

An Assessment of the Impact of Domestic and External Shocks on Macroeconomic Fluctuation in Nigeria

Ali Salisu¹ and Mustapha Hussain²

¹Department of Economics, Bayero University Kano, Kano State, Nigeria.

alialisubeto@gmail.com

²School of preliminary Studies Sule Lamido University Kafin Hausa, Jigawa State

Abstract

This paper aim to assess the impact of domestic and external shocks on macroeconomic fluctuation in Nigeria, covering 1985-2016, External and domestic macroeconomics were used as variables, facto-augmented VAR is utilized as methodology. Finding of the study showed that, The terms of trade shock on domestic variables showed that consumption, inflation rate, investment and broad money supply are statistically significant throughout the quarter and the real gross domestic product, narrow money supply, reserve money, labor force and unemployment are not statistically significant throughout the period, The study also examined the effect of monetary policy shock on exogenous variables and the result shows that monetary policy shock really have no significant effect on most essential external variables. The study therefore advocates 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. Furthermore, there is need for a major policy design to encourage value addition of the nation's export commodities

Keywords: Macroeconomics, Shocks, Domestic shocks, FVAR

Introduction

The current economic recession in Nigeria draw some economist attention to the relative contribution of domestic and external shocks in driving Nigeria's business cycle fluctuation. One of the major concern of modern macroeconomics is the need to understand the causes of macroeconomic fluctuations for policy analysis and forecasting as well as the overall implications for growth and welfare. Economic crisis comes in a cycle. A recession is an economic crisis in the in a form of business cycle contraction, which results in a general slowdown of economic activities in two or more quarters (6months and above). As a result, macroeconomic indicators get worse showing that if there is no appropriate policy response, the economy may slip further into a depression. The Gross Domestic Product (GDP), investment and consumption spending, savings rate, imports and exports, capacity utilization, household income, trade, capital flows, business profits and inflation decline, while indebtedness, illiquidity, bankruptcies and the unemployment rates rise. In general, Less Developed Countries (LDCs) have experienced much more periods of frequent fluctuations (and even longer periods of downturns than upturns) as indicated by the GDP growth relative to other developed countries.

Nigerian is an oil producing country and depends heavily on proceeds from the sales of crude oil to generate foreign earnings to finance her import. In addition, the country also depends heavily on importation of capital and consumable goods from developed and emerging economies to cater for industrial and household needs. As such, the economic fortune of the country is

inextricably tied to global economic activities thus making the country vulnerable to external shocks (Lukman, 2016).

External shocks on small-open economies can lead to booms and bursts in employment, output, balance of payment crises and exchange rate instability (Gafar, 1996). Based on this, effective management of domestic and external shocks can be considered as one of the key issues in macroeconomic management, especially in developing countries Nigeria inclusive.

Statement of Research Problem

A number of interrelated factors contributed to the current economic recession in Nigeria including poor macroeconomic policy, increases in the price of primary commodities (inflation), high interest rates, poor tax system and declining in oil revenue due to fall in oil price. Unfortunately, the economic recession in the country affected numerous macroeconomic variables including inflation and unemployment. The rise in inflation and unemployment affected the low-income household more than others, as it has reduced their purchasing power and social welfare (Babatunde and Olufemi, 2014)

The need to understand and distinguish short-run (fluctuations) and long-run (growth) determinants of the macro-economy has been emphasized in the literature (Agenor, Mc Dermott and Prasad, 2000 and Lane, 2002). Short-run analysis provides the basis for regulating the economy while long-run analysis is concerned with longer term planning purposes. While the latter is influenced by real shocks, the former is determined by nominal shocks. This study is premised on identifying the domestic and external shocks that drive business cycle fluctuations in Nigeria and further classified the shocks into real shocks and nominal shocks.

