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ARDL Approach to Macroeconomic Absorptive Capacity, Fiscal Rule and Output Growth in Nigeria

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Abstract

In spite of several fiscal measures established since independence and given the importance of fiscal rule in promoting the attainment of macroeconomic objectives, it appears that macroeconomic absorptive capacity and fiscal rule in Nigeria have not lived up to expectations. The determinants of absorption capacity of an economy can derive from macroeconomic policy and or the structure of the economy. Inappropriate macroeconomic policies could manifest in divergence of output growth of an economy from its potential while structural factors could result in loss of economic growth relative to potential. Thus, the paper applied ARDL approach to investigate macroeconomic absorptive capacity, fiscal rule and economic growth in Nigeria spanning from 1970 to 2021. The study found that infrastructure, foreign exchange rate, agriculture, peace and stability and trade openness are positively related to loss of growth rate. The ARDL estimation result shows that money supply, Federal government expenditure and interest rate variables are positively related to divergence of output growth from potential, thus intensifying the output gap. Therefore, the study recommends the introduction of absorptive capacity measures into the fiscal rule which will improve the economy by reducing loss of growth rate and close the output gap (by reducing the divergence of growth from potential).

Keywords: Absorptive capacity, Fiscal Rule, Growth, Macroeconomic, Output-Gap
JEL Classification: F41, F43, F62, E60, E62

Contribution to/Originality Knowledge
This paper contributes to existing knowledge in extant literature by applying ARDL methodology which is non-existence in absorptive capacity studies in Nigeria. Since the 1950s, the absorptive capacity of developing countries has been an issue in the policy debate for transfer of capital from developed countries. But the evidence from oil exporting countries since the early 1970s shows that countries not lacking domestic savings and foreign currency are afflicted by inadequate absorptive capacity. The novelty of this paper is hinged on the claim that absorptive capacity is a performance factor in Nigeria's economic growth.

1.0 Introduction

Fiscal rule in Nigeria is guided mostly by expectation of growth and even development across the diverse economic regions of the country (Ogar, Arikpo, & Suleiman, 2019). This is why the major sources of public revenue are centralised and allotted among the tiers of government, using criteria that favour even development and need. The adverse incentive inherent in the disconnect between revenue effort and realised revenue of the different tiers of government causes scant attention to be paid to other fiscal rule measures such as fiscal deficit and debt sustainability potential (Obadan, 2020). Despite this approach, it is generally agreed that Nigeria's economic growth rate is below its potential (Obadan, 2020). Even in periods of comparatively high growth rate, there is no associated economic development (Yesufu, 2016). The constraints on growth have been attributed to lack of absorptive capacity for financial

capital invested in the economy (Ndebbio, 1990 & Adewuyi, 2000). Adler (2015) associated absorptive capacity to institutional and organisational factors that affect a country's ability to plan and execute development projects, change her economic structure and efficiently allocate resources.

According to neoclassical growth theory, the higher government expenditure is the lower long-run per capita income. Endogenous growth theorists also hold the position that higher government spending leads to lower long-run growth. The two schools assert that government spending is unproductive, although Barro (1990) and Arrow & Karz (1970) held that government expenditure can contribute to growth. However, at an empirical level, some studies (Easterly & Rebelo, 2013) show that public investment and long-run growth have positive relationship.

The case for estimating absorptive capacity is based on the assumption that there is a positive correlation between capital consumption and economic growth. According to Kindleberger (1958), "if capital consumption is permitted, there is no question, but that the sky is the limit". The term capital consumption could be likened to absorptive capacity of an economy for public and private investment expenditure. From a development policy viewpoint, the large foreign exchange inflow from oil sales into Nigeria was supposed to have eliminated one of the gaps (foreign exchange gap) in the famed two–gap explanation for underdevelopment. In the absence of the classical foreign exchange and domestic savings gaps, the implication is that there are absorptive capacity constraints to economic growth in Nigeria.

Whereas the need for and importance of capital investment in achieving increased economic growth is well-established, the imperative of efficiency cannot be ignored, if the objective has to be achieved. Capital has been identified as one factor of production, the scarcity of which is associated with underdevelopment (Meier, 2016). Meier suggested that three concepts should be borne in mind when planning the rate of development of a country. The first is a minimum rate of investment that will prevent per capita income from falling, given the population growth rate. Another is the practical maximum rate of investment, which may be set with inter-temporal equity in mind, given a country's savings level. The third concept is the highest rate of investment that is consistent with the economy's absorptive capacity, 'limited by low supply elasticities of co-operant macroeconomic factors' (Adler, 2015). Where domestic savings is lower than the maximum absorptive capacity of an economy, there will be room for the productive use of foreign savings to increase the rate of economic growth. Since the 1950s, the absorptive capacity of developing countries has been an issue in the policy debate for transfer of capital from developed countries. But the evidence from oil exporting countries since the early 1970s (EL-Jehaimi, 2015 & Samii, 2010) shows that countries not lacking domestic savings and foreign currency are afflicted by inadequate absorptive capacity.

