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AGGREGATE DEMAND AND FISCAL POLICY ADJUSTMENT IN NIGERIA: EVIDENCE FROM TWO STAGE LEAST SQUARED AND SIMULATION EXPERIENCE

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Abstract
This study examined the shocks in aggregate demand to fiscal policy adjustment in Nigeria using time series annual data from 1986-2020.The study constructs simple structural macroeconomic models made up of two blocks: consumption and investment sectors that contain seven variables; four are behavioural equations and two are identities. The models were estimated and analyzed using Two Stage Least Square methods and a simulation experiment was also conducted on the simple structural macroeconomics models. The study finds that fiscal policy variables (Tax, government spending and public debt) have significant influence on aggregated demand in Nigeria during the period under investigation. Similarly, the simulation shows magnificent tracking power of the actual from the baseline simulation as the nature of the movement suggested. The study, therefore, recommends that the government should encourage expansionary fiscal policy by expanding public spending channeled to infrastructure and other sectors of the economy like commercial farming and creation of utility. These have to been done through proper monitory as funds usually diverted to private pockets, decrease in taxes as it expands the purchasing power of the citizens which influence aggregate demand and output.

Keywords: *Aggregate Demand, Government Spending, Taxation, Public Debt, Simulation*

1. Introduction

Fiscal policy tools are used in addressing demand shocks in the economy (CBN, 2017). Fiscal policy instruments are used in manipulation of government spending, taxes, subsidy and debt to control total demand variables in the economy (Ahmad, 2008). Fiscal policy is implemented by the fiscal authorities, the Ministry of Finance (Abdulazeez, 2016). On the basis of economic principles, fiscal policy is used to solve economic problems by expanding aggregate demand

components and consequently economic growth (Khaysy& Gang, 2017). Fiscal policy involves the expansion or reduction in public spending and or taxation with the motives of adjusting aggregate demand (Kibiwot & Chernuyot, 2012). To embark on expansionary policy, there should be reduction in taxation which means contraction in either tax expenditure or personal income tax. These reductions in taxes will increase the disposable income and expand consumption. In the same vein, fall in corporate profit taxes will lead to more profit and reinvestment, hence, leading to investment growth, all other things remaining unchanged (Ghulam, 2014). These will expand the aggregate demand. In a clearer form, reduction in taxes boost consumption, expand investment and finally increase aggregate demand (Joab &Daney, 2017).

On the other hand, expansion in public spending will result in growth in total demand (Lee & Gordon, 2005; Koeda, 2008; Miron, 2013). Public debt may negatively affect investment through rise in cost of borrowing resulting from government debts. The finances of government deficit through internal borrowing will decrease the loanable funds that should be channeled to private investment. This affects the request for loanable fund bigger than its supply (International Monetary Fund, 2009). The increased borrowing results in rise in cost of borrowing and decreases the level of private investment. In the same vein, foreign debt may negatively affect private investment. This happens mainly in countries where private sector is less dominant. Increased government foreign debt decreases private sector opportunity for external borrowing because government foreign debt expands the danger of financing the private sector. It limits the accessibility to external credits, and reduces the price of accessing the external fund, thereby decreasing private access to foreign markets (International Monetary Fund, 2009).

Fiscal policy in Nigeria is aimed at influencing aggregate demand to stabilize economic growth. Various fiscal strategies have been adopted by the federal ministry of finance over the years to influence aggregate demand and economic growth. Despite the manipulation of fiscal variables in Nigeria, the problem affecting its total demand continues to expand. Such problems include low investment, low consumption, and high unemployment rate, high importation of consumable and capital goods, and low exportation, among others. *"*These observed problems are responsible for the fast reduction in the total demand components (private investment, private consumption, government consumption and export-import) and consequently economic growth of Nigeria*".*

In Nigeria, the conflict over which tool to use is negatively affecting the economy in terms of stimulating macroeconomic variables such as individual consumption, individual investment, government consumption and export. Finally, a decision in Nigeria about using fiscal policy tools to achieve macroeconomic policy is, in part, a political decision rather than a purely economic one. These constitute low aggregate demand in Nigeria.

