	0.85457	
Agricultural Output Model		
C		0.71798
CONEX(-1)	9.85011	4.99001
GCEX(-1)	-2.02854	-1.79618
OIGDP(-1)	-0.55115	-0.42744
VAT(-1)	0.42788	0.197651
ECT(-1)	-0.27801	
Ad. R-squared	0.98619	
D-W Stat.	1.855506	
Building and Construction Output Model		
C		0.16114
GCEX(-1)	-0.81063	-0.63113
NER(-1)	-0.74790	-2.96582
PLR(-1)	6.28752	7.203277
VAT(-1)	7.68106	2.665986

ECT(1)	-0.31407	
Adj. R^2	0.86261	
D-W stat	2.02218	
Non-Oil Export Model		
C		-0.532899
CONEX(-1)	-2.210011	-1.800011
RER(-1)	0.176586	1.229294
AGDP(-1)	0.082452	0.096199
INDGDP(-1)	0.091080	0.001785
VAT(-1)	0.553903	1.799099
ECT(-1)	-0.036673	
Adj. R^2	0.906017	
D-W stat	2.003578	
Oil Import Model		
C		-0.150460
WDOGDP(-1)	-0.01013	0.017677
NER(-1)	6.926979	9.966514
COP(-1)	-7.0737	-7.49473
VAT(-1)	8.854468	11.92872
ECT(-1)	-0.120033	
Adj. R^2	0.873347	
D-W stat	1.883949	
Non-Oil Import Model		
C		0.905802
CONEX(-1)	4.29011	8.630012
FDI(-1)	4.60007	2.670007
GCEX(-1)	-1.13848	-1.142090
VAT(-1)	0.12496	0.143534
ECT(-1)	-0.54846	
Adj. R^2	0.97485	
D-W stat	2.25106	
Industrial Output Model		
C		0.36597
ENGCON(-1)	-0.032279	-0.22931
CREPRIV(-1)	0.514247	0.27198
GFCF(-1)	-2.17E-10	-2.10001
VAT(-1)	-0.15090	5.88089
NER(-1)	0.30667	0.17034
ECT(-1)	-0.25885	
Adj. R^2	0.92420	
D-W stat	1.630484	

ECT(-1)	-0.36602	
Ad R-squared	0.83810	
D-W Stat.	1.533402	
Service Output Model		
C		0.161371
CONEX(-1)	1.370100	9.090011
PLR(-1)	-0.138586	-0.13590
GOVEX(-1)	0.738936	-0.21256
VAT(-1)	0.199952	3.102722
ECT(-1)	-0.674463	
Ad R-squared	0.994420	
D-W Stat.	1.228950	
Wholesale and Retail Trade Output Model		
C		0.605269
RER(-1)	-4.841910	-0.149508
GREX(-1)	0.460464	0.235115
RGDP(-1)	0.245348	0.203306
VAT(-1)	-0.317003	-0.368428
ECT(-1)	-0.315178	
Adj. R^2	0.97681	
D-W Stat.	1.426920	

Source: Author's computation using E-Views 9.0

The estimated result of the of the Short-Run and Long-Run ARDL Model in Table 3 reveals that the estimated error correction coefficient of endogenous variables are negative and significant at 5 per cent level of significance and shows that, the speed of adjustment at which the previous year's shock of the explanatory variables converges back to the long-run equilibrium in the current year is approximately 34 percent for CONEX, 55 percent for CPI, 39 percent for INVEX, 74 percent for OINV, 61 percent for NOINV, 31 percent OEX, 37 percent NOEX, 12 percent OIMP, 55 percent for NOIMP, 27 percent for AGDP, 26 percent for INDGDP, 37 percent BCGDP, 32 percent for WRGDP and 20 percent for SVGDP. In addition, the high adjusted R- Square in each of the model estimated show that, explanatory variables of the models explain the variation in the endogenous variables while the value of Durbin-Watson coefficient reveals absent of serial correlation in the models.

