IMPACTS OF FUNDAMENTAL MACROECONOMIC SHOCKS AND ANTI – SHOCK POLICIES IN NIGERIA: A DSGE ANALYSIS

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ABSTRACT

This paper extensively used the framework of the dynamic stochastic general equilibrium model (DSGEM) to examine fundamental macroeconomic variables and key policy response variables in Nigeria. The model is used to evaluate the effects of fundamental macroeconomic shocks – general price level, the interest rate, the real exchange rate, and inflation and to test the effectiveness of different policies, using the impulse responses of the variables to one standard deviation and the variance decomposition analysis, in explaining the variations in the main macroeconomic variables. Against this background, this paper analyzes whether the Nigerian economy has any possibility at all to apply anti-shock policies in order to reduce or eliminate the short and long run effects of the stated fundamental macroeconomic shocks. The results show considerable empirical evidence that the foreign interest rate shock leads to much more persistent responses in both domestic and foreign variables. The foreign supply and inflation shocks increase domestic output gap, inflation and interest rates. Higher interest rate and real exchange rate appreciation reduce aggregate demand as well as a fall in output gap and inflation. The policy responses of domestic variables to external shocks have been captured by the method analyses. However domestic policy distortions increase economic effects.

Keywords: Macroeconomic Fundamentals, DSGEM, Policy Responses, Nigeria.

JEL classification Codes: C22, C73, E61

1. INTRODUCTION

The term ‘‘economic shocks’’ is used to describe a disturbance to the economy that was unanticipated. At the macroeconomic level the impact of these shocks are recorded in real growth rates, price inflation, and private investment per capita, government revenues per capita, terms of trade and real exchange rate which closely reflect the movements of oil prices. But patterns of shocks vary among sectors. In terms of GDP the most affected are real and services sectors. The interactions between fundamental macroeconomic shocks and policy responses took a center role of transmitting shocks and economic stimulus. However, economists and policymakers have over the years formulated different policies to accelerate the process of economic sustainability in developing countries. While a number of studies have attributed economic instability in developing countries to external factors, others conclude that internal factors are largely responsible. For example, Duttagupta et al. (2014), the global financial crisis is a perfect illustration of the impact of external shocks on an economy. Rasaki and Malikane (2015) discovered that external shocks are largely responsible for economic instability in African countries. In the case of Nigeria, the over reliance of Nigerian firms on foreign intermediate inputs to produce final domestic output make the economy susceptible to foreign input price shocks. In contrast, Hoffmaister and Roldós (2001) and Raddatz, (2007) conclude that macroeconomic fluctuations in developing countries are caused by internal shocks.

However, the cumulative effect on domestic economic activities could be amplified or dampened depending on how domestic macro - economic policies respond to these internal and external shocks (Adebisi, 2015).

Sustained macro economy is one of the most important policy issues in developing countries. Aghion and others, for example, show that counter-cyclical policies can directly influence long-term growth (see Aghion and Howitt (2005); Aghion et al (2006)). The controversial relationship between economic shocks and macroeconomic policy responses is attributed to the following reasons; differences in the conceptual definition of economic shocks and macroeconomic policy. The basic thrust of this study is to evaluate the relationship between macroeconomic policy response as counter-cyclical measures to economic shocks using a Dynamic Stochastic General Equilibrium (DSGE) model estimated on data for Nigeria, taken into consideration the sources of major exogenous shocks, channels, and level of macroeconomic instability. It would also provide a theory based assessment of how shocks are transmitted to the macro economy.

The central objective of this study is to investigate the effects of some fundamental macroeconomic shocks on the Nigerian economy and the anti - impact of the various macroeconomic policy responses on these shocks using a Dynamic Stochastic General Equilibrium (DSGE) model. The study presents the empirical evidences that shocks and policies attributable to global economic interactions defile the development of an economy. The rest of the paper is structured as follows. Subsequent to introductory section is the literature review, while Section three describes the methodology and model, and section four discusses the results findings stated. Section five concludes.

2. LITERATURE REVIEW

Empirical and theoretical literature on the, sources of macroeconomic instability in developing countries has been quite divergent. While a number of studies posit that fundamental macroeconomic shocks comprises of internal and external shocks which are largely responsible for macro-economic instability in developing countries, other studies conclude that internal factors are responsible. For instance, Mendoza (1995) and Agénor et al. (1999) examine the effects of terms of trade shocks on output variations in developing countries. Kose and Riezman (2001), Bleaney and Greenaway (2001) and Rasaki and Malikane (2015) discovered, that trade shocks and external financial shocks significantly account for output fluctuations in African countries. Related studies focusing on African countries have also shown that external shocks significantly influence their economic fluctuations. Silva (2012) examined the role domestic and external shocks play in driving business cycles in Mexico and Brazil. A non-recursive contemporaneous and block recursive restrictions were imposed and the model was estimated using Bayesian procedure. Huh and Kwon (2015) estimate a Bayesian SVAR model of the real exchange rate, output and trade balance for the G-7 with a set of sign restrictions derived from Clarida and Gali (1994)'s stochastic rational expectations open-economy model with sticky prices. They extend the model by incorporating trade balance and identifying supply shocks using the implied long-run restrictions of the output-neutrality condition. Their results show that nominal shocks tend to induce real exchange rate depreciation; leading to improvements in the trade balance in the long run across the G-7 economies. It triggered a series of shocks in most of the world economies, allowing most of them to experience the direct or indirect impact of the crisis through various shock factors.

The effect of macroeconomic instability still lingers in many developed, developing and emerging economies, and persistent in African countries. More recently, Abere and Akinbobola (2020) examined the relative contributions of external shocks and institutional quality to macroeconomic performance in Nigeria, using structural Vector Autoregressive (SVAR) approach. Their study established the dominance of the relative contributions of external shocks measures over institutional quality to macroeconomic performance in the country. They opined that even though the dominance of terms of trade and foreign aid is highlighted, the role of institutional quality is equally important as it also has significant positive effect on performance. Their study concluded that both external shocks and institutional quality play significant roles, and hence posits the existence of favorable institutional environments as a panacea to successfully absorbing the influence of external shocks which are exogenous to the economy. This argument is buttressed by the submission of Cashin and Sosa (2013), that an accurate identification and evaluation of sources of foreign disturbances and the mechanisms for adjusting to them is important for understanding business cycles dynamics and for designing appropriate policies to manage them. In other words, the extent of a country's vulnerability to external shocks, determine the choice, intensity and sequence of policy responses to such a shock.

Counter cyclical monetary and fiscal policies could, in principle, counteract the pro-cyclical effects that real exchange rate fluctuations are likely to have on the economy. Fiscal policy can always provide a useful counter cyclical device. Indeed, it is frequently argued that fiscal policy is a more powerful counter cyclical instrument than monetary policy in an open economy. A fundamental reason for the incapacity to achieve sustained economic growth is that pro cyclical adjustment typically damages public and private investment and thereby economic growth. Some countries focused on much more narrowly defined short-term stabilization objectives which have resulted many times in exchange rate overvaluation.