The deep crises that have pervaded the Nigerian economy since early 1970s posed considerable challenges to policy makers and economists. At each turn of events efforts are made to design and implement appropriate policy response. Nigeria, no doubt, has witnessed periods of boom and also recessions. In 1970s, the economy was expanding due to large inflow of crude oil income and by the period 1981-1985, at the wake of the falling oil revenue, the economy declined, precipitating a rapid deterioration of the living standard of Nigerians. Iwayemi (1995:5) points out that “the cycle of oil price booms and precipitous decline and the associated transfer problem in terms of the net resource outflow associated with debt repayments, triggered profound changes unparalleled in the history of the economy.”

In response to these various shocks, authorities in Nigeria adopted various policy choices usually in the form of economic policy measures including Stabilization Policy, 1981-1983, Structural Adjustment Programme (SAP), 1986-1992; Medium Term Economic Strategy, 1993-1998 and the Economic Reforms (1999 – 2019 is the democratic era). A major fact in macroeconomic analysis of developing economies like Nigeria, is that they are small-open economies in the sense that they cannot influence world prices and output. Domestic macroeconomic policies are thus buffeted by external shocks which eventually distort the path of the economy. In lieu of that, the broad objective of this study is to determine the impact of domestic and external shocks on economic fluctuations in Nigeria (1985 - 2016).

Macroeconomic shocks: The Nigerian Experience

The deep crises that have pervaded the Nigerian economy since early 1970s posed considerable challenges to policy makers and economists. At each turn of events, efforts are made to design and implement appropriate policy responses. The subsequent periods were not too different as the consequences of the preceding period dragged into the following period. Macroeconomic indicators point to the grave economic situations. In particular, there were sharp fluctuations in the GDP, remarkable fluctuations in inflation rates, unemployment rate, growing size and composition of government expenditure as well as slow growth in domestic production. Others are chronic fiscal deficit, decline in traditional agricultural output, rural-urban drift, etc.

Among these shocks are: crude oil price shock resulting in economic boom of the early 1970s; low crude oil demand shock that led to world recession following the 1979 increases in oil prices; foreign debt shock creating financial short falls in the execution of socio-economic developmental programmes; stochastic shocks resulting from inappropriate policy response to observed economic trends in terms of timing, direction and magnitude; disequilibrium between rural and urban sectors prompting extensive rural-urban drift; terms of trade shocks resulting from currency over-valuation; changes in economic structure; and institutional shocks engendered by transition from state controlled economy to market-based economy (CBN 2015)

Review of empirical literature

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. Starting with the work of Babatunde and Olufemi (2014), who 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. The authors found out that, both real and nominal exchange rates in Nigeria have been unstable during the period under review. Lukman (2016) investigates the macroeconomic response of the Nigerian economy to external shocks by employing global vector autoregression (GVAR). The author 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.

Bayoumi and Swiston (2009) in their study using vector autoregressions of real growth estimated growth spillovers between the US, the Euro area, Japan and an aggregate of smaller countries proxying for global shocks. They found out that the US and global shocks generate significant spillovers in developing countries, but those from the Euro area and Japan are small comparing to the US. Similarly, study by Vamvakidis and Arora (2010) examined the growth spillover of China's economy in recent time by 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. Array of similar studies by Samake and Yang (2011), Ding and Masha (2012) and Poirson and Weber (2011) came to similar conclusion on growth spillover.

There has been a very rich stock of empirical literature on business cycle studies since the path breaking paper of Kydland and Prescott (1982). That work gave credence to Real Business Cycle (RBC) models which have been able to explain, to a large extent, the behavior of actual economies. These models have proved their ability to “account for regularities in the data”. In what follows, we take a spatial survey of some of these works touching on the advanced economies, the Latin America’s and Asia. We close the section with a review of the situation in Africa and, in particular, Nigeria. This chapter, in particular, ends with a table showing empirical evidences of business cycle research.