This study examined the magnitude of shocks in aggregate demand to fiscal policy adjustment in Nigeria and performed simulation experiment. The paper is structure into five sections: The first section is the introduction, literature review in section two, methodology in section three and discussion and analysis of results in section four. The last section covers the conclusion and recommendations of the study.

2. Literature Review

2.1 Conceptual Issues: Aggregate Demand and Fiscal Policy

O'Sullivan and Steven (2003) defined aggregate demand as the total demand by individual and group within a specific period of time. It can be in like manner being seen as the measure of authentic gross domestic product (GDP) mentioned at different worth levels (Sexton, Fortura & Peter, 2005). All out premium (AD) is resolved with a comparable condition for evaluating an economy's all out national yield (GDP): AD = C + I + G + (X – M), where C = Consumer spending on items and adventures; I = Investment spending on business capital product; G = Government spending on open product and endeavors; X = Exports and M = Imports.

Fiscal policy has to do with the use of revenue collected by the government (mainly taxes) and spending to expand economic activities (O'Sullivan & *Steven, 2003)*. According to Okonjo(2003), fiscal policy has to do with adjustment in public expenditure and taxes to expand economic growth. Fiscal and monetary policies are connected and any adjustment in one will affect developments in the other. Undoubtedly, fiscal policy is a key to the progress of any economy, as government's authority to adjust tax and to spend affects the individual income of the people, corporations and business environment (Okonjo, 2003).

2.2 Empirical Literature Review

Joab and Daney (2017) examine the impulse on the aggregate demand in Bolivia through the coordination of the monetary and fiscal policy using the structure of a

Dynamic Stochastic General Equilibrium Model (DSGE). The findings shows that cost push inflation, given that for exogenous inflationary effects, the monetary authorities' response is to raise the interest rate and by the fiscal policy with maintaining a public investment Contractive to avoid even greater inflationary effects.

Emad (2017) analysed the short-term effects of fiscal policy shocks on real gross domestic product in Egypt using Structural vector autoregressive model and impulse response function spanning the period 1985-2015. The results show that public spending shock has a negative impact on real gross domestic product, taxation has a positive but weak impact on real gross domestic product and the impulse response functions were statistically insignificant.

Nursini (2017) evaluates the effect of fiscal policy and trade openness on economic growth in Indonesia for the period 1990-2015 using vector auto-regressive model. The results indicate that public expenditure on infrastructure and human resources has positive and significant effect on economic growth. Routine public expenditure has negative and insignificant effect on economic growth. Trade openness has positive and significant effect on economic growth.

Nwankwo, Kalu, and Chiekezie (2017) examine the impact of fiscal policy on economic growth in Nigeria spanning the period of 1970-2014 using co-integration and error correction (ECM) models. The result of the unit root test shows that public capital spending, revenue from oil, gross domestic product and revenue from tax were stationary at first difference I(1), while public recurrent spending was stationary at levels at levels I(0). The co-integration result shows that there are 3 co integrating equations at 5 per cent level of significance. This indicates that there is a long-run equilibrium relationship between fiscal policy and economic growth.

Wissem (2016) examines the threshold effect of fiscal policy on private consumption in Tunisia using a threshold regression model spanning the period 1975-2010. The results show that public spending and revenue from tax have effects on consumption, when private debt/GDP ratio is below 48 %. The study shows that private consumption reacts in non-linear fashion to changes in fiscal policy.

Joseph**,** Tochi-Nze, and Ekundayo (2016) analysed the nexus between fiscal policy and private investment in five selected West African countries using fixed effect model for panel data ordinary least square model for the period 1993-2014. The findings show the existence of a significant crowding-in effect of public capital spending and revenue from tax while revenue from non-tax indicates a crowding out effect. Recurrent spending and external debt also indicate crowding-out effects but were insignificant. The accelerator effect of output growth was also found to be insignificant across the countries over the study period.