The policy measures that could be envisaged in response to shocks on the economy are: Contra-ctionary monetary policy aimed at inflation reduction, growth rate and production capacity absorption; low real interest rate in order to pave way for increase in domestic production; Contra-ctionary fiscal measure aim to reduce fiscal deficit and make a sustainable budget that can suppress aggregate demand pressure; A market determined exchange rate need to be retained so as to have a competitive real exchange rate and creates market for internationally exchangeable goods and services; Efficient external debt management so as to prevent debt crisis in the macro economy and; Macroeconomic structural reforms in terms of financial sector, producer pricing policies, economic liberalization and institutional reforms to create atmosphere for efficient macroeconomic performance.

Nigeria is an emerging economy that is integrated globally with the rest of the world. It is expected that external conditions in the world will strongly influence economic developments in the country, especially through international crude oil price (given that the country is a primary market dependent economy), as well in financial links. Globalization has made it such that countries of the world are very much dependent on one another in many ways. Global integration through increased trade, financial transactions, foreign investments, global financial institutions and even through macroeconomic policies has made world economies vulnerable to spillover effects from other economies and subject to a variety of external shocks. Several studies as reviewed in this study has shown that these shocks which are propagated through various channels, affect economies differently (depending on whether they are developed, developing,

emerging or underdeveloped) and the countries also respond through different adjustment mechanisms (Sosa and Cashin, 2013).

This study seeks to quantitatively assess the impact of **f**undamental macroeconomic shocks and Anti – shock policies responses in the case of Nigeria economy. Specifically, the study investigate the effects of foreign interest rate shocks, foreign input price shocks which represent foreign supply shocks, foreign output shocks which denote foreign demand shocks, real exchange rate shocks, added a broader range of internal economic shocks that are proxies for all the stated external economic shocks and counter-cyclical policies in Nigeria.

3. METHODOLOGY

DSGE models are typically designed to ascertain fundamental macroeconomic shocks that lead to macroeconomic instability. The models are structural in the sense that each equation has an economic interpretation, policy interventions and their transmission mechanism can be clearly identified. Our analysis in this study, based on these considerations, will use the following estimation techniques: Impulse response functions and Variance decomposition analysis were presented. Numerical values are chosen for the parameters (calibration) and the models are subjected to stochastic shocks in the-domestic supply and demand shocks, domestic and foreign interest rate shocks, exchange rate shock, foreign supply and demand shocks. In addition, measurement errors are added as suggested by Ireland (2004). Measurement errors are suggested as a way to capture the movements and co-movements in the data that the model prescribed, because of its simplified structure.

The data set used for this analysis is the quarterly data of the selected relevant macroeconomic variables vis-à-vis; foreign and domestic output; Inflation; Interest rate and Exchange rate from 1986:Q1 to 2021:Q4. The data for money supply (broad money, M2), exchange rate and monetary policy rate are used as monetary policy variables. Data for government revenues both oil and non-oil revenues, government expenditure (capital and recurrent) will be used as fiscal policy variables.

3.1 Theoretical Framework

This section looks at some theoretical and empirical issues on the relationships between macroeconomic policy responses to internal and external shocks, with specific concentration on the three principal macroeconomic policy instruments: monetary policy, fiscal policy and exchange rate policy. This ties the Mundell-Fleming analysis with the medium and long-run analysis. This is followed by an examination of four different kinds of shocks: domestic aggregate demand shocks, domestic supply shocks, foreign trade shocks and external supply shocks. In each case, the question asked are at what the implication of each shock would be for the short-run, the medium-run and the long-run equilibrium? This helps us to analyze what would happen after each kind of shock if the government fails to react to it at all. We can further ask whether there are appropriate tools available to the government with which to offset such a shock or to mitigate its effects on the economy. Macroeconomic policies are designed in such a way that a unique equilibrium exists in the DSG**E** model. This is in spite the fact that macro economists usually assess their models by checking the predicted effects of macroeconomic shock in them with those observed in the data.

The systematic part of the macroeconomic policy is crucial to the way the model behaves after a shock. The baseline New Keynesian framework for analysis of monetary policy provided in Clarida et al., (1999) is a small Dynamic Stochastic General Equilibrium (DSGE) model in a forward-looking setting. Usually the fiscal policy is of a sort that implies that the government obeys its inter-temporal budget constraint while the monetary authority sets the short-run nominal interest rate according to the Taylor Rule. If instead the fiscal policy violates that inter temporal constraint, the equilibrium will be unique if the monetary authority passively generates seignoirage to finance fiscal deficits thus accepting higher inflation.

This inform approach taken by Clarida et al., (1999) based on the idea that temporary nominal price rigidity provides the key friction that gives monetary policy an influence over the short-term course of the real economy. With nominal price rigidity present, the inflation targeting monetary authority (central bank) can effectively change the short-term real interest rate by varying their monetary policy instrument, the short-term nominal interest rate. The size of the Central Bank's leverage over the near-term of the economy is, as Clarida et al., (1999) point out, still open to debate. Whether or not the central bank binds the future course of monetary policy to a rule or not matters because the two cases differ in their implications for the link between policy intentions and private sector beliefs Clarida et al., (1999).

In all major DSGE models macroeconomic theory is underpinned by micro economic foundations so that the analysis can be based upon framework that incorporate the current methodological advances in empirical macroeconomic modeling. The New Keynesian framework is based on the conceptual framework of the traditional Keynesian IS/LM framework, where the economy is divided into three blocks: (i) the supply-side including a Phillips curve (PC) that relates inflation positively to the output gap; (ii) the demand side including an Investment-Saving curve (IS) that relates the output gap inversely to the real interest rate; and (3) monetary policy including the monetary policy objective function which translates the behavior of the target variables, the inflation rate and output gap, into a welfare measure to guide the monetary authority's policy choice when deriving the interest rate rule. Within the model the short-term nominal interest rate serves as the instrument of monetary policy.

Equations to be estimated

The model used in this study is the Buncic and Melecky (2007) model. This model extends the work of Clarida et.al.(1999), Lubik and Schorfheide (2005) in its simplified form to the small open economy case, which has become the standard and vastly used in the literature. The model is a two-country model domestic and the foreign economies. The Euro Area is taken as the foreign economy which is taken as a proxy for the developed economies. Here we consider a structural version of the foreign economy, as in Lubik and Schorfheide (2007). Some of the studies in the New Open economy macroeconomics (NOEM) field like Lui (2005) consider AR(1) processes for the foreign block. A large part of the derivations of these models were based on Gali (2008).

The model comprises the following variables: y_t, π_t, q_t, r_t, y^*_t, π^*_t, r^*_t representing domestic output, domestic inflation, real exchange rate, domestic nominal interest rate, foreign output, foreign inflation, and foreign nominal interest rate respectively.