The estimated result further indicated positive relationship between Value Added Tax and the endogenous variables used in the models both in the short and at long-run except for Wholesale and Retail Output. The findings corroborate with findings of John and Suleiman (2014), Izedonmi and Jonathan (2014), Nasiru, Haruna and Abdullahi (2016), Ifurueze and Ekezie (2014), Ezeji and Peter (2014), and Fredrick and Okeke (2013). This shows that the pre-forecast result using the actual VAT data increases real sector's variables for the period of study. This result is plausible because VAT is a consumption tax and its burden is bear by final consumers, hence increases aggregate consumption expenditure for the economy. Increase consumption increases Consumer Price Index which encourages aggregate investment in the economy and promotes international competitiveness since VAT do not increase the cost of production but is refunded on exports and so has no effect on the ability of domestic firms to export thereby promoting investment. The increase in investment resulted to increase in the real outputs of the economy such as; agriculture, industries, building and construction and services. The adverse relationship between VAT and Wholesale and Retail output could however be attributed to the weak purchasing power of average Nigerians over the years.

Model Forecast Evaluation and Simulation

A macro econometric model Approach is usually used to forecast the performances of macro variables in a model. To solve a macro model, the solution for forecast is the static and dynamic solutions. The macro model was solved using the static solution, which is most appropriate for predicting a one-step ahead forecast over historical data. The outcome of the static solution indicates that, values of the endogenous variables up to the previous period are used each time the model is solved. The predictive accuracy of the model is crucial because it shows the closeness of the solution values of each equation in the models to the time paths of their actual values. The model is evaluated for both within-sample and out-of-sample predictive performance.

Within-Sample Performance

Time series data ranging from 1994 to 2018 is used to generate a static solution for the model. To validate the estimated model, fourteen graphs of the endogenous variables were examined and presented as figure 1-14 in Appendix I. The figures show that, the predicted series are very close to actual series except for Aggregate Investment (INVEX), Oil export (OEX) and Oil Import (OIMP) which have few gaps between actual and predicted series. This is an indication that, simulated values were able to replicate the critical turning points of the historical data since the simulated values do not deviate much from the actual values. The closeness of the predicted series to the actual series indicates a good forecasting power of the model. It is evidence that, for a one-step and multi-step ahead forecast, the model performs well thus, suggesting that the simulation result will be valid for policy prescriptions.

Out-of-Sample Performance

The focus of the out-of sample forecast is to compare the forecast figure of each of the endogenous variables with their actual figures. This will help ascertain the accurate predictive performance of the models. To examine out-of-sample performance of the models, time series data spanning the period between 1994 and 2018 are estimated to generate static solution of the model and one-step ahead out-of-sample predictions were made. The statistics used to evaluate the predictive performance of a model are Mean Absolute Errors (MAE), Root Mean Square Errors (RMSE); which are the gaps between the actual and the forecasted values of the endogenous variables. The lower the RMSE and MAE, the better the predictive power of the models. Theil inequality coefficient indicates the degree of fitness of the models and lies between 0 and 1. If Theil inequality coefficient is zero; it indicates a perfect fit meaning that, the actual and forecasted values are same but if Theil inequality is one, it indicates that, the predictive power of the model will be worst. These statistics are presented in Table 4.

Table 4: The statistics used to evaluate the predictive performance of models

Endogenous Variables	Mean Absolute Error (MAE)	Root Mean Absolute Error (RMAE)	Theil inequality Coefficient
CONEX	1.621	2.271	0.035
CPI	4.554	7.198	0.037
INVEX	1.451	2.211	0.186
OINV	1.087	1.311	0.026
NOINV	1.338	2.079	0.095
OEX	1.183	1.594	0.097
NOEX	1.008	1.331	0.109
OIMP	2.445	3.582	0.108
NOIMP	3.717	4.772	0.046
AGDP	6.221	7.836	0.032
INDGDP	1.111	1.611	0.076
BCGDP	1.492	2.091	0.054
WRGDP	3.987	7.125	0.034
SVGDP	7.722	1.066	0.025

Source: Author's Computation from E-Views

Table 4 presents the statistics used to evaluate the predictive performance of the model for all the endogenous variables and it shows that the errors are considerably small indicating that the predictive powers of the models are satisfactorily. In the same vein, Theil inequality coefficients are neither zero none one which further indicates high predictive capacity of the models.

Simulation Results

The study employed one policy variable for the simulation; fifty percent increase in Value Added Tax (5% to 7.5%). The actual figures of this policy variable are inserted into the model and the result of the simulation predicting the impact of the increase in VAT for four years (2020-2023) is presented in Table 5.