Ejuvbekpokpo, Sallahuddin and Clark (2015) examine the impact of fiscal policy on investment expenditure in Nigeria covering the period of 1970-2010 using ordinary least squares (OLS) method. The findings show that fiscal policy has a significant impact on investment spending in Nigeria while public spending and gross domestic product have significant impact on investment, but corporate income tax has a positive, instead of a negative impact on investment spending in Nigeria.

From the previous studies reviewed, most of the study uses ordinary least squared regression model for estimation and analysis, some studies used vector autoregressive and some structural vector autoregressive models which are more superior to the ordinary least squared regression model in terms of reliability of the result. In this study, two stages least squared regression model which permit corrected errors and does not need normal distribution and it is less sensitive to specification errors than are the full information estimator. Therefore, it is not necessary to test for stationary and normality data before estimating the model. In addition, none of the studied reviewed performed simulation to test the reliability of the model in predicting the movement of the endogenous variables.

2.3 Theoretical Literature

The Keynesian Theory

Keynes (1936) propounded the Keynesian theory. This is a theory that says the government should increase demand to boost growth. Keynes described his premise in "The General Theory of Employment, Interest, and Money." It was revolutionary. First, it argued that government spending was a critical factor driving Aggregate demand. That meant an increase in spending would increase demand.

Keynes (1936) believes consumer demand is the primary driving force in an economy. As a result, the theory supports the expansionary fiscal policy. Its main tools are government spending on infrastructure, unemployment benefits, and education. A drawback is that overdoing Keynesian policies increases inflation (Keynes, 1936). The Theory says that advocating for expansion in public spending leads to increase in local output**.** Deficit expenditure moves the economy in the short-run by making family units feel better off, thus expanding total consumption by government and private sectors (Keynes, 1936). As aggregate demand increases, fiscal deficit will have positive effect on macroeconomic activity, thereby expanding savings and capital formation. Public spending in an underemployed economy add to aggregate demand at prevailing prices and interest rates with no calculation necessity for private family units to offset (displace or crowd-out) their own purchases as long as public goods are not close substitutes for private goods. The resulting speedy growth of nominal GDP would produce faster growth of real GDP and demand would thus create its own supply, in stark contrast to Say's Law.

Keynes (1936) recognize**s** the possibilities of public spending crowding-out private (investment) spending through growth in cost of credit (interest rate), hence the suggestion for fiscal deficit to be implemented only during a depression. Keynes (1936) further posit that fiscal deficits could have a negative impact on the external sector, reflected through trade deficit, but only if the domestic economy is unable to absorb the additional liquidity through an expansion in output. Hence, if the supply of output does not expand in response to the deficit, the surplus spending would only add to the level of imports, thereby resulting in a trade deficit and subsequent decrease in the exchange rate: "the twin-deficits" hypothesis.

One of the major criticisms of the Keynesian theory was by the supply-side economists that increasing business growth, not consumer demand, will boost the economy. They agree the government has a role to play, but fiscal policy should target companies. They rely on tax cuts and deregulation (*Wanniski, 1978).* Despite the criticism of the Keynesian theory, the theory better explained the linked between fiscal policy and aggregate demand that other theories such as the classical theory.

3. Methodology

The study used the macro-econometric model (MEM) in analyses. This macro-econometric model has two types of equations that explain the economy. The

behavioural equations are estimated from time series data while the identities equations are hold by definition.

3.1 Model Specification

The study constructs a model with two blocks, consumption block and the investment block which contains seven variables. The variables are connected with one another through four behavioural equations and two identities. General structure of the model is briefly explained here.

3.1.1 Consumption Sector Block

Total consumption comprises of private consumption and government consumption

$C_t = P_t^C + G_t^C$ ……1

$P_t^C = a_0 + a_1 Tax_t + a_2 GE_t + a_3 PD_t + \mu_{t1}$ ……...2

$G_t^C = b_0 + b_1 Tax_t + b_2 GE_t + b_3 PD_t + \mu_{t2}$ ……..3

Where C = Total consumption, P^C = Private Consumption, G^C = Government Consumption

GE = Government Expenditure, Tax = Taxation and PD = Public debt. A priory expectation for consumption sector block parameters is: Positive parameters: α_2, b_2, and Negative parameters: α_1, α_3, b_1, b_3