In allocating and applying public revenue in Nigeria, there is no *a priori* and objective determination of the country's and the component States' absorptive capacity. Social indicators such as primary school enrolment, land mass, population, minimum responsibility, and equality of States are used in the fiscal rule (revenue allocation). Every attention is focused, on the expenditure side, on economic and social needs. No obvious account is taken of the absorptive

capacity for any public investment expenditure (Abdullah, Mustafa, & Dahalan, 2022). Accordingly, it is possible to find schools without adequate number of teachers, pupils and instructional materials or hospitals that are not well-equipped and adequately staffed. It could manifest as unrealizable investments in fiscal programmes even though monies are released for such investments (Abdullah, *et al*, 2022). This leads to waste of economic resources. The demand for investment capital is derived from the demand for the output of the investment which if not effective, results in unabsorbed capital (Stevens, 2011). Capital investment is effectively absorbed if it generates expected output which in turn generates further demand for output and investment. When this happens, growth accelerates. One reason for the failure of investments is the thesis of lack of demand (Berger, 2012) because of the stage of development of a country. Absorptive capacity constraints create insufficient market demand for some goods and services. Perhaps, investments in Nigeria in crude petroleum refining, petrochemical, fertiliser production and motor vehicle assembly plants have failed because of this even though their failure is generally attributed to mismanagement, corruption and waste. The poverty rate in the country since the 1980s is an indicator of inadequate economic growth. Economic growth can be spurred or hindered by the structure of the economy and macroeconomic policy.

It is the claim of this study that absorptive capacity is a performance factor in Nigeria's economic growth. The problem of the study therefore is to address the following questions: What are the structural and macroeconomic factors that constrain the absorptive capacity of the economy in Nigeria? How do the constraints on absorptive capacity limit growth rate or cause divergence of the growth rate of the economy, relative to its potential?

There are two main objectives of this study. One is to establish that there are factors in the structure of Nigeria's economy that limit its absorptive capacity, thereby causing a loss of growth rate (relative to potential). The second is to establish that some elements of the macroeconomic policy regime have caused the economy's growth rate to diverge away from its potential.

2.0 Literature Review

2.1 Conceptual framework

Absorptive capacity: The term "absorptive capacity" appears frequently in current discussions of economic development and foreign aid. It refers to the total amount of capital, or the amount of foreign capital, or the amount of foreign aid (capital plus technical assistance) that a developing country can use productively. Thus it means different things to different people, who may also have in mind different concepts of productivity and different time spans. More so, absorptive capacity may then be defined as that amount of investment, or that rate of gross domestic investment expressed as a proportion of GNP, that can be made at an acceptable rate of return, with the supply of co-operant factors considered as given. This is not to say that the investor, or the investing authority, would not attempt to increase the supply of co-operant factors. But, in the short run, this increase is either a physical impossibility or is so costly that it increases sharply the total cost of investment or the total operating cost, and thereby reduces the return on capital below the acceptable rate.

Fiscal rule: A fiscal rule is a long-lasting constraint on fiscal policy through numerical limits on budgetary aggregates. Fiscal rules typically aim at correcting distorted incentives and containing pressures to overspend, particularly in good times, so as to ensure fiscal responsibility and debt sustainability. Without overall limits, incremental budgeting can become an open-ended process in which governments accommodate demands by spending more than they have. A fiscal rule has two fundamental characteristics. First, it presents a constraint that binds political decisions made by the legislature and by the executive. And second, it serves as a concrete indicator of the executive's fiscal management. While fiscal rules can help governments to achieve fiscal objectives and discipline, there is no one-size-fits-all rule for every country. Fiscal rules may focus on different elements of government fiscal performance: revenues, expenditures, budget balance, and public debt. Across OECD member countries, the most common types of fiscal rules are budget balance rules (28 member countries) and debt rules (23), due to obligations for European Union countries. Revenue rules are the least common, as only five OECD member countries have them in place (Australia, France, Greece, the Netherlands, and the Slovak Republic).

Economic growth: Economic growth can be defined as the increase or improvement in the inflation-adjusted market value of the goods and services produced by an economy in a financial year. Statisticians conventionally measure such growth as the percent rate of increase in the real gross domestic product, or real GDP. Economic growth can also be defined as an increase in the production of goods and services in an economy. Increases in capital goods, labour force, technology, and human capital can all contribute to economic growth. Economic growth is commonly measured in terms of the increase in aggregated market value of additional goods and services produced, using estimates such as GDP. The four phases of economic growth are expansion, peak, contraction, and trough. Tax cuts are generally less effective in spurring economic growth than are increases in government spending. If the rewards of economic growth go only to an elite group, then it is unlikely that the growth will be sustainable.

2.2 Theoretical framework

Many theories of fiscal policy and macroeconomic variables exist but this study will only review Keynesian fiscal theory of output and income, and savers spender's theory. The study is however, founded on the theoretical postulates of Mankiw (2000).

