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Impact of Domestic and External Shocks on Macroeconomic Stability in Nigeria

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Abstract

This study investigates the impact of domestic and external shocks on macroeconomic stability in Nigeria (1985-2020). This study was conducted using seven (7) variables, consisting of three (3) domestic variables, namely, Real Gross Domestic Product (RGDP), Broad Money Supply (RM2), and Government Expenditure (GEXP) and four (4) external variables, namely, Crude Oil Price (COP), Foreign Direct Investment (FDI), Trade Openness (TRD), and Official development Assistant (ODA). The method of estimation used is Structural Vector Auto Regression (SVAR) model as proposed by Blanchard and Quah (1989) and Kutu and Ngalawa (2016). The study assesses the impulse response functions and variance decomposition of Nigeria economy stability. The impulse response function shows that, RGDP have positive and significant responses to the shocks from external variables (COP, TRD, and ODA) and domestic variable (RM2) in the short run and long run while RGDP have negative and insignificant response to the shocks from FDI and GEXP throughout the period. The variance decomposition shows that the contributions of external variables (COP, FDI, ODA and TRD) are relatively significant and have strong influence on RGDP in all terms while contributions of domestic variables (RM2 and GEXP) have no noticeable influence on RGDP throughout the period. Therefore, external variables, that is, crude oil price, foreign direct investment, trade openness and official development assistant are liable for economic variation in Nigeria. Thus, steps towards macroeconomic stabilization and trade and investment liberalization must be supported by credible structural reforms if Nigeria is to regain international confidence and improve the standard of living of the population.

Keywords: Domestic Shock, External Shock, SVAR, Impulse Response Function
JEL Classification:E63, F02, F41, C4

Contribution to/Originality Knowledge
The paper contributes to the existing literature on the impact of domestic and external shocks on macroeconomic stability in Nigeria. The originality of the study relies on the data, methodology and results obtained.

1.0 Introduction

The present economic recession in Nigeria draws some economist attention to the relative contribution of domestic and external shocks in driving Nigeria business cycle stability. One of the major concerns of modern macroeconomics is the need to understand the causes of macro-economic fluctuations for policy analysis and forecasting because of the overall implications for growth and welfare. Economic crisis come in a cycle. A recession is an

economic crisis in the business cycle contraction, which results in a general slowdown in economic activities in two or more quarters (6months and above).

Economic stability refers to an absence of excessive fluctuations in the macroeconomy. An economy with fairly constant output growth and low and stable inflation would be considered economically stable. An economy with frequent large recessions, a pronounced business cycle, very high or variable inflation, or frequent financial crises would be considered economically unstable (Baxter & Swiston, 2015).

External shocks occur when unpredictable change in an exogenous factor affects endogenous economic variables. Hence, economies that rely on foreign resources and foreign markets are more susceptible to external shocks than others. It is common among policymakers to ascribe volatility in economic performance in developing countries to external shocks. Although the importance attached to external shocks is reasonable based on some prevalent structural features, this does not imply that external shocks are solely responsible for the volatility. Internal shocks emanating from corruption, political irresponsibility, and other forms of social vices are potential sources of volatility. Specifically, disparities in economic institutions are the main cause of disparities in economic performance across the globe (Acemoglu *et al.*, 2003; Acemoglu & Robinson, 2008).

In low income countries economic activities are greatly unstable and influenced by internal as well as external shocks. This is one of the reasons why substantial empirical literature has focused on this issue. But the existing works on this issue share two shortcomings. First, analysis do not allow for the possibility of time variation in the parameters of the model. This feature is surprising as changing dynamics of variables such as inflation and output have been highlighted by many studies of macroeconomics. Second, most empirical studies on the domestic and external shocks is based on Small-scale Vector Autoregressions (VARs). Moreover, from a practical perspective small VAR are unable to provide inference on large number of variables that may be interest of policy makers. This study proposes an open economy Structural Vector Autoregression (SVAR) which assumes that all variables depend in fixed proportion on past values of the set and new structure shocks. This means all observable variables are endogenous while shocks are the impulses that move the system. SVAR allow for as many types of shocks as there are time series in the set. Consequently, the proposed model contains significantly more information than the small-scale VAR, used in the existing literature. The broad objective of this study is to determine the impact of domestic and external shocks on macroeconomics stability in Nigeria.