Table 5: Simulation Result of the Policy Scenario

Endogenous Variables	Years	50% Δ in VAT	Endogenous Variables	Years	50% Δ in VAT
CONEX	2020	-1.6802	OIMP	2020	-0.3548
	2021	-1.6754		2021	0.0749
	2022	-1.5534		2022	-0.3263
	2023	-1.7618		2023	-0.1091
CPI	2020	-0.5203	NOIMP	2020	-0.1065
	2021	-0.5426		2021	-0.0970
	2022	-0.4729		2022	-0.2093
	2023	-0.4522		2023	-0.0656
INVEX	2020	-1.0812	AGDP	2020	-0.2558
	2021	-0.0865		2021	-0.2427
	2022	0.3609		2022	-0.2046
	2023	0.4856		2023	-0.2590
OINV	2020	-2.6765	INDGDP	2020	-0.4175
	2021	-2.6968		2021	-0.3329
	2022	-2.6373		2022	-0.2048
	2023	-2.6544		2023	-0.3324
NOINV	2020	-0.3394	BCGDP	2020	-0.1740
	2021	-0.1877		2021	-0.0178
	2022	-0.1522		2022	-0.1152
	2023	0.1227		2023	-0.1626
OEX	2020	-0.3870	WRGDP	2020	-0.2045
	2021	-0.0755		2021	-0.1761
	2022	0.1208		2022	-0.1553
	2023	-0.2411		2023	-0.2185
NOEX	2020	0.14930	SVGDP	2020	-0.2596
	2021	-0.2478		2021	-0.3270
	2022	-0.3400		2022	-0.0921
	2023	0.18498		2023	-0.2583

Source: Author's Computation using E-views

Using stochastic and static simulation, results in table 5 reveal that, 50% increase in Value added tax will reduce aggregate consumption approximately by1.68%, for the year 2020 and 2021, 1.55% and 1.76% for the year 2022 and 2023 respectively. This shows that, there will be an inverse relationship between the 50% increase in value added tax and consumption in Nigeria. It further reveals an inverse relationship between increase in VAT and CPI as 50% increase in VAT will reduces CPI approximately by 0.52%, 0.54%, 0.47% and 0.5% for the year 2020, 2021, 2022 and 2023 respectively. This is plausible due to the weak purchasing power of consumers in Nigeria.

The simulation result also shows that 50 percent increase in VAT will reduce aggregate investment by 1.08 percent in the 2020 and 1.09 in the year 2021 while in the year 2022 and 2023; 50 percent increase in VAT will increase aggregate investment by 0.36% and 0.49% respectively indicating a positive relationship. Oil investment however indicated inverse relationship with 50 percent increase in VAT throughout the predictive periods of the study. Non-Oil Investment however indicated an inverse relationship with 50 percent VAT increase in Nigeria for the period of 2020 to 2022 while the 50% VAT hikes will increase Non-Oil investment by 0.12 percent in 2023.

Furthermore, the estimated result also reveals that, Oil export will be reduce by 0.39%, 0.08% and 0.24% for the year 2020,2021 and 2023 respectively due to 50 percent hikes in VAT while it will increase by 0.12% for the year 2022. Non-Oil export will however increase by 0.15% in 2020, reduce by 0.25% in 2021, 0.34% in 2022 and increase by 0.18% in 2023.

Similarly, both oil and non-oil import will be adversely affected by 50% hike in VAT throughout the predictive periods except Oil Import which will increase approximately by 0.07% in 2021. In the same vein, all the output variables in the economy including; AGDP, INDGDP, BCGDP, WRGDP and SVGDP will be adversely affected throughout the predictive period due the 50 percent hike in VAT as shown in table 5. The results of the forecast of the 50% increase in VAT on real sector of the Nigerian economy clearly indicated that, if the new VAT hikes is implemented without necessary measures put in place to argument consumers' income and reduce the cost of doing business, the 50% hikes will be counter-productive for the economy. This is in line with the conclusion of Alarudeen (2019) who affirmed that government can implement an increase in the rate of VAT to ensure that the final rate of 15% is achieved in a way that satisfies the public (households and business community) and also ensures maximum revenue generation for the government.