In another study for the US economy, Mountford and Uhlig (2002) proposed and used an identification scheme of sign restrictions on the impulse responses. They found that government spending shocks crowd out both residential and non-residential investments but leave consumption unaffected. Further, the study reveals that a cut in deficit spending stimulates the economy for the first four quarters but has low median multiplier of 0.5, and that a positive shock to tax generates a contractionary effect on output, consumption and investment. Conclusively, the authors argued that the best fiscal policy for stimulating aggregate economic activities tends to be a deficit-financed tax cut. A similar conclusion was drawn in their subsequent study (Mountford and Uhlig, 2005). In yet another study for the US, Fu, Taylor and Yucel (2003) assess the relationship between fiscal policy and US growth under a VAR methodology. In contrast to other studies for the US, the authors found that an increase in government size (public spending) leads to slower economic growth, regardless of how the expenditure was financed. Their results differ sharply with previous evidence for the US obtained by Edelberg, Eichenbaum and Fisher (1999) under a different identification scheme. Specifically, the authors study the response of the US economy to specific episodes of military build-ups and conclude that there is a significant and positive short-run effect on output. In addition, Biau and Girard (2005) use a five-variable VAR (government direct spending, net revenue, GDP, interest rate and the price level) to examine the effects of fiscal policy shocks in France. They found a positive reaction of private consumption while the effects on private investment was also found to be positive but only in the first year. Using a Bayesian SVAR and a recursive identification scheme, Afonso and Sousa (2009) analyze the macroeconomic effects of fiscal policy shocks for the US, UK, Germany and Italy. Their results show that government spending shocks, in general, have a small effect on output, depreciates real exchange rate, but varied impact on housing prices. Meanwhile, Mancellari (2011) attempts an estimation of the effect of fiscal policy on output, prices and interest rates in Albania using structural VAR model. Utilizing data for the period 1998:1- 2009:4 and following the methodology of Blanchard and Perotti (2002), the author found that a tax cut has the highest cumulative multiplier effect on output and up to 1.65 after five quarters. In a relatively recent study, 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 have 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 aggregate economy. The results differ from one country to another with various methodological approaches adopted and diverse period.

Theoretical Framework

Business Cycle Theories

There are several approaches to reviewing business cycle theories. However, they share some common properties. One of this is the fact that there is always a driving force behind economic fluctuations. The latter may be some kinds of shocks, frictions, or disturbances that constitute the original cause of the cycle. In addition, most theories build on propagation mechanism that amplifies and translate small short-lived shocks into large, persistent economic fluctuations.

In this study, we review business cycle theories from certain basic propositions constituted by the schools of thought. These schools of thoughts include the Monetarists and the New Classical School (NCS), the other mainstream and the Keynesian School of thought (KS) and its variants notably the New Keynesian School (NKS).

Methodology

Type and sources of data

The type of data specified for this research work was secondary in nature, as time series spanning 1985–2016 was employed for the analysis. Data was collected from statistical publication of Central Bank of Nigeria (CBN), National Bureau of Statistic (NBS), journals, annual report and other relevant publication.

Model specification

To meet with the core objective of this study, we formulate an open economy FAVAR model with time-varying coefficients that allows us to efficiently model the impact of large set of Nigeria and external variables in driving business cycle fluctuation. FAVAR is useful for several advantages like low serial correlation in residuals, allow large number of variables, summarizing time series facts, simplify complex relationship among variables, policy analysis, structural implications and helpful for describing and forecasting dynamic behavior of economic time series. The start point is the following restricted VAR model:

$$\begin{pmatrix} F_t^* \\ F_t^{Nig} \\ R_t \end{pmatrix} = \begin{pmatrix} \beta_{11}(L) & 0 & 0 & F_t^* \\ \beta_{21}(L) & \beta_{22}(L) & \beta_{23}(L) & F_{t-1}^{Nig} \\ \beta_{31}(L) & \beta_{32}(L) & \beta_{33}(L) & R_{t-1} \end{pmatrix} + \mu_t \dots \dots \dots (1)$$