Consequent upon this,, to establish the New Keynesian framework, one has to Log-Linearize DSGE models consisting of the alternative market clearing and optimality

conditions in the neighborhood of a non-stochastic zero condition steady state which will subsequently lead to a canonical representation of the equilibrium of the model consisting of a dynamic IS curve, a New Keynesian Phillips Curve (NKPC) and some form of fiscal and monetary policies model at the domestic level, as well as equations for the external sectors. This makes it possible for the fully micro-founded New Open Economy Macroeconomic literature to tie in with traditional Open Economy Macroeconomic models of the Mundell-Fleming-Dornbusch type.

The model is already in log-linear form: Formally, the solution of the log-linearised system can be written as: The model analyzed consists of a set of linearized equations so that each variable in the model is in percentage deviation from its steady state value. That is $x_1 = (X_1-X)/X$ is in log-deviation and X is the steady state value. The variables with asterisks are the foreign variables. The open economy model we shall be estimating for Nigeria is derived from Buncic and Melecky (2007). As in other variants of the SOE model, there are basically seven key equations and some set of exogenous variables.

The New Keynesian Phillips curve.

This has become a standard method of analyzing inflation dynamics. Equation 1.0 is an open economy New Keynesian Phillips Curve (NKPC). This curve is derived from the profit maximization decision of the domestic firms under the monopolistic competition and sticky prices. The NK Phillips curve is forward looking, as expectations about future inflation influence the current inflation. It also comprises a backward looking element in inflation, so that past inflation matters for current inflation. This extension due to Gali and Gertler (1999) improves the inertia of the inflation. Since it is an open economy Phillips curve, the exchange rate also enters the equation.

$$\pi_t = \rho_\pi E_t\pi_{t+1}+(1-\rho_\pi)\pi_{t-1}+\lambda_1 y_t + \lambda_2 q_t + \epsilon_{\pi,t} \qquad (1.0)$$

The IS equation.

The IS equation so described is structurally given. Equation (1.1) is an open economy IS curve. Since the IS curve results from the optimizing decision of households who maximize their lifetime utility, a forward looking element appears. The backward looking element is the result of either external habit formation or adjustment costs in capital (see Buncic and Melecky, 2007). Moreover, since it characterizes an open economy, the domestic output is influenced by both the real exchange rate and by the foreign output.

$$yt = \rho_y E_t y_{t+1} + (1-\rho_y)\, y_{t-1} - \partial_t(r_{t-1}-E_{t-1}\pi_t) + \partial_2 q_{t-1} + \partial_3 y_t^* + \epsilon_{y,t} \qquad (1.1)$$

The monetary reaction function:

The monetary policy rule equation (1.2) is a Typical Taylorian Rule. Here, the standard Taylor formulation is modified to allow for interest rate smoothing, as proposed by Clarida et al. (1999). The fact that the exchange rate is not included in the reaction function can be argued from the existing literature that founds little or no statistical evidence that the monetary authority reacts to the exchange rate fluctuations, (see Lubik and Schorfheide (2007).

$$r_t =\rho_r r_{t-1}+(1-\rho_r)(\psi_t\pi_t+ \psi_y y_t) + \epsilon_{m,,t} \qquad (1.2)$$

Exchange rate equation:

Equation (1.3) specifies the real exchange rate dynamics. The real exchange rate follows the uncovered interest parity to which a shock is added in order to take into account the measurement errors. The same approach was also followed by Justiniano and Preston (2004).

$$E_t\Delta q_{t+1} = (r_t - E_t\pi_{t+1}) - (r_t^* - E_t\pi^*_{t+1}) + \epsilon_{q,t} \quad (1.3)$$

Foreign economy equations:

Equations (1.4)-(1.6) specify the foreign economy, in this case the euro area- proxies world developed economies. The foreign economy is similar in structure to the domestic economy. Since the foreign economy is taken as a large economy, no open-economy elements appear in the equation that characterize it (Buncic & Melecky, 2007).

$$\pi_t^* = \rho_\pi^* E_t\pi_{t+1}^* + (1-\rho_\pi^*))\pi_{t-1}^* + \lambda^* y_t^* + \epsilon_{y,t}^* \quad (1.4)$$

$$y_t^* = \rho_y^* E_t y_{t-1}^* + (1-\rho_y^*)y_{t-1}^* - \partial^*(r_{t-1}^* - E_{t-1}\pi_t^*) + \epsilon_{y,t}^* \quad (1.5)$$

$$r_t^* = \rho_{rf} r_{t-1}^* + (1-\rho_{rf})(\psi_{rf}\pi_t^* + \psi_{yf} y_t^*) + \epsilon_{m,t}^* \quad (1.6)$$

By this specification, we pin down the small open economy as a system affected by foreign and worldwide data-generating processes but which has little or no perceptible influence on the rest of the world. It is in this sense that we interpret our SOE model.

4. RESULTS AND DISCUSSION OF FINDINGS

Impulse Response Analysis of the Fundamental Macroeconomic Shocks

The impulse-response analysis can be viewed as additional robustness test for the goodness of the present model specification. Since the determinacy of the rational expectations equilibrium has been assured, it would be interesting to investigate how the endogenous variables of the model react to simulated transitory shocks at home and abroad. As a preliminary to simulating the model assuming active monetary and fiscal policies, we here consider the relative importance of internal and external shocks. While active monetary and fiscal policies in principle can offset the impact of either kind of shocks on the domestic economy, the capacity to limit the effect of external disturbances may in practice be limited, especially so for a small open economy like Nigeria. To address the question of how important foreign shocks were in explaining the recession of the late 1980s and the deflation around the year 2000 and presently since 2014 – 2018 and COVID – 19 devastating effect on the world economy and experience of Nigeria economy, the study simulate the model by setting all domestic shocks to zero.

The results of the simulation show a number of differences that come with openness. Charts 1-7 illustrate the responses of different fundamental structural macroeconomic shocks to anti - shock policies, presented as follows:

1. The Interest Rate Shock

Charts 1 and 2, show the influence of domestic nominal and foreign nominal interest rate on the (a) domestic output, (b), the domestic inflation (c) the real exchange rate and (d) domestic interest rate. The domestic interest rate increases less than 1% since the output

gap and the inflation respond negatively from the first period to the interest rate shock. The impact of this on the domestic variables is not persistent. Inflation decreases by 0.3% but its effect lasts for about two quarters. The impact on the output gap is slightly more persistent. Output decreases by more than 0.15% and its negative effect lasts for about six quarters. One may notice that output reacts in a realistic way, with a hump-shaped response to the interest rate shock. The increase in the domestic inflation leads to increase in the domestic interest rate, which reacts strongly by 2%. This further leads to a decrease in the output gap with a lag of one year. The foreign interest rate shock leads to much more persistent responses in both domestic and foreign variables. The results show a peak for the nominal interest rate at the beginning of the adjustment period, which implies that the Central Bank of Nigeria needs to react strongly to a real interest rate shock in order to bring the inflation rate to its optimal path. In order to derive the observed interest rate response, the Central Bank of Nigeria must reduce money supply. This shock also produces an appreciation of the Naira as indicated by the partial existence of uncovered interest rate parity, evidenced in the fact that higher interest rate generates capital inflows that initially appreciate Naira as indicated below in Chart 1. These results-both in terms of the magnitudes and shapes of the charts-align fairly closely with findings in the regular DSGE literature (Smets & Wouters, 2007; Aruoba & Schorfheide, 2009). In the long run all variables tend towards a steady state (equilibrium).