Conclusion

This study investigated value added tax (VAT) and the real sector performance of the Nigerian economy using macro econometric approach. The model is estimated and simulated using VAT policy change of the federal government to describe time paths of the endogenous variables of the system of equations specified in the study. The estimated result reveals that, the pre-forecast VAT value has positive relationship with real sector variables included in the model except for Whole sale and Retail output in Nigeria. However, the simulated results indicated an adverse relationship between 50 percent increase in Value Added Tax (TAX) and the real sector's variables included in the model. It is therefore concluded that, the current purchasing power level of average Nigerians is not robust enough to support the federal government VAT increase policy. Considering the fact that, VAT is a consumption tax and its burden is bear by final consumers, the current income level of average Nigerians cannot trigger growth in the real sector variables in Nigeria for the predictive period of the study.

Recommendations

Based on the findings of the study, the following recommendations are made;

i. Conscious effort should be made by all tiers of government and the private sector to sincerely implement the new minimum wage in order to improve the purchasing power of Nigerian workers.

ii. In addition, there is a need to massively invest and improve the basic infrastructures and social amenities such as electricity, road network, hospitals, schools, water system etc. This will reduce the cost of living and doing business to improve the real income of the economy.

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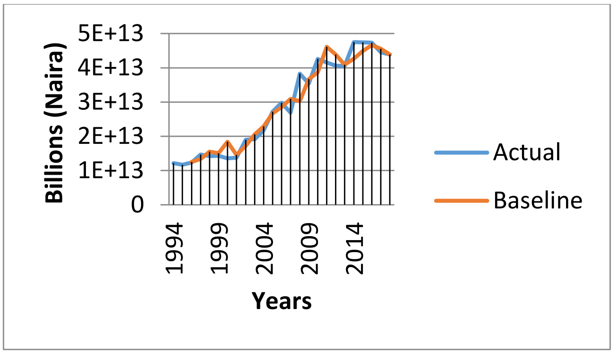
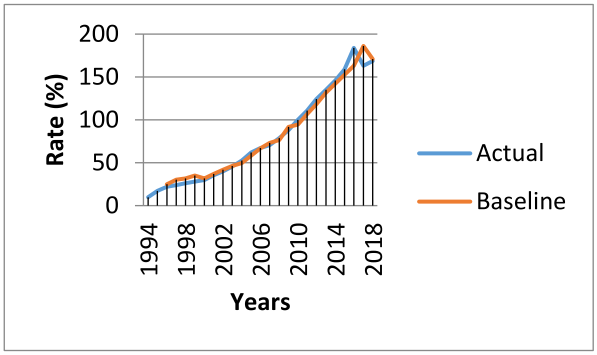
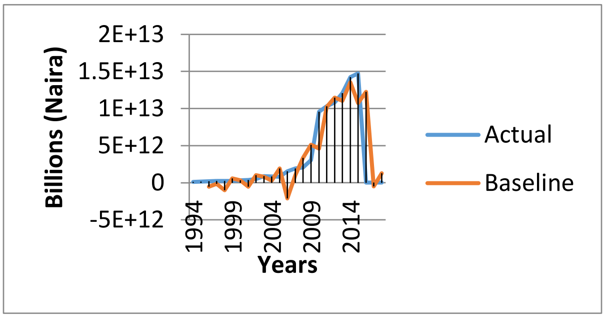
Appendix I: Static Solution for the Model validation



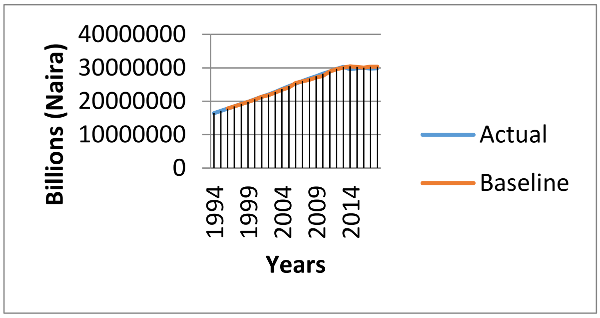
Source: Author's Extraction from E-Views
Figure1: Baseline simulation for CONEX