2.2.1 The Savers-Spenders Theory

Savers-Spenders theory of fiscal policy was developed by Mankiw (2000). This theory was developed because of inconsistency of Barro-Ramsey (1974) theory of infinitely-lived families. Savers-Spenders theory is the new theory developed to explain the behavioural pattern of fiscal policy in the economy. The theory is based on some prepositions (Mankiw, 2000). The first proposition is on temporary tax changes having large effects on the demand for goods and services. This proposition states that the higher take-home pay that spenders received will be offset by higher tax payments, or by lower tax refunds. The implication is that consumers

should realize that their lifetime resources were unchanged and therefore, should save the extra take-home pay to meet the upward tax liability.

The second proposition is on government debt in relation to crowd out capital in the long-run. This proposition states that extra consumption reduces investment, which in turn raises marginal product of capital and as well decrease the level of economic growth. It is also of the opinion that higher interest rate margin, induces savers to save more. The implication of this proposition is that extra consumption and higher interest rate margin affect the growth of manufacturing sector which in turn reduce economic growth in Nigeria.

The third proposition states that government debt increases steady-state inequality. This means that a higher level of debt means a higher level of taxation to pay interest on debt. The tax will fall on both the savers and the spenders but the interest will only fall on savers. The implication of this is that a higher level of debt rises the income and consumption of the savers and lowers the income and consumption of the spenders.

2.2.2 Keynesian Fiscal Theory of Output and Income

John Maynard Keynes (1883-1946) formulated a theory, which supports government serious participation in economic growth and development. Specifically, he postulated that in order to correct prolonged unemployment and depression in an economy, government has to intervene in the economy through taxation and government expenditures in order to promote output, growth and employment. He also pointed out that to solve the problems of unemployment in the economy, which is a situation where output is below full employment level, an appropriate fiscal policy measure must be taken. This type of policy could be either raising government expenditures or cutting taxes or combination of both. It needs be said that government of many countries accepts fiscal policy as an effective management instrument for government revenue mobilization and utilization. The policy consists of two components, changes in government expenditure and changes in taxation.

In Keynesian theory, spending is what stimulates output, and thus creates employment and generates income. This theory is based on the fact that aggregate demand, which is total spending, induces business firms to supply goods and services. If therefore total spending in an economy declines arising either from pessimism about future economic environment or from saving more of the current income, the business firms will respond by cutting down production (Nyong, 2001). Thus, less spending results in a fall in output. This of course leads to a decline in many other macroeconomic variables.

The theory indicates that variation in government expenditure has a direct effect on income through the multiplier. Therefore, government expenditure is an important component of aggregate demand. Moreover, increase in government taxation, tax rate or lump sum tax has a negative impact on economic activity. Thus, whereas increase in government expenditure promotes economic activity, increase in taxation has opposite effect of decreasing economic activity, given that taxation is withdrawal from income stream while expenditure is an injection

(Nyong, 2001). This therefore shows that the use of fiscal policy through changes in government expenditure promotes economic activity and hence growth at all levels.

2.3 Empirical Literature Review

Several studies have rendered empirical evidence on fiscal sustainability. Tanzi (2021) states that public debt is an important fiscal policy tool and sustaining a balance between revenue inflow and spending is key in fiscal management. According to the paper, the idea of tax smoothing, which is essential to provide a steady flow of public goods and services and run a countercyclical fiscal policy, depends on the capacity of the government to borrow during recessions and repay debt during booms. In this sense, "some economists have advocated borrowing to finance public investment, which has been referred to as the "golden rule". This argument fundamentally relies on two basic assumptions: - first; "because public investment creates assets that favour future generations, thus the latter should pay for it and second; that public investment is always productive" (Tanzi, 2021).

In view of the large fiscal deficits and debt overhang that characterized most of the developing countries and the resultant retarded growth experienced by the majority of the economies in Africa, studies have also examined the sustainability of fiscal policy and debt profile of developing countries. Most of these studies fundamentally explain the nexus between debt and growth, as well as setting a debt threshold upon which debt becomes inefficient for driving growth (Rose, 2020; Polito & Wickens, 2022; Omotosho, Bawa & Doguwa, 2021).

Other studies have focused on the relationship between fiscal rules, the sustainability of fiscal policy, and the outcome of economic performance (Fat´as, 2020; Franco & Zotteri, 2021; and Rose, 2020), the relationship between fiscal reform and fiscal sustainability and emphasize the role of fiscal rules in ensuring the sustainability of fiscal policy, (Franco & Zotteri, 2021). Some other studies have also extended the analysis to the sustainability of fiscal policy in general, (Bohn, 2022; Afonso & Rault, 2019; Legrenzi & Milas, 2020; Abdullah, *et al*, (2022).

Countless studies have examined the relationship between fiscal policy, growth in developed, developing, and emerging economies, interest rates, and inflation. Ariyo (2013) examined fiscal policy and economic development in Nigeria. This study examined the short and long-run impact of fiscal policy on economic development in Nigeria between a period of 1981 and 2013 using annual time series data sourced from world development indicators (2014) and the central bank of Nigeria (2014). It used government recurrent expenditure, government capital expenditure, government investment, and tax revenue to indicate fiscal policy. Economic development was proxied by real per capita income. The model was estimated using pair-wise correlation to ascertain the relationship and then cointegration and error correction mechanism for impact after confirming the data's stationarity using unit root. The result showed that government recurrent expenditure and government investment have a significant positive impact on economic development in both the short and long run within the period under consideration. Capital expenditure appeared to have a short-run positive impact but not in the long run. Tax revenue had an inverse significant impact in both the short and long run. The

speed of adjustment to equilibrium was found to be high. The results are all in line with theories and previous studies.