The VAR in equation (1) consists of two blocks, one for the Nigeria and other for the rest of the world, which is ordered first. The information about the Nigeria and the rest of the world is summarized by the unobserved factors, $F_t = [F_t^* F_t^{Nig}]'$, where * denotes the foreign economies and *Nig* denotes the domestic economy. The *Nig* short-term interest rate, R_t , is included to account for domestic monetary policy. The zero restrictions in equation (1) reflect our assumption that

being a small open economy, the Nigeria is unable to influence the rest of the world. These, together with the unobserved common components; form the dynamic system that evolves according to the above transition equation. Where $\beta(L)$ is a conformable lag polynomial of finite order p , and $\mu_t = \Omega_t^{1/2} e_t$ with the structural disturbances $e_t \sim N(0, I)$ and $\Omega_t = A_{0,t}(A_{0,t})'$ is the stochastic covariance of the reduced form shocks. The structure of $\beta(L)$ reflects the small open economy assumption such that the domestic factors do not impact on world factors, but not vice versa.

There are three foreign factors $F_t^* = F_t^{Y*}, F_t^{\Pi*},$ and F_t^{R*} where F_t^{Y*} is a foreign real activity factor, $F_t^{\Pi*}$ is a foreign inflation factor, F_t^{R*} is a foreign interest rate factor. F_t^{Nig} denote $k=4$ factors for the Nigeria. The seven factors together summarize the variation in an underlying panel data set of external and domestic (Nigeria) variables. They are linked to panel data set due to following equation.

$$\begin{pmatrix} X_t^{Y*} \\ X_t^{\Pi*} \\ X_t^{R*} \\ X_t^{Nig} \\ R_t \end{pmatrix} = \begin{pmatrix} \Lambda_t^{Y*} & 0 & 0 & 0 & 0 \\ 0 & \Lambda_t^{\Pi*} & 0 & 0 & 0 \\ 0 & 0 & \Lambda_t^{R*} & 0 & 0 \\ 0 & 0 & 0 & \Lambda_t^{Nig} & \Lambda_t^R \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} F_t^{Y*} \\ F_t^{\Pi*} \\ F_t^{R*} \\ F_t^{Nig} \\ R_t \end{pmatrix} + V_t \dots\dots (2)$$

Where X_t^{Y*} denotes data on foreign real activity, $X_t^{\Pi*}$ denotes data on foreign inflation, denotes X_t^{R*} data on foreign interest rates and X_t^{Nig} denotes a panel data set for the Nigeria that includes indicators on real activity, inflation, money supply, asset prices etc. $\Lambda_t^{Y*}, \Lambda_t^{\Pi*},$ and Λ_t^{R*} are the factor loadings on foreign real activity data, foreign inflation data and foreign interest rate data. Λ_t^{Nig} is N^{Nig} kmatrix of factor loadings that link the k domestic unobserved factors to Nigeria data and $\Lambda_t^R, N^{Nig} \times 1$ captures the contemporaneous relationship between some of the ‘fast-moving’ Nigeria variables and the short-term interest rate.

We assume two sources of time-variation in equations (1) and (2). Firstly, we allow the VAR covariance matrix $Var(v_t) \equiv \Omega_t$ to evolve over time as a random walk. Secondly, following Del Negro and Otrok (2008), the factor loadings $\Lambda_t^{Y*}, \Lambda_t^{\Pi*}, \Lambda_t^{R*}, \Lambda_t^{Nig}$ and Λ_t^R are also assumed to evolve over time as random walks. This assumed structure is an efficient way of introducing time-varying dynamics within our model. In particular, the time-varying factor loadings allow the relationship between the external variables ($X_t^{Y*}, X_t^{\Pi*},$ and X_t^{R*}) and domestic variables X_t^{Nig} to be time-varying. This can easily be seen by substituting the equation for F_t^{Nig} from (1) to the equation for X_t^{Nig} in (2). This gives:

$X_t^{Nig} = \Lambda_t^{Nig}[\beta_{21}(L)F_{t-1}^* + \beta_{22}(L)F_{t-1}^{Nig} + \beta_{23}(L)R_{t-1} + U_t] + \Lambda_t^R R_t + v_t^{Nig}$ where the product of $\Lambda_t^{Nig} \beta_{21}(L)$ is time varying. Similarly, allowing Ω_t to be time varying implies time varying contemporaneous relationship between external and domestic variables.