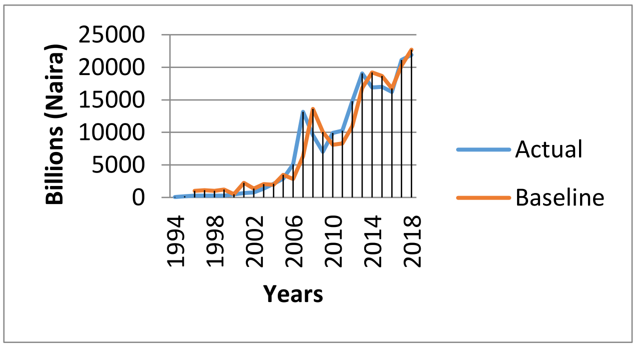
Source: Author's Extraction from E-Views
Figure 2: Baseline simulation for CPI



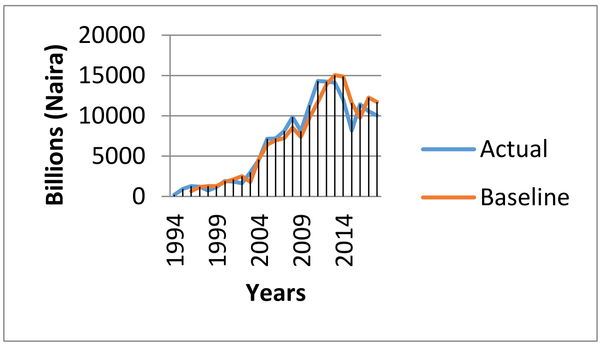
Source: Author's Extraction from E-Views
Figure 3: Baseline simulation for INVEX



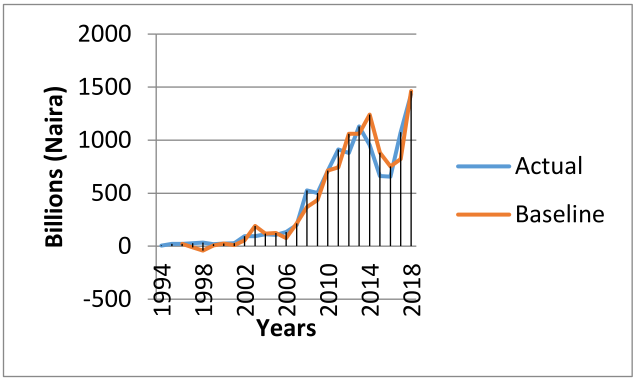
Source: Author's Extraction from E-Views
Figure 4: Baseline simulation for OINV



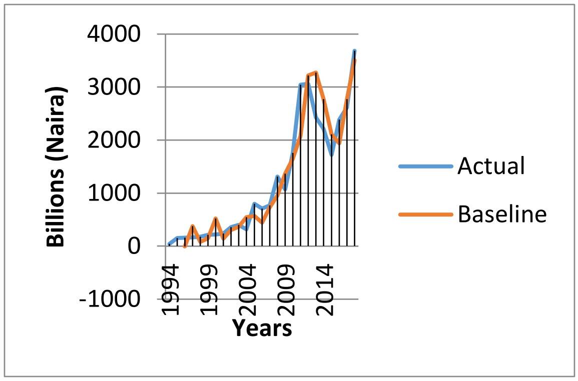
Source: Author's Extraction from E-Views
Figure 5: Baseline simulation for NOINV



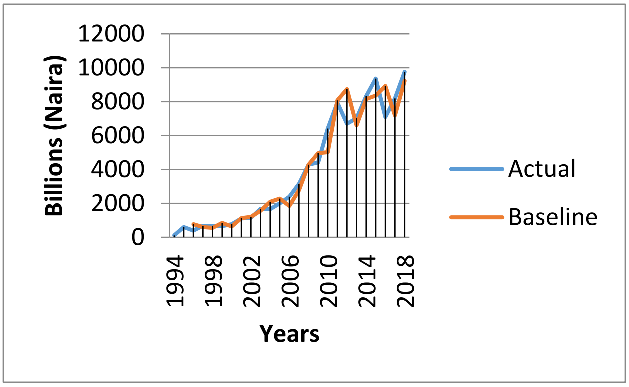
Source: Author's Extraction from E-Views
Figure 6: Baseline simulation for OEX