3.1.2 Investment Sector Block

Total investment consists of investment by private individuals (P^I) and investment by the government (G^I) $I_t = PI_t + GI_t$ ….....4

$P_t^I = a_0 + a_1 Tax_t + a_2 GE_t + a_3 PD_t + \mu_{t1}$ ……...5

$G_t^I = b_0 + b_1 Tax_t + b_2 GE_t + b_3 PD_t + \mu_{t2}$ ……...…6

Where I = Total investment, P^I = Private Investment, GE = Government expenditure, Tax = Taxation, PD = Public debt. A priory expectation for consumption sector block parameters is: Positive parameters: α_2, b_2, *and* Negative parameters: α_1, α_3, b_1, b_3,

3.2 Sources of Data

Annual time series data spanning the period 1986-2020 were used for the estimation. The detail of data description with respect to variables, signs and source are presented in table 1.

Table 1: Data Description

S/N	Series	Signs	Source
1	Government Expenditure	GE	CBN
2	Taxation	Tax	CBN
3	Private Consumption	P^c	CBN
4	Private Investment	P^I	CBN
5	Investment by the government	G^I	CBN
6	Consumption by the government	Gc	CBN
7	Public Debt	PD	CBN

Source: Author's Compilation, 2021

3.3 Techniques of Data Analysis

Quantitative data were used in the study to address the objectives mentioned in the previous section. Data were obtained from Central Bank of Nigeria Statistical Bulletin only. Two stage least square techniques were used in the estimation of the behavioural equations in the macro econometric models. The two stages least squared (2SLS) permit corrected errors and does not need normal distribution and it is less sensitive to specification errors than are the full information estimator.

Therefore, it is not necessary to test for stationary and normality data before estimating the model. Simulation exercise was performed after estimation of the macro econometric model.

4. Discussion and Analysis of Result

4.1Results of the Structural Model and Analysis

The behavioural equations specified in the previous section were estimated using two stages least squared regression model and the results are presented below:

4.1.1 Consumption Sector Block Result

Table 2: Result for PC equation

Variables	Coefficient	t.value
Tax	-0.31	-0.54
GE	0.22	-2.21
PD	0.19	-3.40
R^2=0.74	R^{-2}= 0.71	DW=2.11

Source: Computed by the Author (2021)

Table 3: Result for GC equation

Variables	Coefficient	t.value
Tax	0.36	3.32
GE	0.013	2.19
PD	0.53	3.01
R^2=0.58	R^{-2}= 0.53	DW=2.32

Source: Computed by the Author (2021)

The result in table 2 indicates the adjusted coefficient of determination (R^{-2}) is high. The R^{-2} value of 0.71 showed that over 71% of the contribution in the dependent variable (Private Consumption) is explained by the joint independent variables in the model. The estimated coefficients of the variables in table 2 were also very impressive as they fall within a-priori expectation of the study. Tax variable showed a negative coefficient (-0.31). This shows that there is an inverse relationship between tax and private consumption. 1% increase in tax will lead to 31% decrease in private consumption. Other variables that showed positive signs: GE (0.22) and PD (0.19). The values of t-statistics of all the explanatory variables in table 2 were statistically significant at 5% level except for Tax. The DW value of 2.11means no autocorrelation among the variables.

Table 3 is the estimated result for government consumption (GC). The adjusted coefficient of determination is very high (0.53%), this implies that the function explains 53% linear movements in the dependent variable of GC. The result shows that tax, government expenditure and public debt have positive and significant relationship with government consumption (G^C) as indicated by the t-values of the respective variables which are greater than 2 in absolute terms.