The political economy and institutional framework of developing countries can pose severe challenges for effectively scaling up output growth. Among them are (i) multiple powerful groups pushing for the redistribution of a windfall when institutions are weak (the "voracity effect"; Lane, and Philip; Arezki & Brueckner, 2020); (ii) pressures to earmark investments to the geographic areas where resources are extracted; and (iii) investments by oil or mining parastatals and public-private partnerships in resource-for-infrastructure deals that are not integrated into the budget or not fully transparent (Barma et al., 2012). Governments need some type of commitment mechanism (institutionalized savings rules) to support incentives for saving resource revenues; otherwise, there is a possibility that their savings may merely transfer spending power to a bad successor (Collier, 2012).

The lack of consensus and a common benchmark for determining sustainable fiscal spending and borrowing, Burnside (2022) provided a new framework for assessing key indicators of the health and soundness of fiscal rule stands. This new approach which is adopted in this paper provides an alternative strategy to test for the robustness of existing framework and determine if the methodology approached adopted constitute a major factor in the divergent views expressed in the literature with respect to fiscal sustainability in terms of ; estimation of government's ability to borrow as well as finance its debt servicing and repayment; prediction of the onset of fiscal crises that may be lurking; assessment of the fiscal risk associated with contingent liabilities; and the assessment of prior fiscal policy record and discussion of future policy choices.

3.0 Methodology

A country's macroeconomic policy regime and or her economic structure affect her economic growth performance through the impact on the economy's absorptive capacity. Inappropriate macroeconomic policy can manifest in the divergence of the growth rate of an economy from its potential while structural factors can result in loss of economic growth relative to potential.

Episodes of oil boom in the early 1970s and 80s, and the commodity boom of this century failed to stimulate sustainable economic growth in Nigeria as a result of their effects on the real exchange rate and the impact of the real exchange rate on other industries. It was a case of the so-called Dutch Disease which caused growth to diverge from a path that was expected as country's macroeconomic policy and economic structure were not appropriate (Ndebbio, 1990; Adewuyi, 2000). Indonesia, also an oil-exporting country, followed a different policy and did better than Nigeria in the same period (Bevan, Collier, & Gunning, 2019). Also structural factors such as the population growth rate, the state of infrastructure and political instability have caused loss of growth rate, given the resources invested, especially by the public sector.

The Model

Two empirical models are specified: a loss of growth rate (LGR) model based on structural variables and a divergence of growth rate (DGR) model based on policy variables.

The LGR model is stated as relating GDP growth to some structural determinants as follows:

$$LGR = f\left(MP, INFRA, DEF, EDU, HLT, FOREX, AGRIC, PINSTA, TOP\right) \quad (1)$$

Where:

LGR = Gross Domestic Product; MP = Manpower; INFR = Infrastructure; DEF = Defence;

EDU = Education; HLT = Health; FOREX = Foreign Exchange rate; AGRIC = Agriculture;

PINSTA = Political stability; and TOP = Trade Openness.

Analysis of the model, using OLS, will establish the contribution or otherwise (hence loss of growth rate) of the variables to economic output growth in Nigeria.

The second model, the divergence of growth rate (DGR) model is stated as relating output gap to a number of policy variables as follows:

$$\Delta GAP = f\left(GAP, M2, TOP, INFL, FXP, LR\right) \quad (2)$$

Where:

ΔGAP= change in output gap, M2 = money supply, TOP= trade openness, INF= inflation

FXP= Total Federal government expenditure, LR= interest rate

Analysis of the model, using conventional multivariate cointegration procedures will show the variables that drive the divergence of output growth from potential.

The ARDL specification of the above model is given as follows:

$$\Delta GAP_t = \alpha_0 + \sum_{k=1}^{n1} \alpha_1 \Delta GAP_{t-k} + \sum_{k=1}^{n2} \alpha_2 \Delta M2_{t-k} + \sum_{k=1}^{n3} \alpha_3 \Delta TOP_{t-k}$$
$$+ \sum_{k-1}^{n4} \alpha_4 \Delta INF_{t-1} + \sum_{K-1}^{n5} \alpha_5 \Delta LFXP_{t-1} + \sum_{k-1}^{n6} \alpha_6 \Delta LR_{t-1} +$$
$$+ \beta_1 GAP_{t-i} + \beta_2 \Delta M2_{t-i} + \beta_3 TOP_{t-i} + \beta_4 INF_{t-i} + \beta_5 LFXP + \beta_6 LR_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

where, Δ denotes the first difference operator, α_0 represents the intercept, $\beta_1 - \beta_6$ are long-run relationship coefficients, $\alpha_1 - \alpha_6$ are short-run dynamics of the model

The specification of the ARDL model of cointegration is based on the Pesaran, Shin and Smith (2011) bound F-test procedure. The F-test is a test of hypothesis where the null represents no cointegration among variables and the alternative indicates the existence of cointegration. This is presented as follows:

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$$

$$H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0 \quad \text{..... (4)}$$

If the F-statistics from the joint test of significance is greater than the upper bound, the alternative hypothesis is accepted. However, if it is below the lower bound, the null hypothesis of no cointegration is accepted. If the test lies between the upper and lower bounds, it is inconclusive.