There are controversies among economists regarding the necessity of stabilization policies in enhancing stable macroeconomic performance. While the monetarists believe that an economy is stable enough so that stabilization policies are not necessary, the non-monetarists, on the contrary, argue that an economy experiences instability that necessitates active stabilization (Modigliani, 1988). The neoclassical growth model posits that countries with the same production functions, savings rates, identical depreciation rates, and population growth tend to grow at the same rate in the steady state, and this leads to convergence in the long run (Solow, 1956). This assertion is premised on the assertion that poor countries with lower initial income

experience higher growth rates than richer countries. In reality, however, the convergence theory does not always hold as production functions vary across countries. The variations in the production functions are usually attributable to the following factors: technological progress, human capital, and public and social infrastructure, which includes institutions and the rule of law. Modeling macroeconomic stability has evolved from calibrated Vector Autoregression (VAR) to popular Structural Vector Autoregression (SVAR) models, VAR being the workhorse of the modern SVAR models. The Structural Vector Autoregression method was developed by Shapiro and Watson (1988) and Blanchard and Quah (1989) utilize long-run restriction to identify the economic structure from the reduced form.

The paper is structured into five sections, such as introduction which consist statement of the research problem, objectives of study, and the structure of the study. Section two comprises empirical literature review and theoretical framework. The third section comprises of the methodology used in the study. Section four focus on interpretation and analysis of the data collected using econometrics tools while the final section comprised of the summary, conclusion and recommendations of the findings.

2.0 Literature Review

Many studies in the past focused on effect of oil price shocks on macroeconomic performances of either oil exporting countries or oil importing countries, with little attention to other sources of external and domestic shocks. To achieve a comprehensive review of literature, we examined studies that focus on transmission of business cycle, money supply shocks and other sources of domestic and external shocks.

One of the consequences of recent global financial crisis is the growing number of studies on transmission of business cycle, especially from developed countries such as the US, European Union, Japan, China, India, to other countries majorly the developing ones. The recent study, Abere and Akinbobola (2022) examine the external shocks, institutional quality and macroeconomic performance in Nigeria using SVAR approach. They concluded that both external shocks and institutional play significant roles, and hence, posits the existence of favourable institutional environment as a panacea to successfully absorbing the influence of external shocks which are exogenous to the economy. Sunday (2019) employs a sign-restricted Bayesian Structural Vector Autoregressive (BSVAR) model to analyse how global demand, oil price and US monetary policy shock impact the Nigerian business cycle. The results shows global demand and oil price shocks are the principal foreign drivers of the Nigerian business cycle. Rasaki (2018) investigate the effect of external shocks on economic growth dynamics in Nigeria using SVAR and considered six external shocks. The results indicate that external shocks impact economic growth of Nigeria. Parkyn and Vehbi (2013) examine the macroeconomic effects of fiscal policy in New Zealand using a five-variable SVAR model for the period 1983:1-2010:2.Their results indicate that government expenditure shocks has a modest effect on output in the short term, but lowers it in the medium to long-term. While they found a positive but limited impact on inflation following a fiscal expansion, the sign of the effects of tax policy changes were less clear cut. A clear insight from the above review is that

there is no unique conclusion on the effect of fiscal policy on the macro-economy. The results differ from one country to another and various methodological approaches adopted.