4.1.2 Investment Sector Block Result

Table 4: Result for PI equation

Variables	Coefficient	t.value
Tax	-0.81	-2.41
GE	0.23	3.74
PD	-0.04	-2.32
R^2=0.65	R^{-2}= 0.62	DW=1.88

Source: Computed by the Author (2021)

Table 5: Result for GI equation

Variables	**Coefficient**	**t.value**
Tax	0.02	2.34
GE	-0.13	2.98
PD	0.33	-1.42
R^2=0.77	R^{-2}= 0.72	DW=1.98

Source: Computed by the Author (2021)

Table 4 reveals that the R^{-2} which is 0.65 implies that the function explains 65% linear movements in the dependent variable of P^I. All the explanatory variables are statistically significant as their t-values are up to 2 in absolute terms. A percentage increase in GE would result to an increase in Private investment (P^I) by 23%, while a percentage increase in Tax and PD would lead to decrease in P^I by 81%, and 4% respectively. The DW value of 1.88 is within the rejection region. The study therefore concludes absence of autocorrelation among the variables. Table 5 represents the government investment (G^I) sub-sector in Nigeria. The estimated result showed that R^{-2} adjusted is 72%. As expected, some of the coefficients exerted high positive significance impact on government investment (G^I). The coefficients of Tax (0.02) and PD (0.33) exert positive influence on the government investment (G^I). The coefficient of GE (–0.13) exert negative influence on the government investment (G^I). All the variables except PD (–1.42) are significant at 5% level.

4.2 Simulation Experiment

Simulations are conducted to test the reliability of the model in predicting the movement of the endogenous variables. Figure 1 show the actual and simulated values of endogenous variables, provides body of facts for the good successful completion of the model. The graphs show the stochastic dynamic of actual and baseline simulation. Government Consumption (GC), private consumption (PC), Government Investment and private investment (PI) track their historical path well. A careful view of the graphs indicates that the model tracks the time long strip and turning points of the dependent variables significantly well. This is a good signer that the model entraps the bustling of Nigeria's economy with respect to the behaviour of the variables of interest thus, suggesting its suitability for policy simulation.