If a cointegration is established, the next step is to estimate the unrestricted error correction model which is specified below:

$$\Delta GAP_t = \alpha_0 + \sum_{k=1}^{n1} \alpha_1 \Delta GAP_{t-k} + \sum_{k=1}^{n2} \alpha_2 \Delta M2_{t-k} + \sum_{k=1}^{n3} \alpha_3 \Delta TOP_{t-k}$$
$$+ \sum_{k-1}^{n4} \alpha_4 \Delta INF_{t-1} + \sum_{K-1}^{n5} \alpha_5 \Delta LFXP_{t-1} + \sum_{k-1}^{n6} \alpha_6 \Delta LR_{t-1} + \theta ECM_t + \varepsilon_t \quad \text{..... (5)}$$

Data Sources

The study draws on yearly data of relevant variables covering the period 1970 to 2021. For the LGR model, real GDP was obtained from the Statistical Bulletin published by the Central Bank of Nigeria (CBN). Data were obtained from the Medical and Dental Council of Nigeria, the Central Bank of Nigeria Annual Reports and Statements of Account covering the years of the study and data for the health variable was obtained from the WDI.

4.0 Results and Discussion

Unit Root Test

Table 1 presents the outcome of unit root tests, using the Augmented Dickey Fuller (ADF) method. It shows that all the variables used in the model are I (1), that is they are stationary after first difference.

Table 1: Conventional Unit Root and Stationarity Tests

	Level ADF	**First Difference ADF**	**Integration**
MP	1.1966	-5.716***	I(1)
INFRA	-2.3857	-8.1623***	I(1)
DEF	-0.2458	-10.015***	I(1)
HEDU	-2.3412	-7.5492***	I(1)
HLT	0.8845	-3.5983***	I(1)
FOREX	0.5108	-5.9435***	I(1)
AGRIC	-0.5418	-6.4809***	I(1)
TOP	-2.4025	-8.7114***	I(1)
LGDP	0.2753	-5.3124***	I(1)

*** indicates 1% level of significance

We are therefore justified to use OLS in estimating the model coefficients.

Ordinary Least Squares (OLS) Estimation

Table 2 shows the results of the estimation of the model and the relationship between the dependent variable –Loss of Growth Rate and the explanatory variables i.e., Manpower, Infrastructure, Defence, Education, Health, Foreign Exchange rate, Agriculture, Political stability and Trade Openness. The adjusted coefficient of determination (R^2) is around 0.98, implying that about 98 per cent of the total variation in GDP is explained by the explanatory variables. The F-Statistic also shows that the explanatory variables are jointly significant and the Durbin Watson value of 1.51 per cent suggests that the degree of serial correlation is relatively acceptable.

Table 2: OLS Estimation Results

Variable	Coefficient	t-Statistic	Prob.
C	2.166683	0.376252	0.7091
MP	-0.000203	-1.664070	0.1056
INFRA	0.762878	3.596596	0.0010
DEF	-0.063967	-1.618558	0.1151
EDU	-0.392283	-4.571534	0.0001
HLT	-0.035152	-5.940705	0.0000
FOREX	0.004217	1.287032	0.2070
AGRIC	0.085043	6.641458	0.0000
PINSTA	0.177059	1.020230	0.3150
TOP	0.177059	1.074150	0.2905

Source: Authors Computation

In terms of the significance of the explanatory variables, it is observed that the coefficients of Infrastructure, Education, Health, and Agriculture are statistically significant at one per cent level. Other explanatory variables are not statistically significant. While Manpower, Defence, Education and Health exhibit negative relationship and statistical insignificance, Foreign Exchange Rate, Political Instability and Trade Openness show positive relationship, though statistically insignificant. This is in line with the findings by Abdullah, Mustafa, & Dahalan, (2022)

Tests of Cointegration

Since all the variables are I (1), it means that the series are non-stationary and in a static model with non-stationary series, the estimates can only be stable and reliable if the errors are stable. To test for this, we applied the Engle-Granger two step procedures to test for cointegration or long-run relationship between the dependent and the independent variables. In the first stage, the residuals generated from the static OLS estimation are saved and in the second stage we tested for unit root in the residuals, using ADF at levels only. If the residuals are stationary or integrated of order zero I (0), we conclude that the residuals generated by variables in the OLS

equation are cointegrated. The result in Table 3 indicates the presence of cointegration. The null hypothesis of no cointegration is thus rejected at 5% level of confidence.