Equations (1) and (2) capture the time-varying dynamic relationship between macroeconomic conditions in the rest of the world (F_t^{Y*} , F_t^{I*} , and F_t^{R*}) and the Nigeria economy (as summarised by F_t^{Nig}) in driving macroeconomic fluctuation in Nigeria. By using the VAR in equation (1) it is possible to estimate the impulse response of F_t^{Nig} to an innovation in F_t^* : Moreover, by using equation (2), it is possible to recover the response of any of the variables in the Nigeria X_t^{Nig} to this external shock.

Techniques of estimation

The model in equations (1) to (2) is estimated using Bayesian methods described in Kim and Nelson (1998), Primiceri (2005) and Del Negro and Otrok (2008) to approximate the posterior distribution. To investigate the time-series property in order to avoid spurious regression problem, an Augmented Dickey-Fuller (ADF) test is conducted to test for the order or integration of all series. The ADF test is based on the Null Hypothesis that a unit root exists in the autoregressive representation of the time series. After conducting the test for stationarity and identifying the time series property of the series, A model is constructed to test whether the variables are co-integrated. If the variables are found to be co-integrated, the analysis would continue with VECM (Vector Error Correction Model), if otherwise, it would use FAVAR (Factor-augmented Vector Autoregressive Model). Finally, after all these test have been carried out, the IRF (Impulse Response Function) will be employed to capture the transmission of shocks to the economy.

Variables and Measurement of Data

Quarterly data from 1985 Q1 to 2016 Q4 were used. The data set spans 20 variables, which comprises both domestic and foreign variable. The domestic (Nigeria) variables used in this study are as defined below:

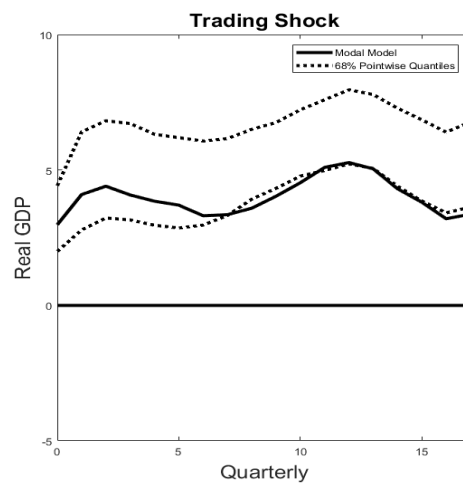
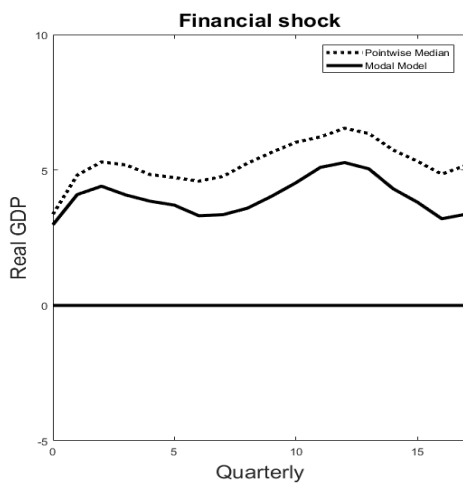
RGDP:	Real Gross Domestic Product
PCON:	Total Private Consumption
RM:	Reserve Money
RM1:	Narrow Money Supply
RM2:	Broad Money Supply
RUEM:	Rate of Unemployment
LAF:	Labour Force
INV:	Investment
INFR:	Inflation Rate

While the foreign/external variables used in this study includes;

CP: Commodity Price. Five (5) commodity prices are selected which includes (1) Agricultural Material Price Indices namely; Tuber, Cotton, wool, rubber, and hides price; (2) Commodity Price Indices – vegetable oil, meat, seafood, sugar, bananas, and oranges price; (3) Commodity Fuel (Energy) – crude oil (petroleum), natural gas, and coal price; (4) Beverage Price Indices – coffee, Tea, and Cocoa; (5) Metal Price- copper, aluminum, iron ore, tin, nickel, zinc, lead and uranium.