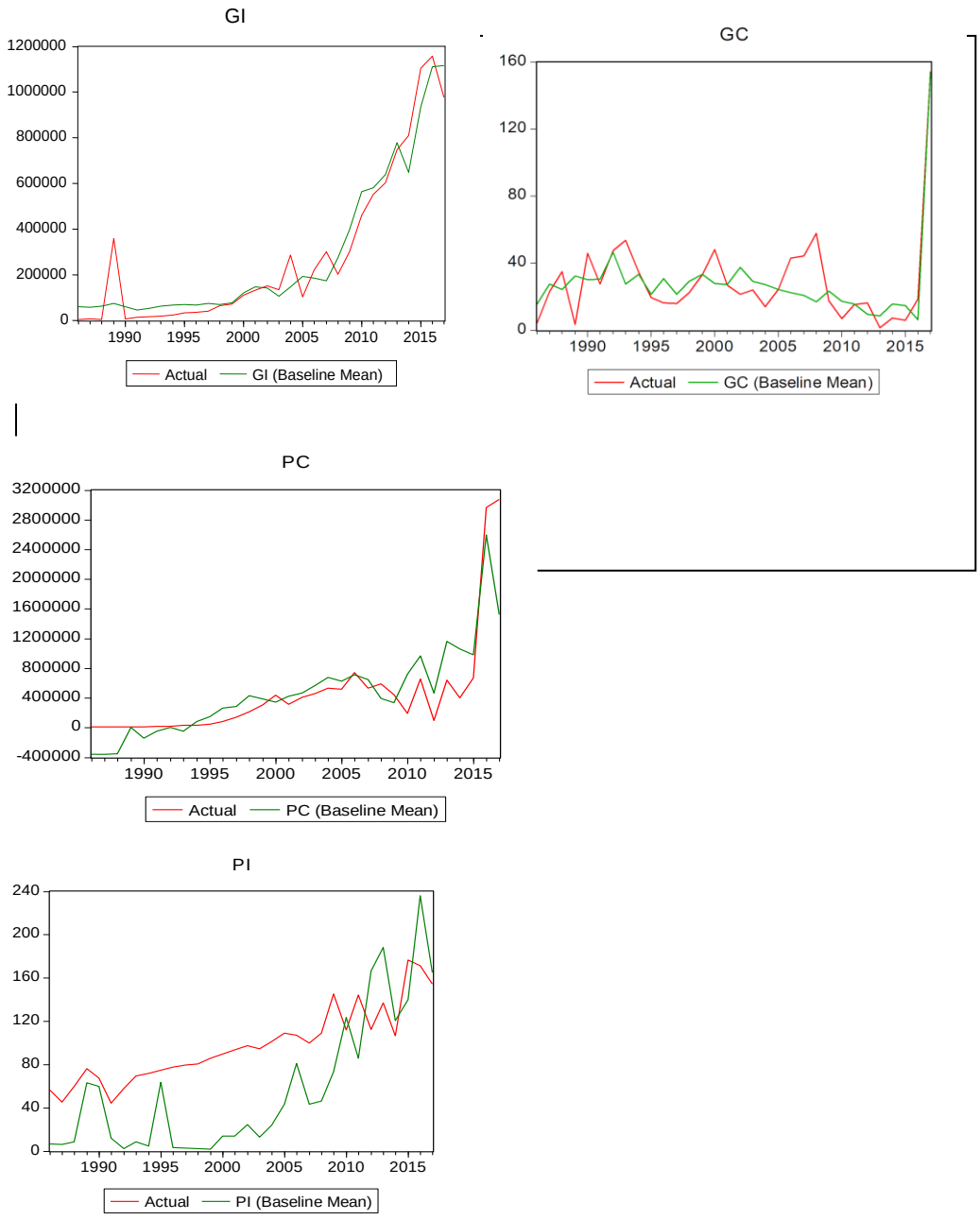

Figure 1: Graphs of the Stochastic Dynamic Baseline Simulation

4.3 Discussion of Results

The results obtained after estimating equations show that fiscal policy is statistically significant in influencing aggregated demand. Government expenditure (GE) and public debt (PD) are statistically significance in stimulating private consumption (PC) while tax is insignificance in show in table 2. The findings also show significant contribution of taxation (tax), government expenditure (GE) and public debt (PD) to government expenditure (GE). This can be seen in table 3 as the t-values are all greater than 2 in absolute terms. In the same vein, taxation (tax), government expenditure (GE) and public debt (PD) statistically influence private investment (PI) as show in table 4 while table 5 indicates the result for government investment (GI) equation. Taxation (Tax) and government expenditure (GE) are statistically significant while public debt (PD) is not. The results obtained are in line with a priori expectation and also with the works of Ejuvbekpokpo, Sallahuddin and Clark (2015) and Wissem (2016). The major difference is the simulation experience conducted and tests the reliability of the model in predicting the movement of the endogenous variables. Similarly, the baseline simulation indicated good tracking power of the actual from the baseline simulation as the nature of the movement suggested. In conclusion, this study is different from other study in terms of variables of fiscal policy used, the aggregate demand components used and model and techniques of analysis used in examining the shocks in aggregate demand to fiscal policy adjustment in Nigeria.

5. Conclusion and Recommendations

The study applied macro-econometric model with structural equations which were estimated using two stages least square method (2SLS) and simulation experiment was also performed. The main finding of the study shows that shocks in aggregate demand were as a result of adjustment in fiscal policy.

The study concludes that fiscal policy is statistically significant in influencing private consumption, private investment, government consumption and government investment in Nigeria during the period under investigation. Finally, simulation experiment performed reveals that the model tracked the time paths and turning points of the dependent variables well.

Based on findings, the study suggests the implementation of the following recommendations: The study suggest that since government spending is found to be an aggregate demand stimulant, the government should change the nature of its spending by channeling more towards provision of capital projects especially in

the area of infrastructural development; this will have the effect of both stimulating individual consumption and investment consumption (aggregate demand) and consequently output growth. Taxation has a negative impact on aggregate demand (private consumption and investment consumption).

Therefore, to fight the problem of low aggregate demand, tax rates should be lowered. Decrease in taxes will expand the purchasing power of citizens and boost private consumption (aggregate demand). Public debt crowd-out investment in the private sector in the short run, the government should strive to reduce her debt profile by improving its revenue base.

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