Table 3: Cointegration Test

Trend assumption: Linear deterministic trend (restricted)				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.885828	231.6372	150.5585	0.0000
At most 1 *	0.690969	149.1754	117.7082	0.0001
At most 2 *	0.617604	104.5515	88.80380	0.0023
At most 3 *	0.481819	68.02218	63.87610	0.0215
At most 4 *	0.447543	43.03981	42.91525	0.0486
At most 5	0.327710	20.49138	25.87211	0.2020
At most 6	0.132535	5.402860	12.51798	0.5396
Trace test indicates 5 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Parsimonious Error-Correction Model

To measure the deviation from the long-run equilibrium, we conducted a parsimonious ECM. The result indicates that 25% of any disequilibrium in the model is corrected every year.

Table 4 presents the parsimonious error correction estimate which shows the model as well fit by exhibiting a strong predictive power. The adjusted R^2 of 98% implies that the total variation in Loss of Growth Rate is explained by the variables in the system.

The error correction coefficient is negative (-0.2573) and statistically significant (0.042) at 5% level, making it consistent with statistical and theoretical expectations.

Table 4: Parsimonious Error-Correction Model Result

Variable	Coefficient	t-Statistic	Prob.
C	-7.9229	-2.5468	0.0167
DLNLGDP(-1)	0.9802	9.3109	0.0000***
DAGRIC(-1)	0.0138	1.2621	0.2173
DFOREX(-1)	0.0032	1.6958	0.1010
DFOREX(-2)	-0.0034	-1.7209	0.0963*
DHEALTH(-2)	0.0038	0.9083	0.3714
DHEDU(-2)	-0.0390	-0.8451	0.4052
DINFRA(-1)	0.5068	2.3221	0.0277**
DINFRA(-2)	-0.1881	-0.8772	0.3878
DLDEF(-2)	0.0267	1.3297	0.1943

DMP(-2)	-0.0722	-2.1735	0.0384**
DTOP(-1)	-0.5041	-1.8989	0.0679*
ECM(-1)	**-0.2573**	**-2.1311**	**0.0420****
R-squared	0.9984		
Adj R-squared	0.9977		
LM-Test	0.1242		
F-statistics	1433.9		

***, ** indicate 1% and 5% level of significance, respectively

Autoregressive Distributed Lag (ARDL) Model

We adopted the ARDL model because it is appropriate in single-equation regressions, particularly where the regressors include one or more lagged values of the explanatory variables. In this type of model, using OLS may yield biased estimates of the coefficients. On the other hand, ARDL model has been shown to provide unbiased estimates of the long-run model and valid t-statistics (Harris & Sollis, 2013).

Within an ARDL model, when a policy variable changes, its effect can be determined. It is also suitable for multiple (multivariate) explanatory variable analyses. Another advantage of this model is that it does not take into consideration the integration property of the series. Hence, according to Pesaran et al. (2011), it does not matter whether the variables are I (0) or I (1). Where a series is non-stationary, cointegration amounts to ECM in ARDL model.

Lag Order Selection

We chose the appropriate lag structure of the ECM by three model selection criteria: Schwarz Bayesian Criterion (SBC), Akaike Information Criterion (AIC), and Hannan-Quinn information criterion. The results are presented in Table 5.

Table 5: VAR Lag Order Selection Criteria

Order	AIC	SC	HQ
0	17.19037	17.44113	17.28168
1	5.095962	6.851329	5.735170
2	1.094678	4.354645	2.281778
3	-1.411332*	3.353235*	0.323661*

AIC: Akaike information criterion, SBC: Schwarz Bayesian criterion, HQ: Hannan-Quinn information criterion. The result suggests lag 3 order selection both with AIC, SBC and HIC.

Estimation of the ARDL Model

The null hypothesis of no cointegration against the alternative hypothesis was tested using Wald or Bound test for joint coefficients of the one period lag of the dependent and independent variables. The result of this test is presented in Table 6. Evidence from the table indicates that we can reject the null hypothesis of no cointegration. This means there exist long-run relationship among output gap, money supply, trade openness, federal government expenditure, inflation and real interest rate. From the table, the computed F-Statistic of 4.751

is greater than 3.97 of upper bound critical value. The critical values for the bound test are obtained from Pesaran et al. (2011).

Table 6: Bound Test for Cointegration

Test Statistics	Value	Significant level	Bound critical value (unrestricted intercept and trend)	
F-statistics	4.751		I(0)	I(1)
		1%	3.81	4.92
		5%	3.05	3.97
		10%	2.68	3.53

As cointegration among the variables is established, we estimated the unrestricted error correction model which is specified below to confirm the existence of long-run relationship between output gap and the explanatory variables within the ARDL model:

$$\Delta GAP_t = \alpha_0 + \sum_{k=1}^{n1} \alpha_1 \Delta GAP_{t-k} + \sum_{k=1}^{n2} \alpha_2 \Delta M2_{t-k} + \sum_{k=1}^{n3} \alpha_3 \Delta TOP_{t-k}$$
$$+ \sum_{k-1}^{n4} \alpha_4 \Delta INF_{t-1} + \sum_{K-1}^{n5} \alpha_5 \Delta LFXP_{t-1} + \sum_{k-1}^{n6} \alpha_6 \Delta LR_{t-1} + \theta ECM_t + \varepsilon_t$$