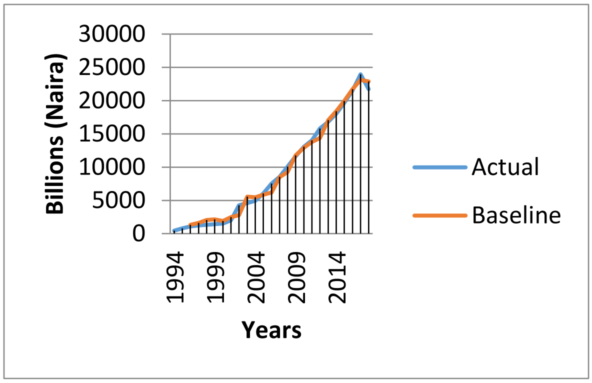
Source: Author's Extraction from E-Views
Figure7: Baseline simulation for NOEX



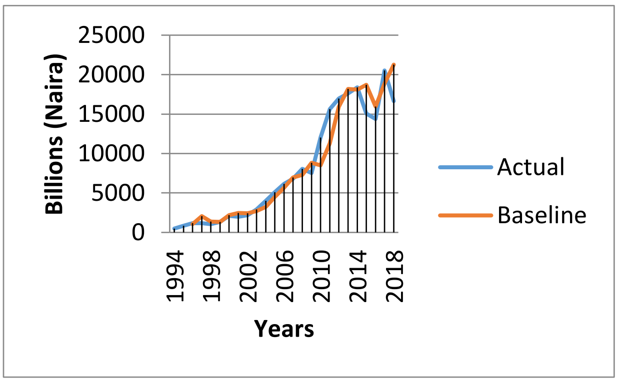
Source: Author's Extraction from E-Views
Figure 8: Baseline simulation for OIMP



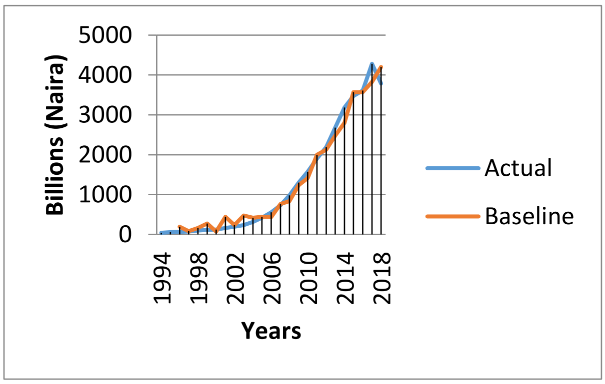
Source: Author's Extraction from E-Views
Figure 9: Baseline simulation for NOIMP



Source: Author's Extraction from E-Views
Figure10: Baseline simulation for AGDP



Source: Author's Extraction from E-Views
Figure11: Baseline simulation for INDGDP



Source: Author's Extraction from E-Views
Figure12: Baseline simulation for BCGDP

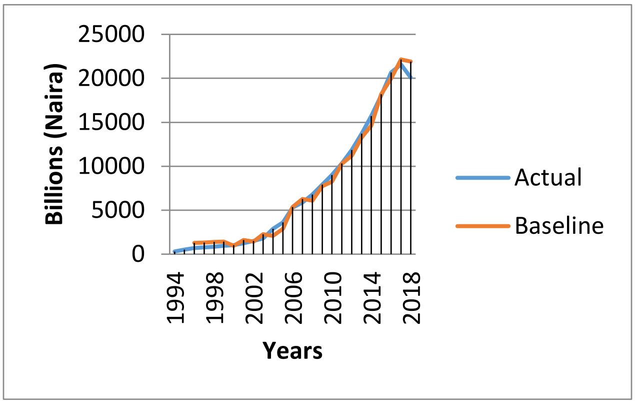


Figure13: Baseline simulation for WRGDP

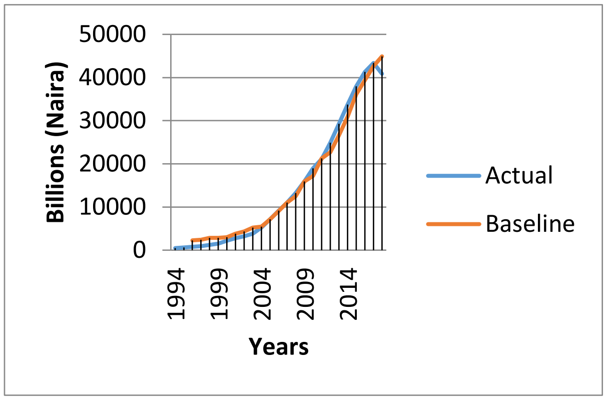


Figure14: Baseline simulation for SVGDP