Chart 1: The influence of _e_m on y, r, pie and q.

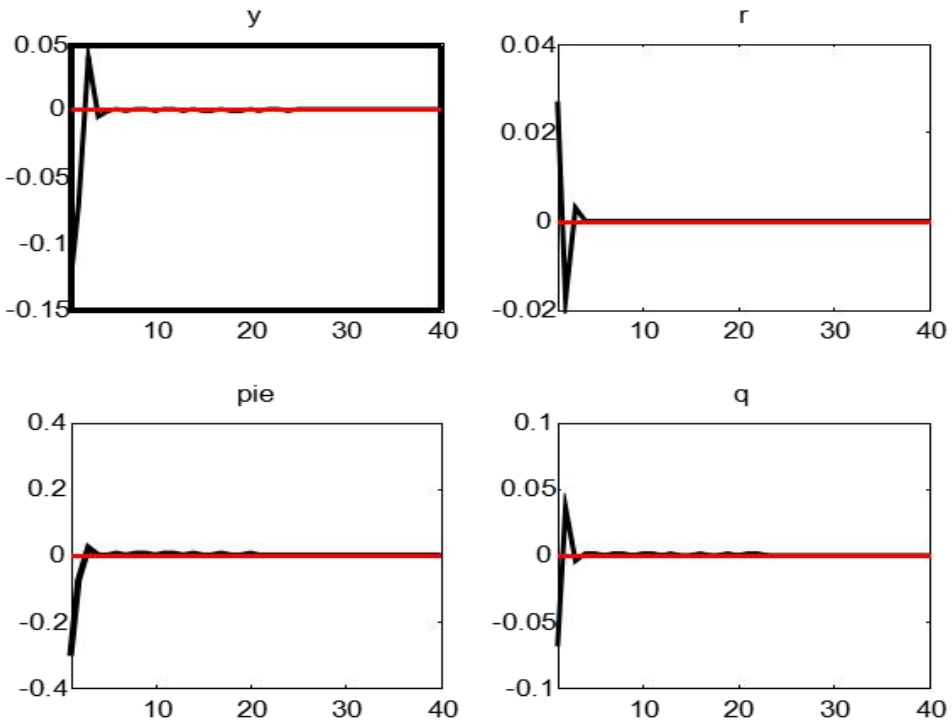


Chart 2: The influence of e_mst on y, r, pie and q.

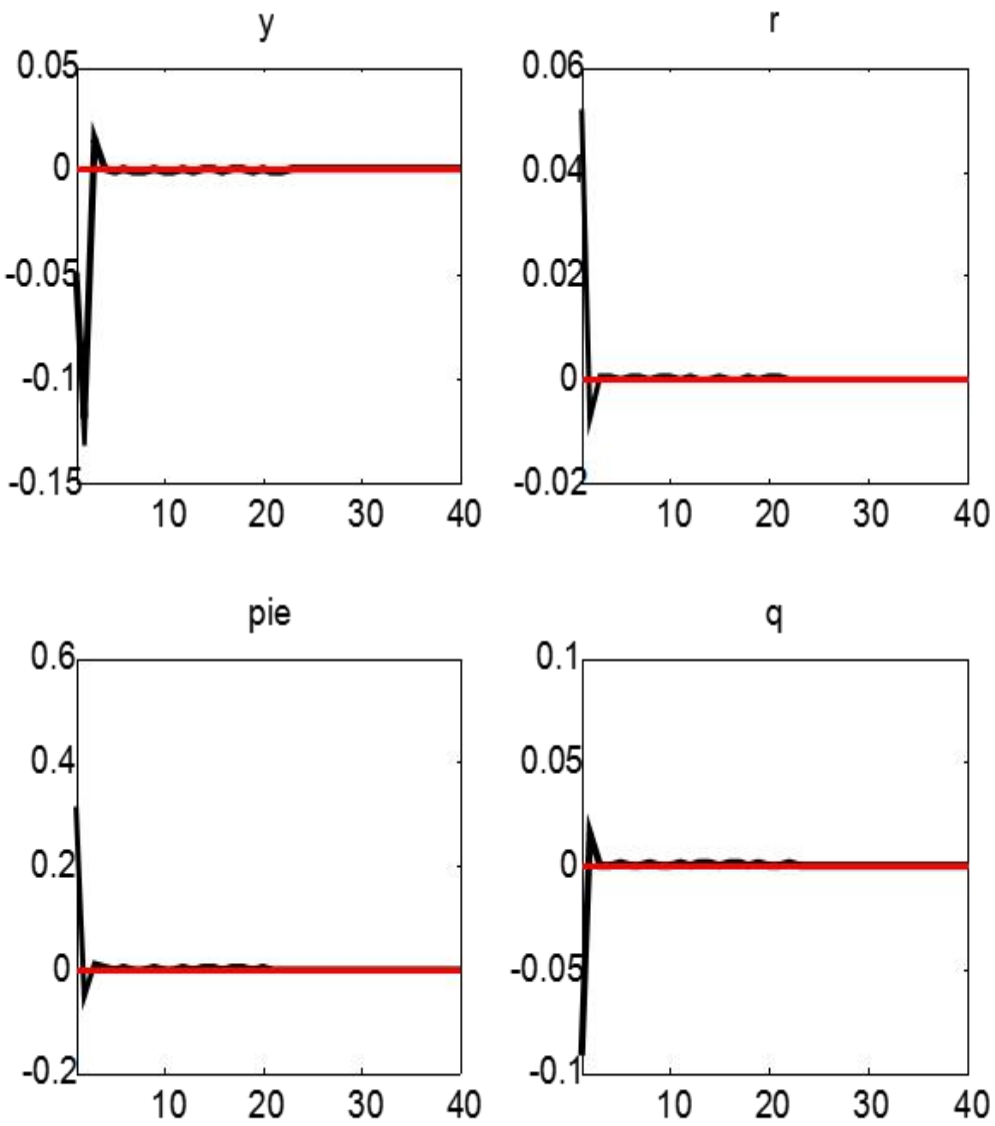


Chart 3: The Demand Shock

Charts 3 and 4 show that demand shock leads to a strong response of the output, which increases more than one percent. This response is in line with economic theory. The percentage is moderate, as the effect completely dies out after five quarters. When viewed through the Taylor rule, the interest rate reacts positively but moderately. The 0.3% increase in the interest rate leads to a negative response in the inflation that decreases by 0.3%. In response to the positive output gap and higher inflation, the Central Bank raises real interest rates, which leads to a depreciation of the exchange rate (Naira), vis-à-vis other international currencies. These results clearly show the presence of a sizable liquidity effect in our model following the unexpected tightening of the monetary policy. It means that restrictive monetary policy is leading to the increase of nominal interest rate that causes an increase in the devaluation of the Naira.