Babatunde and Olufemi (2014) analysed the effects of monetary policy shocks using changes in various monetary policy instruments on exchange rate volatility in Nigeria using classical ordinary least square. He found out that, both real and nominal exchange rates in Nigeria have been unstable during the period under review. Lukman (2016) investigate the macroeconomics response of Nigeria economics to external shocks employed global vector autoregression (GVAR). He found out that, oil price shocks have direct effect on real gross domestic product and exchange rate in Nigeria but variables like inflation and short-term interest rate do not show immediate response to the shocks.

Kabundi and Ngwenya (2011) specified a FAVAR model to assess the efficacy of contractionary monetary policy on real, nominal and financial variables in the South African economy using monthly data spanning from 1985 – 2007. Though the study could not establish the existence of price puzzle common with SVAR analysis, it nevertheless found monetary policy as potential price stabilizing tool by influencing the outcomes of key macroeconomic indicators in South Africa. In addition, real and financial sector variables were observed to respond negatively to tight monetary policy stance in the economy as they were found to be significant and rightly signed.

Philip, Haroon and Angeliki (2011) analysed international transmission of shocks using Factor-augmented Vector Autoregression (FAVAR) and the key results show that a foreign monetary policy tightening resembles the classic beggar-thy-neighbour scenario for the United Kingdom in the period 1975 – 90. In more recent periods, the response is negative but largely insignificant.

Vamvakidis and Arora (2010) examined the growth spillover of China's economy in recent time employing vector autoregressions approach and they concluded that spillover effects of China's growth have increased in recent decades and long-term spillover effects are also significant and have extended in recent decades beyond Asia and this has serious implication for a developing country like Nigeria that have serious trade relations with china

3.0 Methodology

The type of data specified for this study is secondary in nature, as time series spanning from 1985 – 2020 employed for the analysis. Data was collected from statistical publication of Central Bank of Nigeria (CBN), National Bureau of Statistic (NBS), annual report and other relevant publication.

3.1 Model Specification

To examine the impact of domestic and external shocks on macroeconomics fluctuation in Nigeria, the study employed an open economy Structural Vector Autoregression (SVAR) model because it captures the dynamic behaviour of all variables in the model. Apart from the restrictions, the main assumption in SVAR is that all the variables are independent and

exogenous, unless identified otherwise. The researcher adopts the model from the work of Blanchard and Quah (1989) as cited in Kutu and Ngalawa (2016); Rotimi and Ngalawa (2017); Akande and Kwenda (2017).

The structure of the economic model is expressed in a reduced form as;

$$Y_t = A_1 Y_{t-1} + \ldots + A_q Y_{t-q} + BZ_t + B_1 Z_{t-1} + \ldots + B_p Z_{t-q} + \mu_t \quad (1)$$

Where t = 1 ….T, Y_t is the vector of the endogenous variables with intercept determinants and time trend. $Z$is also the vector of exogenous variables, while U_t is the vector of the residuals, $A_i \; and \; B_i$ represent the matrices of the coefficients.

Let the matrix of the variance and covariance be;

$$\phi = E\left(U_t U_t^{'}\right) \quad (2)$$

For this study OLS shall be used for the estimation of $A_i, B_i \; and \; \emptyset$ the parameters of the structural form is;

$$CY_t = C_1 Y_{t-1} + \ldots + C_q Y_{t-q} + DY_t + \varepsilon_t \quad (3)$$

Where $C_i \; and \; D$ represent the matrices of the parameters of the economic variables, and ε_t represents the structure of the economic shock, with variance and covariance matrices denoted as $W = E(\varepsilon_t \varepsilon_t')$. Equation 1 and 2 representing the reduced and the structural form are related in the form;

$$A_i = C_0^{'} C_i; \qquad \varepsilon_t = C_0 U_t \quad (4)$$

Similarly, the variance and covariance matrix relationship of the reduced and structural form is written as $\emptyset = \; C_1 W \; (C_0^{-1})'$.

The recursive VAR involves structural rigidity of the underlying relationship between the variables, which therefore leads to the questioning of its ability to appropriately describe the dependences between the variables of a model. Hence, in order to eliminate these weaknesses, it is essential to use SVAR identification method.