- RTIM: Total Import
- RTEX: Total Export
- TOT: Terms of Trade
- NEERI: Nominal Effective Exchange Rate Indices
- NFA: Net Foreign Assets
- SFE: Supply of Foreign Exchange
- COP: Crude Oil Price.
- WINR: World Interest Rate
- WGDP: World GDP
- WINF: World Inflation Rate.

Transmission Channels of Shocks on RGDP



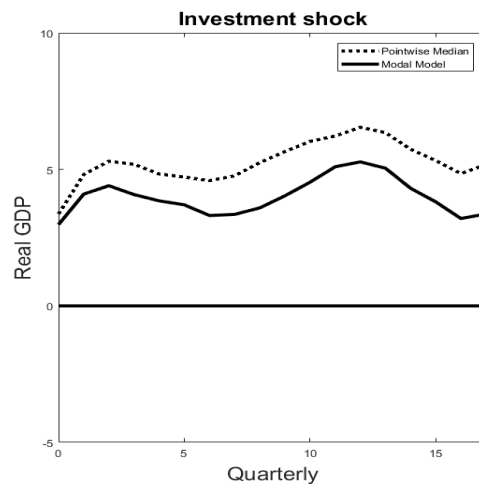


Fig. 1: Transmission Channels of Shocks on RGDP

In the literature, there are three channels of transmission of shocks namely; Trading Channel, Financial Channel and Investment Channel. For the purpose of this research work, Total Export and Total Import is considered for trading channel while Nominal Effective Exchange Rate is considered for financial channel and also Net Foreign Asset is considered for investment channel.

Fig. 1 present the dynamic effect of the Real Gross Domestic Product (RGDP) in response to financial, trading and investment shocks. One striking feature is the uniform switch in the sign following the shocks. The GDP depicts 1% standard deviation increase as a result of trading shock, GDP improves at first quarter and deteriorates at about second quarter which later improves in third quarter due to trading shocks. Therefore, trading shock contributed significantly to the observed RGDP. Adegboyega (2017) result shows that there is stable, long-run relationship between import-export and economic growth, but the magnitude is minimal. The factor which is likely to be responsible for the shock in the trading channel includes government policies that encourage export with implementation of import control.