Chart 3: The influence of e_pie on y, r, pie and q.

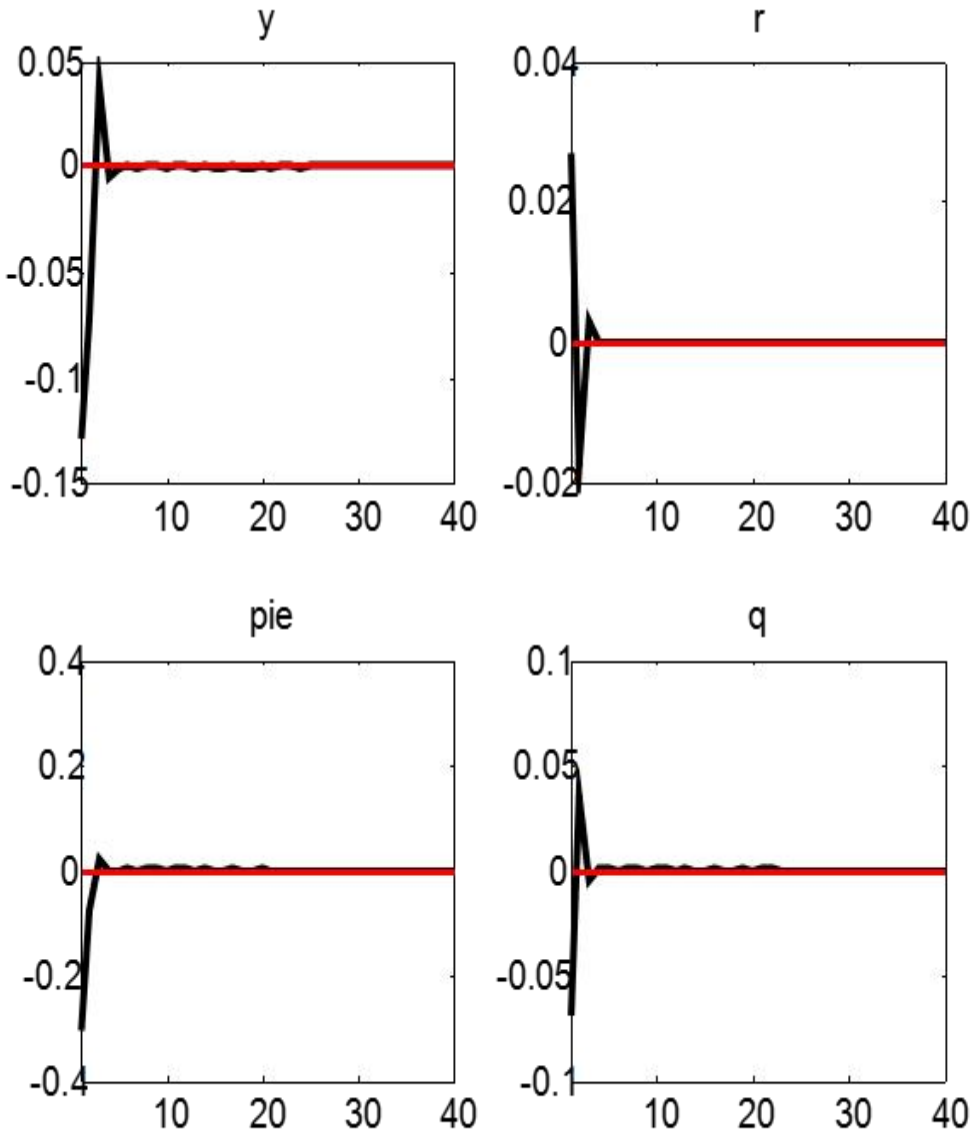
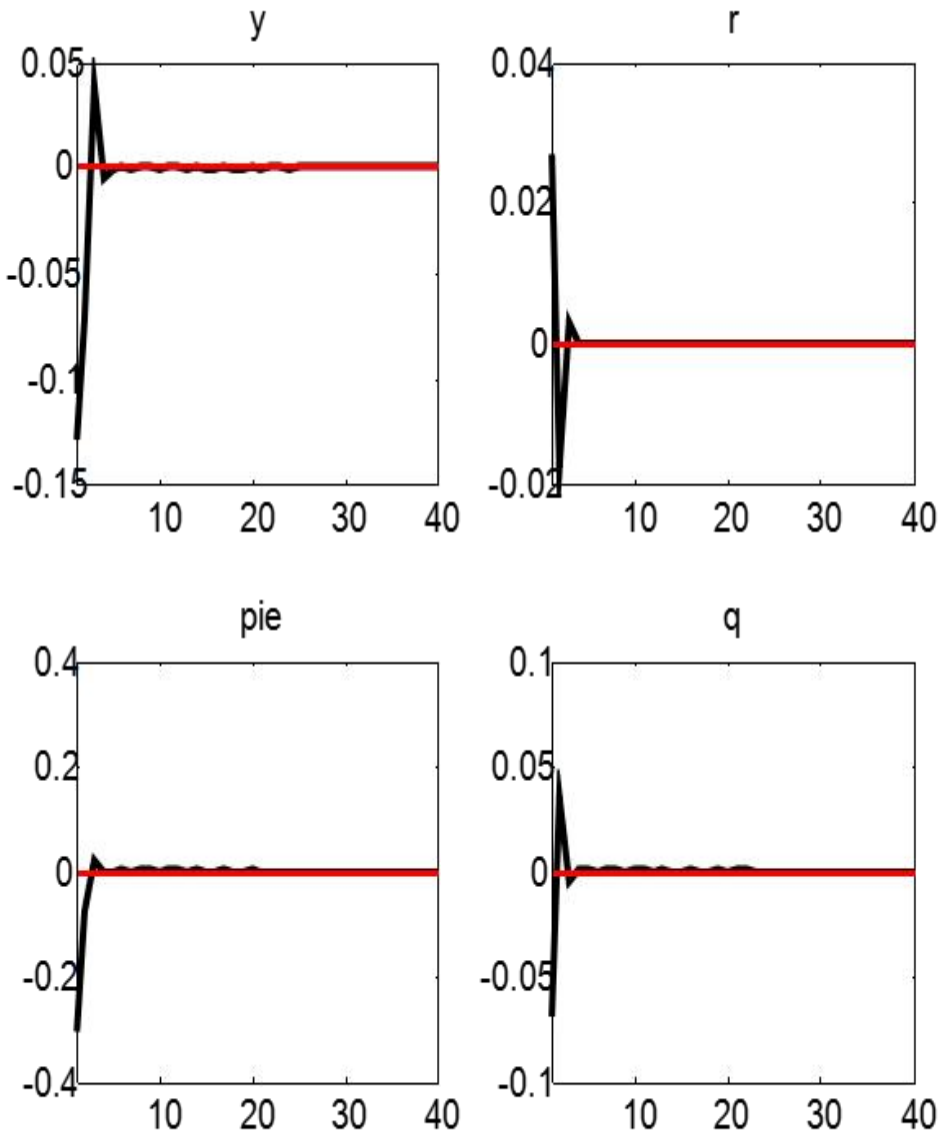


Chart 4: The influence of e_pist on y, r, pie and q.