The equation can be specified in the following order; Y = (Crude Oil Price (COP), Foreign Direct Investment (FDI), Trade Openness (TRD), Official Development Assistant (ODA), Real Gross Domestic Product (RGDP), Money Supply (RM2), Government Expenditure (GEXP). The basis of this ordering centered in the implicit assumption of the policy maker that some variables may or may not contemporaneously vary with policy decisions. For instance output growth and prices do not respond simultaneously with the monetary policy changes, expect the crude oil price. We considered four external shocks for the purpose of giving better capturing. These are crude oil price, trade openness, foreign direct investment, and official development assistant are here assumed to be exogenous to all the identified variables in the domestic

economy. This structure has been identified, because Nigeria economy is highly open and being affected through foreign shocks.

5.0 Presentation, Analysis and Interpretation of Results

5.1 Unit Root Test

The stochastic non-stationarity of the series was examined in this study and their integration orders were established through the unit root test. This was considered necessary in order to avoid misleading and spurious results. Therefore, for a consistent and reliable result, two statistical tests had been conducted, viz Augmented Dickey- Fuller (ADF), and Phillips-Perron.

Table 5.1 Unit Root Result

Ind. Var	Method	Critical Value	Unit Root Test with no Trend		Unit Root Test with Trend	
			1st diff	Prob	1st diff	Prob
COP	Augumted Dickey Fuller	1%	-3.670170	0.0004	-4.296729	0.0025
FDI	Augumted Dickey Fuller	1%	-3.679322	0.0002	-4.309824	0.0013
TRD	Augumted Dickey Fuller	1%	-3.670170	0.0000	-4.394309	0.0060
ODA	Phillip – Perron	1%	-3.670170	0.0000	-4.296929	0.0000
RGDP	Phillip – Perron	1%	-3.670170	0.0000	-4.296729	0.0000
RM2	Phillip – Perron	1%	-3.670170	0.0000	-4.296729	0.0000
GEXP	Augumted Dickey Fuller	1%	-3.689194	0.0002	-4.323979	0.0011

Source: Author's computation using Eview 10 (2022)

From the above table 5.1 reports of the ADF and PP test of unit root test. All variables are found to be intergrated with first difference at 1% level of significance in ADF and PP test.

5.2 Lag Length Criteria

Table 5.2 Lag Length Criteria Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-742.7105	NA	1.20e+13	49.98070	50.30765*	50.08529
1	-670.0749	106.5323*	2.72e+12	48.40499	51.02056	49.24173
2	-609.6663	60.40857	2.31e+12*	47.64442*	52.54861	49.21331*

Source: Author's computation using Eview 10 (2022)

In VAR, a standard lag length criterion is used to define the number of optimal lags. Most of the criteria indicate optimal lag length is 2 (table 5.2) , while SC and LR test indicated that

optimal lag length is 0 respectively and therfore, Akaike information criterion which indicated optimal lag length of 2 is used in this study.

5.3 Johanson Co-integration Test

Table 5.3 Johanson Co-integration Test Result

Hypothesis No of CE(s)	Trace Statistic	5% Critical Value	Prob.	Max-Eigen Statistic	5% Critcal Value	Prob.
None	171.9356	150.5585	0.0608	55.59211	50.59985	0.0522
At most 1	116.3434	117.7082	0.0912	44.32444	44.49720	0.0805
At most 2	72.01900	88.80380	0.4295	25.16082	38.33101	0.6602
At most 3	46.85818	63.87610	0.5596	18.16536	32.11832	0.7892
At most 4	28.69282	42.91525	0.5805	12.03055	25.82321	0.8708
At msot 5	16.66227	25.87211	0.4406	10.84813	19.38704	0.5290
At most 6	5.814137	12.51798	0.4443	5.814137	12.51798	0.4843

Source: Author's computation using Eview 10 (2022)

From the table 5.3 reports the Johanson Co-integration test at level, it shows that there is no existence of co-integration of COP, FDI, TRD, ODA, RGDP, RM2, and GEXP at 5% critical value.