The Results of the Long run Model

Given that long-run relationship has been established using the ARDL model, we went on to estimate the long-run coefficients as shown in Table 7. From the table we find that both money supply (M2) and federal government expenditure (FXP) have a positive relationship with output gap and are statistically significant at 1% and 5% levels. Interest rate (LR) shows also a positive relationship with output gap but is statistically not significant. However, trade openness and inflation show negative relationships with output gap. Although inflation is statistically significant at 10%, trade openness is not significant. The result conforms to the findings by Omotosho, Bawa, & Doguwa (2021)

Table 7: The Results of long-run coefficients

Variables	**Coefficient**	**t- statistics**	**P value**
Constant	**1.7426**	3.7729	0.0006***
LM2	0.3423	2.1797	0.0355**
LFXP	0.6888	3.8099	0.0005***
TOP	-0.7105	-1.3671	0.1796
INF	-0.0053	-1.8118	0.0779*
LR	0.0038	0.3006	0.7653

Assessment of the Stability of the ARDL Model

To establish the stability of the model parameters, we carried out recursive estimation and recursive residuals test. As can be seen in Figures 3 and 4 the graphs for CUSUM and CUSUMQ test for stability of the model indicates the recursive residuals and recursive

residuals square are within 5 per cent critical bounds, which is an indication of the stability of the model.

Figure 1: Cumulative Sum of Recursive Residuals

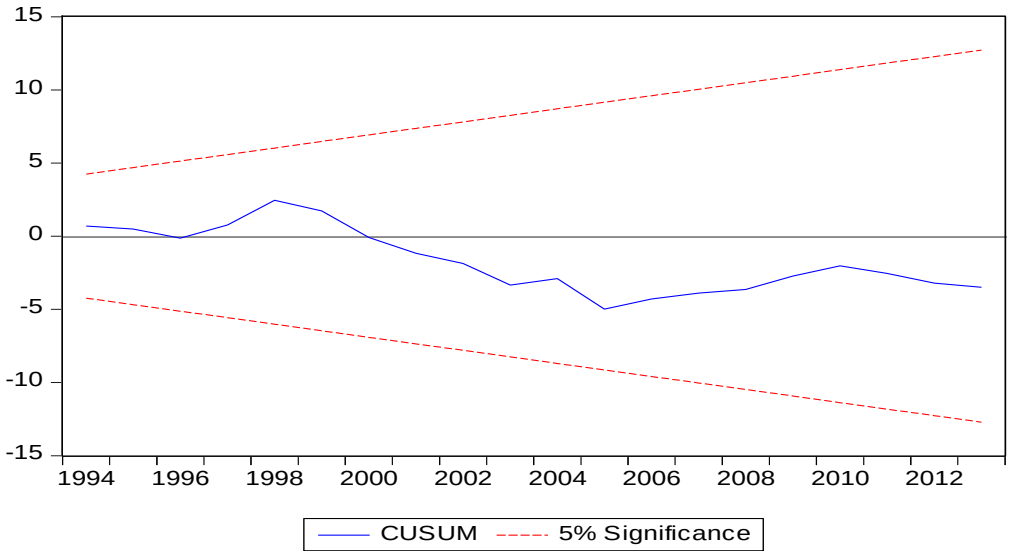
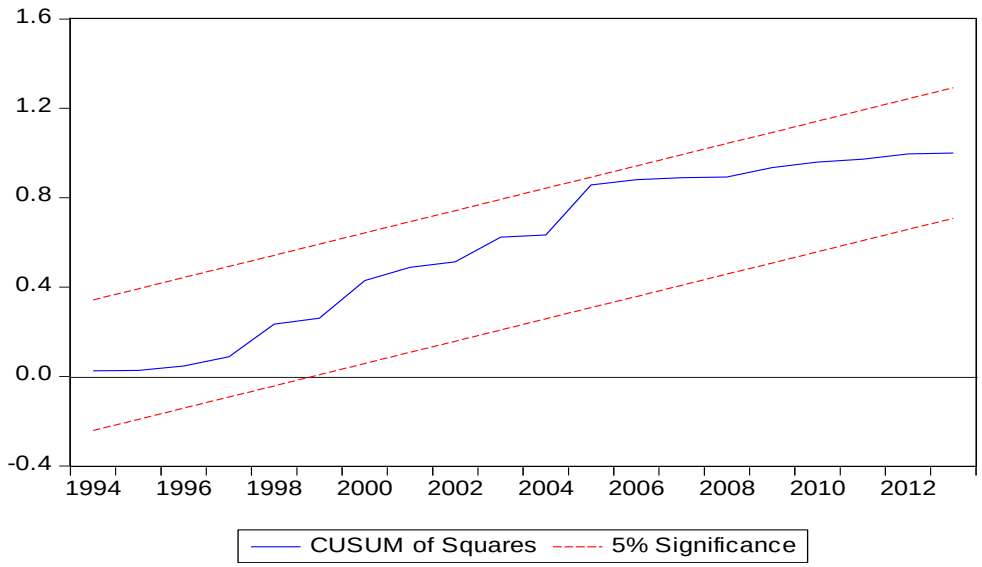


Figure 2: Cumulative Sum of Squares of Recursive Residuals



Forecast Results

Forecast estimates of the parameters of the Divergence of Growth (DGR) and the Loss of Growth (LGR) models were carried out using both full and sub-sample data. As our data were time series, Box-Jenkins Autoregressive Integrated Moving Average (ARIMA) model was applied in the forecast. 95 per cent confidence limits were imposed to restrict our estimates within the confidence interval.