.The Supply Shock

Charts 5, 6 and 7., show the influence of domestic and foreign supply shocks on the (a) domestic nominal interest rate; (b) domestic inflation; and (c) the real exchange rate. A one percent temporary positive supply shock leads to a 0.06% increase in the interest rate. The increase in the interest rate leads to an actual increase in the inflation to about 0.05%. In other words increase in the interest rate leads to a negative effect on the output gap. The output gap reacts again in a realistic way. The response is moderate and the maximum peak is reached after two quarters at about -0.2%. The result indicates that a shock to foreign output gap increases domestic output gap, inflation and interest rates. However, the impact on exchange rate and money supply is not noticeable in the short run. An increase in inflation leads to a rise in the real interest rate as well as in the appreciation of naira. As a result of this, higher interest rate and real exchange rate

appreciation reduce aggregate demand as well as a fall in output gap and inflation. The increase in the developed economy inflation leads to an increase in the developed economy interest rate. Furthermore, the increase in the interest rate is moderate, of 0.15%, but persistent, as it lasts for more than five periods. This implies, that the Central Bank of Nigeria should react strongly to a real rate shock at very beginning of the adjustment period.

Chart 5: The influence of e_q on y, r, pie and q.

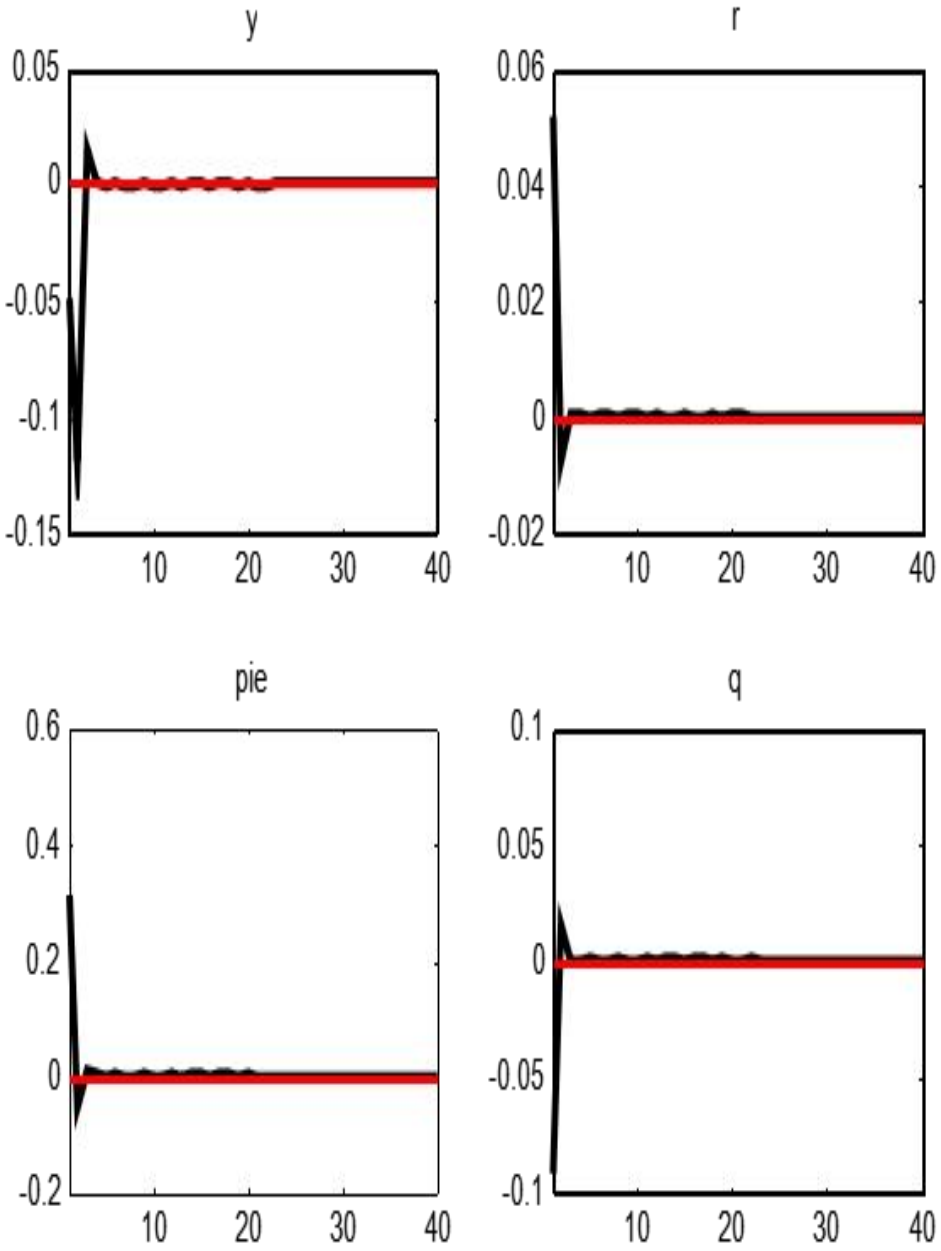


Chart 6: The influence of e_yst on y, r, pie and q.