5.4 Root of Characteristic Polynominal Test

The study also conducted some VAR authentication tests like roots of polynominal test used to check that VAR is stationary or not. The result indicate that VAR is stationary and statisfy stablility condition because modulus of root characterisitic polynominal is less than 1 and no root lies outside the unit circle.

Table 5.4 Root of Characteristic Polynominal Test Result

Roots of Characteristic Polynomial	
Root	**Modulus**
0.921689 – 0.253872i	0.956014
0.921689 + 0.253872i	0.956014
0.544380 – 0.579048i	0.794762
0.544380 + 0.579048i	0.794762
-0.219223 – 0.737755i	0.769638
-0.219223 + 0.737755i	0.769638
-0.756205	0.756205
0.001180 – 0.606763i	0.606764
0.001180 + 0.606763i	0.606764

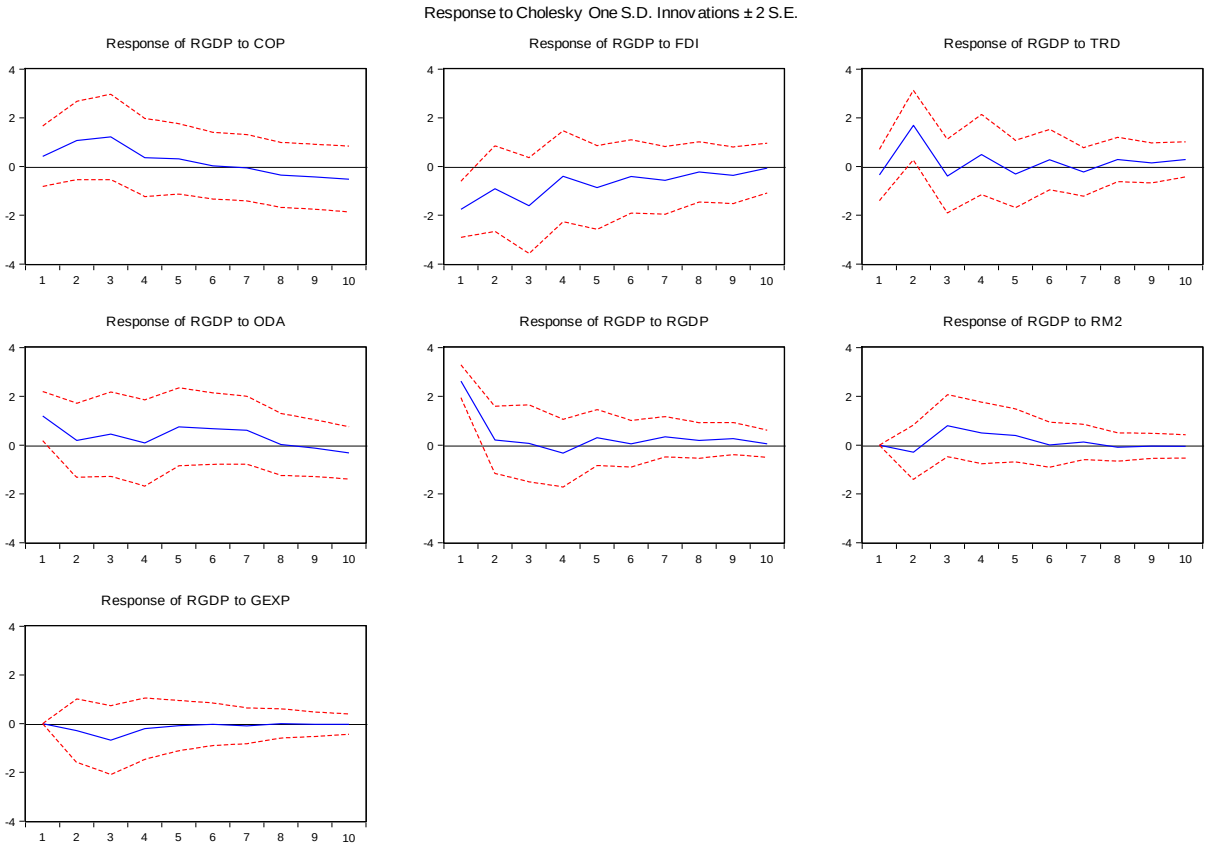
0.548699 – 0.083151i	0.554964
0.548699 + 0.083151i	0.554964
0.192606 – 0.510190i	0.545336
0.192606 + 0.510190i	0.545336
-0.453964	0.453964