Figures 1 and 2 show forecast results of DGR model for both in and out-sample forecast while figures 3 and 4 show those of the LGR model. Evidence from both models shows an upward

trend in DGR and LGR for the full sample forecast. In the out-of-sample forecast in the two models, DGR and LGR are expected to accelerate up to the forecast sample period. The drivers of the acceleration were the same factors evident in the estimation: money supply (M2), Federal Government Expenditure (FXP) and Interest Rate (LR) in the DGR model; and Foreign Exchange Rate (FOREX), Political Instability (PINSTA) and Trade Openness (TOP) in the LGR model forecasts.

The forecasts show a good fit going by the parameters. The DGR full sample forecast shows Root Mean Squared Error (RMSE) and Mean Absolute Error (MAE) of 0.327 and 0.284 respectively, while the out of sample forecast, which cover 1990 to 2020 shows 0.317 and 0.109 per cent, respectively. The errors are small, indicating forecasting ability. Theil inequality coefficient for the full sample is 0.118 as compared with 0.004 for the sub-sample, meaning almost perfect fit, particularly for the sub-sample forecast. Both the bias and variance proportions are quite small, also indicating good forecast. The bias and variance proportions for the full sample are 0.000053 and 0.54213 while out of sample forecast recorded 0.0206 and 0.3422 per cent, respectively. We can conclude that the forecast series are not very widely deviated from the actual series. This is in line with the findings by Burnside, (2022).

5.0 Conclusion

This study made the claim that there were absorptive capacity constraints that are limiting the growth of the economy which should be taken into account in designing the country's fiscal rule to eliminate the constraints and boost the performance of the economy. The sectors that have been shown to be responsive to good economic performance need to be encouraged. Thus, appropriate and adequate Manpower (MP), Defence (DEF), Education (EDU), and Health (HLT) are necessary to increase the absorptive capacity of the country. Increasing investment in the sectors would improve macroeconomic management capacity and ultimately, factors such as infrastructure, agriculture and foreign exchange management which are now not contributing to strengthening the capacity of the economy to achieve self-sustaining growth. The period of the study had more years of political instability than otherwise and the finding is that more political stability would lower economic growth. The tensions associated with military rule exist under civilian rule as election in Nigeria is characterized by uncertainty and antagonism unrelated to overt public policy choices. It would appear that the influence of the rent from oil revenue overwhelms the impact of political regime changes on the rate of economic growth in Nigeria. Nigeria's share of oil in real GDP has hovered between eight (8%) and twenty (20%) percent between 1965 and 2013. Whereas oil revenue is invested through the public sector, economic productivity evidenced by total factor productivity (TFP) was not growing. The agricultural sector's response to loss of economic growth is most interesting. Instead of increasing investment in the sector, the findings suggest that what has been put in place in the sector should be more intensively used for return on investment. Similarly, increasing money supply and government expenditure at the rate the country has being doing is not helpful because they have not produced the expected growth.

The forecast of the model was good and suggested that our hypotheses were correct. This study has confirmed that the problem of inadequate growth rate of the economy is not caused by

inadequate investment only. Instead, we find that some sectors of the economy and some macroeconomic policies are yielding the expected changes in terms of reducing loss of economic growth and closing the divergence in the output gap. The fiscal rules in place now, especially the criteria for allocating funds accruing to the Distributable Pool Account of the Federation by the Federal Accounts Allocation Committee (FAAC) assumes that there are needs to be met, without any consideration for absorptive capacity for additional expenditure. As recent events have shown, the oil-price-based budget benchmark has not fared well as a fiscal rule. The political enthusiasm for public investment is not matched by necessary civil service skill and national institutions and the outcome over the years have been that so much has been invested but "there is little to show"

5.1 Policy Recommendations

Incorporation of absorptive capacity into the fiscal rules will make it possible for appropriate institutional, sectoral and macroeconomic policies to be put in place to enhance the rate of growth of the country's economy. This study has identified manpower as a cooperant factor which is missing. Training of all strata of manpower in cognate fields and exposure to work experience is required to drive productivity improvement and close the output gap. Health is another factor identified in this study which if improved would improve the absorptive capacity of the economy. Endemic diseases such as malaria and typhoid can limit the performance of the educational, agricultural and industrial sectors. Concerted and well-directed investment to reduce the burden of malaria and other debilitating diseases will increase the absorptive capacity of the economy and increase both the rate of economic growth and output.

Current external sector practices and policies were found to be inappropriate for the absorptive capacity of the economy. This is an urgent area of reform because the managed exchange rate regime is implicated in high import content of the average consumer basket of commodities. This level of bias is harmful to domestic output and employment. Even if the government does not want to free the exchange rate from direct control, it can adopt a policy of consistent undervaluation instead of the present overvaluation. China has used such a policy trust to great advantage in the last two decades. Japan has recently adopted a similar stance to promote exports.

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