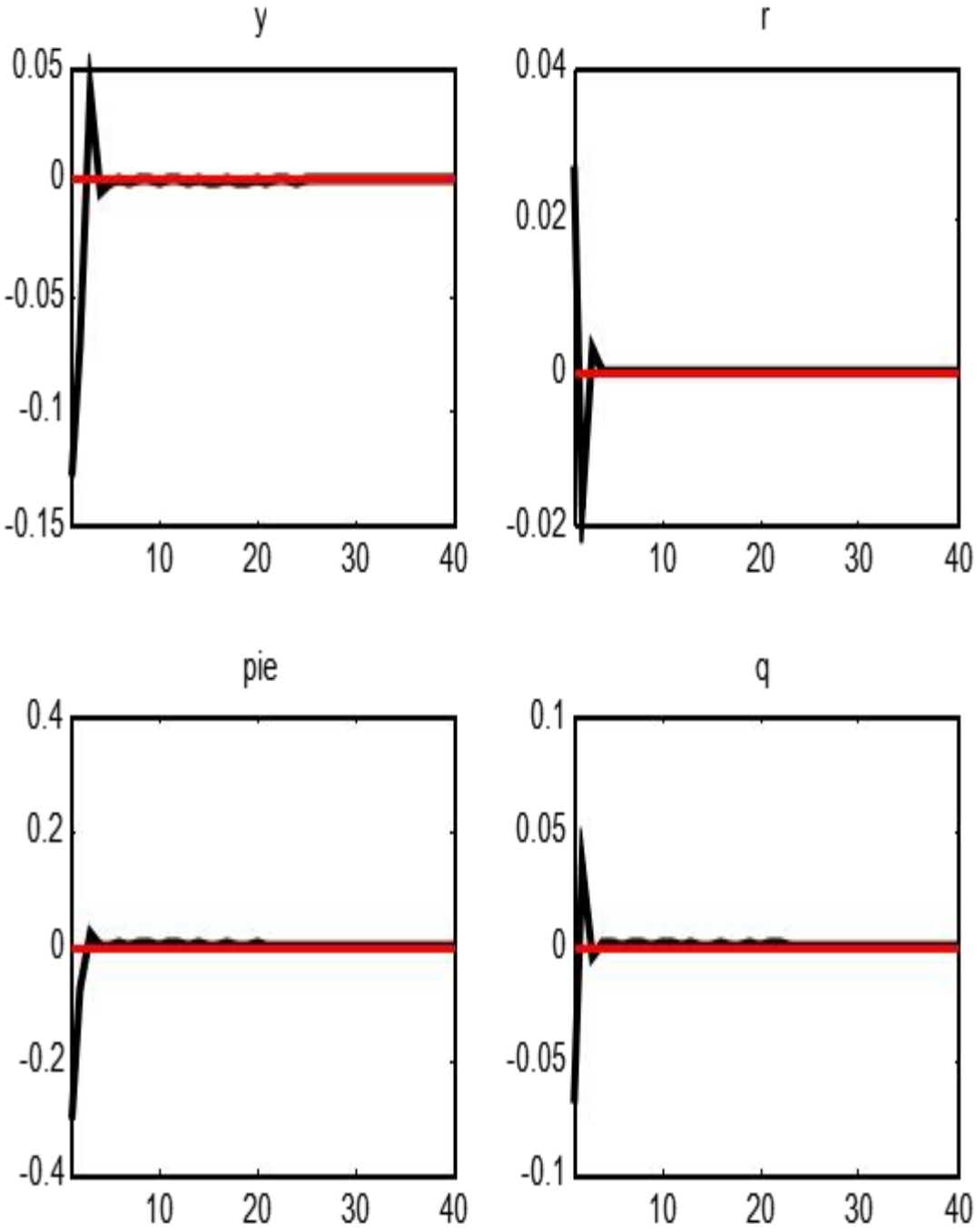
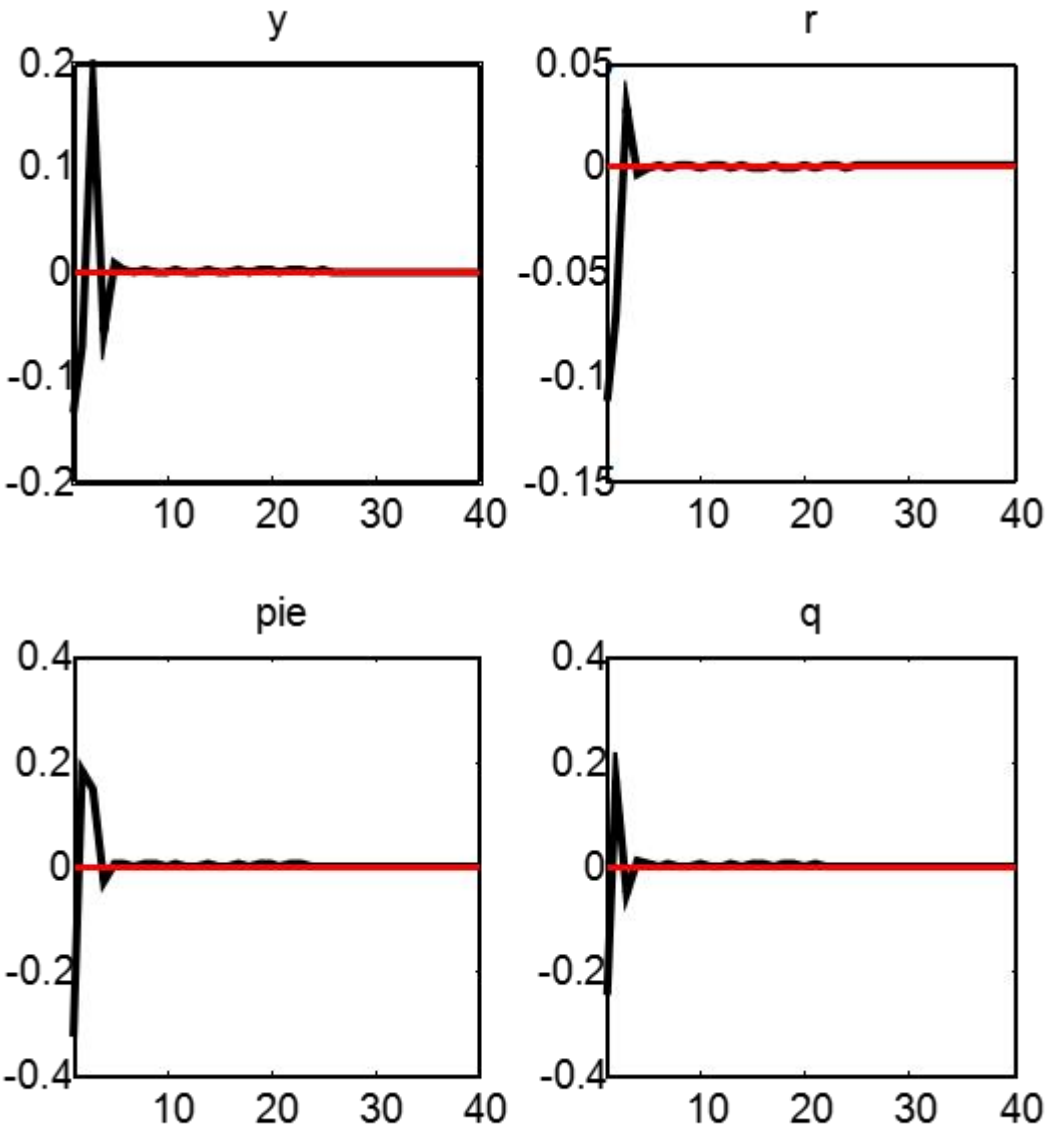


Chart 7: The influence of e_y on y, r, pie and q.