Source: Author's computation using Eview 10 (2022)

5.5 Impulse Responses Analysis

Figure 1 show the dynamic effect of Real Gross Domestic Product to response of crude oil price, foreign direct investment, trade openness, official development assistance, money supply and government expenditure to one standard deviation of RGDP.

Figure 1. Impose Respone Result of RGDP



Source: Author's computation using Eview 10 (2022)

From figure 1 above, RGDP has a positive and significant response to the COP and ODA shocks. COP rate fall steadily, and it becomes negative at the third quarter while ODA fall steadily at quarter one to quarter 2 and later improve at the third quarter and become negative at the fourth quarter. Similarly, RGDP, has positive and significant response to the TRD shock, it improve at the first quarter and fall immediately after the second quarter and later improve in the third quarter. Also, RGDP have positive and significant response to the RM2 shock but later insignificant at the third quarter. RGDP has a negative and insignificant response to the

FDI and GEXP shocks throughout the period. Therefore, external shocks are more relevant to explain the variation in economic growth than internal shocks in Nigeria or developing countries. Comparing the estimate with previous study as Benedict and Uzochukwu (2011) that terms of trade shocks in Nigeria are high and has impacted negatively on macroeconomic performance.

Table 5.5 Impulse Response Result on RGDP

Period	COP	FDI	TRD	ODA	RGDP	RM2	GEXP
Short Term	0.366085	-0.400661	0.491901	0.083582	-0.333185	0.498973	-0.207758
	(0.80042)	(0.93382)	(0.82269)	(0.88223)	(0.69393)	(0.63218)	(0.62865)
Semi-	-	-0.361095	0.145415	-0.128100	0.265033	-0.038758	-0.025273
Medium	0.422892	(0.58003)	(0.41096)	(0.58151)	(0.32758)	(0.25835)	(0.25032)
Term	(0.66878)						
Medium	-	0.273423	-	-0.307855	-0.068912	-0.106845	0.085575
Term	0.241448	(0.48269)	0.056710	(0.56909)	(0.21799)	(0.20916)	(0.22080)
	(0.70256)		(0.24674)				
Long Term	0.287997	-0.128720	0.021483	0.213569	0.019208	0.050146	-0.042232
	(0.70366)	(0.38549)	(0.16688)	(0.50792)	(0.15720)	(0.15433)	(0.15965)

Source: Author's computation using Eview 10 (2022)

Table 5.5 show the dynamic effect of Real Gross Domestic Product to response of crude oil price, foreign direct investment, trade openness, official development assistance, money supply and government expenditure to one standard deviation of RGDP.

In the short run, shocks to COP accounts for 0.37%, TRD accounts for 0.49%, ODA accounts for 0.08%, and RM2 account for 0.50% which means in the short-run RGDP have positive and significant response to the shock from external variables (COP, TRD, and ODA) and domestic variable (RM2) while negative and insignificant response to the shock from FDI (-0.40%) and GEXP (-0.21%).

In the semi-medium term, real gross domestic product have negative and insignificant response to the shocks from COP (-0.42%), FDI (-0.36%), ODA (-0.13%), RM2 (-0.04%) and GEXP (-0.03%) while shock to trade openness (0.15%) have asymmetric impact on RGDP.