The simulations presented in the study, using the Impulse response analysis, indicate that all seven of the simulated shocks, including an exogenous domestic output, domestic interest rate, domestic rate of inflation, exchange rate, foreign interest rate, foreign level of inflation and foreign output, would each have a significant effect on macroeconomic behavior in the short run. At the same time, the rapid response of monetary policy, along with a flexible exchange rate, helps to limit the adverse effects on output losses, consumption, and the external balance.

Variance Decomposition Analysis

In order to analyze the long run impact of domestic and foreign shocks on the domestic variables, the study decomposes the variance of the variables. The decomposition is done for the long run, that is, for over 40-period planning horizons. Shocks are unanticipated and appear in period one and for the remaining periods considered. The impact of domestic and foreign shocks on domestic variables of interest – Output, Inflation, Interest rate and Exchange rate are tabulated in Tables **1-7** using Variance Decomposition Analysis. The variance decomposition shows the percentage of error variance in one variable due to one standard deviation shock of the variable itself and other variables in the system.

Table 1: Domestic Supply Shock

Domestic Variables	PERIOD1	PERIOD4	PERIO8	PERIOD 16	PERIOD 20	PERIOD 40
Output	1.85	6.92	6.92	6.92	6.92	6.92
Inflation	10.96	8.68	8.68	8.68	8.68	8.68
Interest rate	32.65	25.93	25.93	25.93	25.93	25.93
Exchange rate	7.54	5.99	5.99	5.99	5.99	5.99

Source: Author's computations, (2021)

Table 2: **Domestic Demand Shock**

Domestic Variables	PERIOD1	PERIOD 4	PERIOD 8	PERIOD16	PERIOD2 0	PERIOD40
Output	72.3	59.57	59.57	59.57	59.57	59.57
Inflation	34.15	28.76	28.76	28.76	28.76	28.76
Interest rate	0.14	6.83	6.83	6.83	6.83	6.83
Exchange rate	34.38	28.43	28.43	28.43	28.43	28.43

Source: Author's computation, (2021)

Table 3: Domestic Interest Rate Shock

Domestic Variables	PERIOD 1	PERIOD4	PERIOD8	PERIOD 6	PERIOD20	PERIOD 40
Output	12.36	9.63	9.63	9.63	9.63	9.63
Inflation	2.94	3.28	3.28	3.28	3.28	3.28
Interest rate	30.80	25.32	25.32	25.32	25.32	25.32
Exchange rate	4.23	4.08	4.08	4.08	4.08	4.08

Source: Author's computation, (2021)

Table 4: Exchange Rate Shock

Domestic Variables	PERIOD 1	PERIOD 4	PERIOD8	PERIOD16	PERIOD 20	PERIOD40
Output	13.75	23.86	23.88	23.88	23.88	23.88
Inflation	51.93	59.27	59.27	59.27	59.27	59.27
Interest rate	36.41	41.92	41.92	41.92	41.92	41.92
Exchange rate	53.85	61.50	61.50	61.50	61.50	61.50

Source: Author's computations, (2021)

Table: 5: Foreign Supply Shock

Domestic Variables	PERIOD1	PERIOD4	PERIOD8	PERIOD 16	PERIOD2 0	PERIOD 40
Output	0.04	2.57	2.57	2.57	2.57	2.57
Inflation	0.00	0.00	0.00	0.00	0.00	0.00
Interest rate	0.00	0.00	0.00	0.00	0.00	0.00

Source: Author's computations, (2021)

Table 7: Foreign Interest Rate Shock

Domestic Variables	PERIOD1	PERIOD4	PERIOD8	PERIOD 16	PERIOD20	PERIOD40
Output	96.39	91.54	91.54	91.54	91.54	91.54
Inflation	0.01	0.01	0.01	0.01	0.01	0.01
Interest rate	0.01	0.01	0.01	0.01	0.01	0.01
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00

Source: Author's computation, (2021)

The domestic output gap variance is determined mostly by the demand shocks. This, it has significant effect for all periods under consideration. The effect ranges between 34% to 29% on Inflation. Exchange rate is equally affected although to a minimum extent, but has significant impact on domestic output, while its impact on interest rate is low. Domestic supply shocks impact is heavy on interest rate at about 11% on inflation and exchange rate 8%, while interest rate recorded the high impact during the periods considered and mildly in the rest of the periods. As a result of this, higher interest rate and real exchange rate appreciation reduce the aggregate demand as well as a fall in output gap and inflation. The influence on other domestic variables reflect similar impact (see Tables 1 -2).

This study believes that it is normal for the domestic interest rate shocks to impact much on domestic output because of the source, of funds for investment in the production of real goods and services. Its impact on inflation and exchange rate is however low. (see Table 3) And exchange rate shocks also help to explain the variance of Inflation, Interest rate, value of the domestic currency (Naira) and the output gap. In fact all domestic variables are significantly affected by the exchange rate shock. It is often argued that a depreciating exchange rate can encourage exports and curb imports, even though this will

depend to some extent on the potential for growth in Nigeria's major export markets as well as on the price elasticity of demand for the country's imports. Growth in manufactured exports tends to be slow, and would be inhibited by any uncertainty regarding future exchange rates. Furthermore, majority of Nigeria's imports are of a capital or intermediate nature. These goods have a relatively low price elasticity of demand while import volumes are unlikely to decline significantly in the face of higher prices. The exchange rate variance is mostly explained by its own shocks and by the domestic interest rate shocks. (see Table 4) Both the foreign demand and supply shocks have significant impact on domestic output. This can be attributed to "Dutch Disease Syndrome" of Nigerians' consumption. All other domestic macroeconomic variables are not even affected at all. Hence, the Nigeria macroeconomic policy should focus mainly on how to increase the domestic output, through nominal interest rate manipulation by the Central Bank and to equally discourage foreign goods dependent consumption syndrome by the populace. (see Tables 5 - 6). The foreign interest rate shocks contribute on the explanation of the interest rate variance. It has a serious impact on the level of domestic output which may be as a result of the real economy production dependence on foreign capital inflows and external debt overhang.(see Table 7).

5. CONCLUSION AND POLICY RECOMMENDATIONS

Fundamental macroeconomic shocks demand Anti - Policy response to adverse these shocks. The world economy from integration to globalization via fundamental macroeconomic shocks requires that appropriate monetary and fiscal policy must be consistent and coordinated. Restrictive monetary policy will fail if fiscal policy remains expansive. When the economy is overheating, monetary and fiscal policy must reduce the rate of growth of aggregate demand. In spite of the fact that the what, why and how of the past efforts have been examined thoroughly, the effects of the shocks still persist. There is, however, a growing recognition of the importance of governance and institutional set up of a country in responding effectively to fundamental macroeconomic shocks. What is perhaps less clear is how, in reality, these affect policy responses and their implementation.

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