In the long term, shocks to COP accounts for 0.28%, TRD accounts for 0.02% but not noticeable, ODA accounts for 0.21%, and RM2 account for 0.05% which means that in the long-run RGDP have positive and significant response to the shock from external variables (COP, TRD, and ODA) and domestic variable (RM2) while negative and insignificant response to the shock from FDI (-0.13%) and GEXP (-0.04%).

5.6 Periodic Analysis of the Variance Decomposition

The variance decomposition estimates the proportion of each shock effect resulting from the variance of each of the endogenous variables and also from the shock of the variable itself over

a period of time. In our findings, the shock has been broken down to short-term, semi-medium term, medium term and long term, variable by variable, as contained in Table 5.6. It gives the variance decomposition of the Real Gross Domestic Product (RGDP) where the RGDP contemporaneously responses to shock of itself in short run as 30.25%. Thus, out of the remaining 69.75% other variables, the COP accounts for 12.63%, FDI account for 28.66, TRD is 14.60, ODA accounts for 7.15 which means external shocks in the model have strong influence on the RGDP in the short run while RM2 and GEXP accounts for 4.18 and 2.53 respectively which means domestic shocks do not have strong influence on the RGDP in the short run.

Table 7.6 Variance Decomposition of RGDP

Period	COP	FDI	TRD	ODA	RGDP	RM2	GEXP
Short Term	12.62798	28.66323	14.59678	7.146575	30.25361	4.184602	2.527224
Semi-Medium Term	12.21630	29.58475	13.63395	11.22791	26.90271	4.223211	2.211164
Medium Term	15.92400	27.92403	12.81155	12.67124	24.57488	3.976338	2.117977
Long Term	17.02751	27.62282	12.48626	13.04305	23.84360	3.887228	2.089525

Source: Author's computation using Eview 10 (2022).

In summary, the external shocks, particularly, FDI and crude oil have significant impact on economic growth in Nigeria. Also, the trade openness and official development assistant are significantly impacts on economic growth and stability in Nigeria, being an open economy. Other variables (RM2 and GEXP) had insignificant impact or influence on the RGDP.

6. Conclusion and Recommendations

The study assesses the impulse response function and forecast error variance decomposition of Nigeria economy fluctuation. Conclusively external variable are liable for economic variations. The study therefore advocate that Nigeria should take practical steps to ameliorate the adverse effect of external shocks by carefully selecting and engaging policy thrust that suit the economic problems and environments.

The policy implication of the study is that it is important to understand the causes of macro-economic stability in developing economies for policy analysis and forecasting because of the overall implications for growth and welfare. It is imperative that government embarks on policies that will avert recession or even depression which though originating from an economy can have regional/ global implications.

i. Steps towards macroeconomic stabilization and trade and investment liberalization must be supported by credible structural reforms if Nigeria is to regain international confidence and improve the standard of living of the population. All these can be achieved through innovation in technology, finance, and policy and will need new

approaches, new type of partnerships, and new mind-set that encourages new actors such as adequate protection that can help people economically invulnerable.

ii. Long-run export diversification leading to less terms of trade volatility should be considered as a policy option aimed at private sector productivity growth. One of the reasons for extreme terms of trade shocks among most developing countries is the concentrated nature of their exports relative to their well diversified imports. They can, however, reduce aggregate terms of trade volatility by changing the composition exports.

iii. The current global financial meltdown is reminiscent of the Great Depression of the 1930s. This study has shown that the Nigerian economy is perturbed by both real and nominal factors reinforcing the need for government intervention in the economy. The current experiences show that the economy cannot be left to the invisible hands and ultra-liberal market reforms. It is imperative that government embarks on policies that will avert recession or even depression which though originating from an economy can have regional/ global implications.

iv. Finally, a major finding of the study is the fact that the export sector which is supposed to be the engine of growth of the economy is exhibiting weak linkages with the rest of the economy. This study suggests the need for a major policy design to encourage value addition of the nation's export commodities.

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