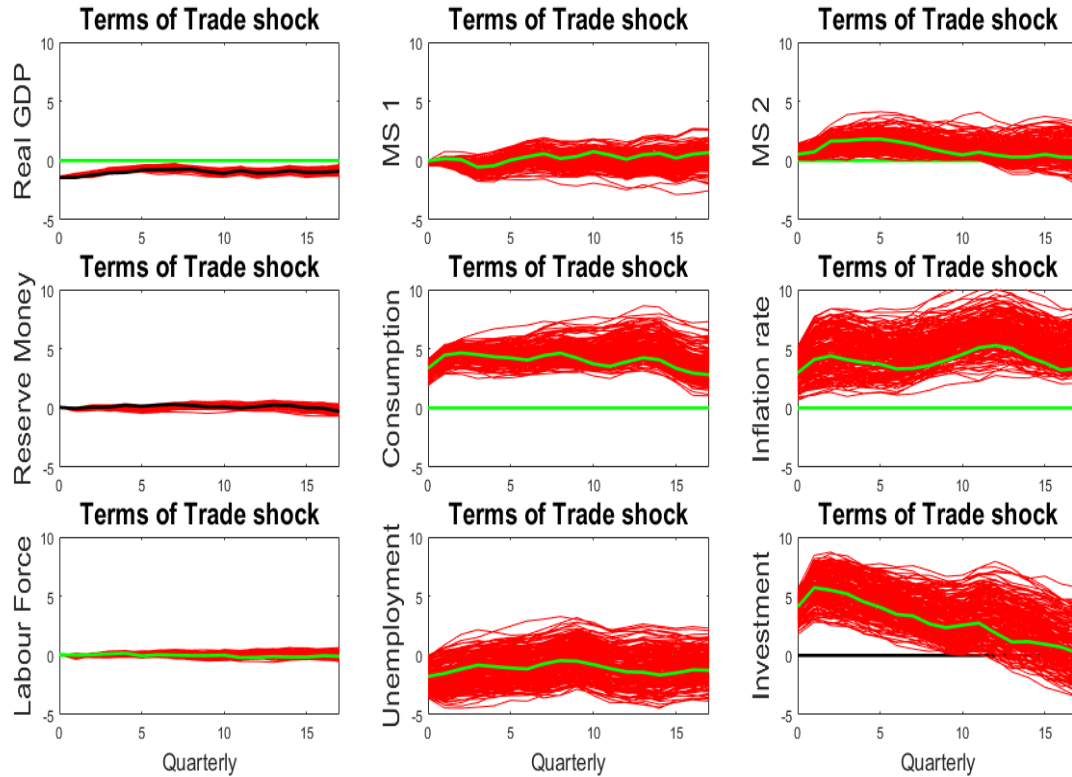


Fig. 2: The Response of Nigeria Domestic Indicator to the Terms of Trade Shock

Terms of trade variations as a potentially important channel of transmission of disturbances between national economies have a long tradition in international economics. This section assumes that the terms of trade are exogenous and analysis whether changes in them caused by variation in Nigeria domestic variables.

Fig. 2 present impulse response function results of exogenous terms of trade shocks on Nigeria domestic variables. Real Gross Domestic Product, Labour Force, Unemployment, Broad Money Supply (M2), Narrow Money Supply (M1), Reserve Money were virtually unaffected by the shock which means that throughout the quarter terms of trade shock have no positive relationship with economic fluctuation and its statistically insignificant. Similar conclusion was found out by Benedict and Uzochukwu (2011) that terms of trade shocks in Nigeria are high and has impacted negatively on macroeconomic performance. The factor which likely to be responsible for this is inability of the government to create macroeconomic stabilization as well as trade and investment liberalization in Nigeria to enable the economy to regain international confidence and improve the standard of living of the population.

The plots of time vary response on consumption, investment and inflation rate result depicts one standard deviation increase due to the shock from international trade. From chart 2, the impulse response function of terms of trade shock on consumption and inflation improve at first quarter and stable throughout the second quarter which later fall slightly at the third quarter and improve at fourth quarter. Consumption and inflation rate have positive relationship with term of trade shock which means it is statistically significant throughout the quarter. Terms of trade

shock on investment improve at the first quarter and a sharp fall toward the end second quarter and the response function decline during the third fifteen quarters. In a short run, the estimated shock on investment is statistically significant but become insignificant toward end of 15 quarter. Nikola Spatafora and Andrew Warner (2011) that permanent terms of trade shocks have a significant positive effect on consumption, investment and output, particularly of non-tradable found out similar conclusion.

Fig. 3 present the response of Nigeria external indicator to the monetary policy shock. Impulse response of monetary policy shock on exchange rate, total import, commodity products are improved at first quarter and a sharp fall immediately at second quarter. The magnitude of this fall is small after the second quarter. This implies that in a short run there is positive relationship between monetary policy shock and exchange rate, total import and commodity product. But in the long run the relationship is not apparent. Babatunde and Oluwafemi (2014), show that both real and nominal exchange rates in Nigeria have been unstable during the period under review.

From fig. 3, the response of monetary policy shock on total export, crude oil price, world inflation and world GDP are statistically insignificant throughout the period. Therefore, there is no positive relationship between monetary policy shock and export, crude oil price, world inflation and world GDP. Similar conclusion was found by Nwosa and Ajibola (2018) that monetary policy was insignificant in influencing export diversification in Nigeria.

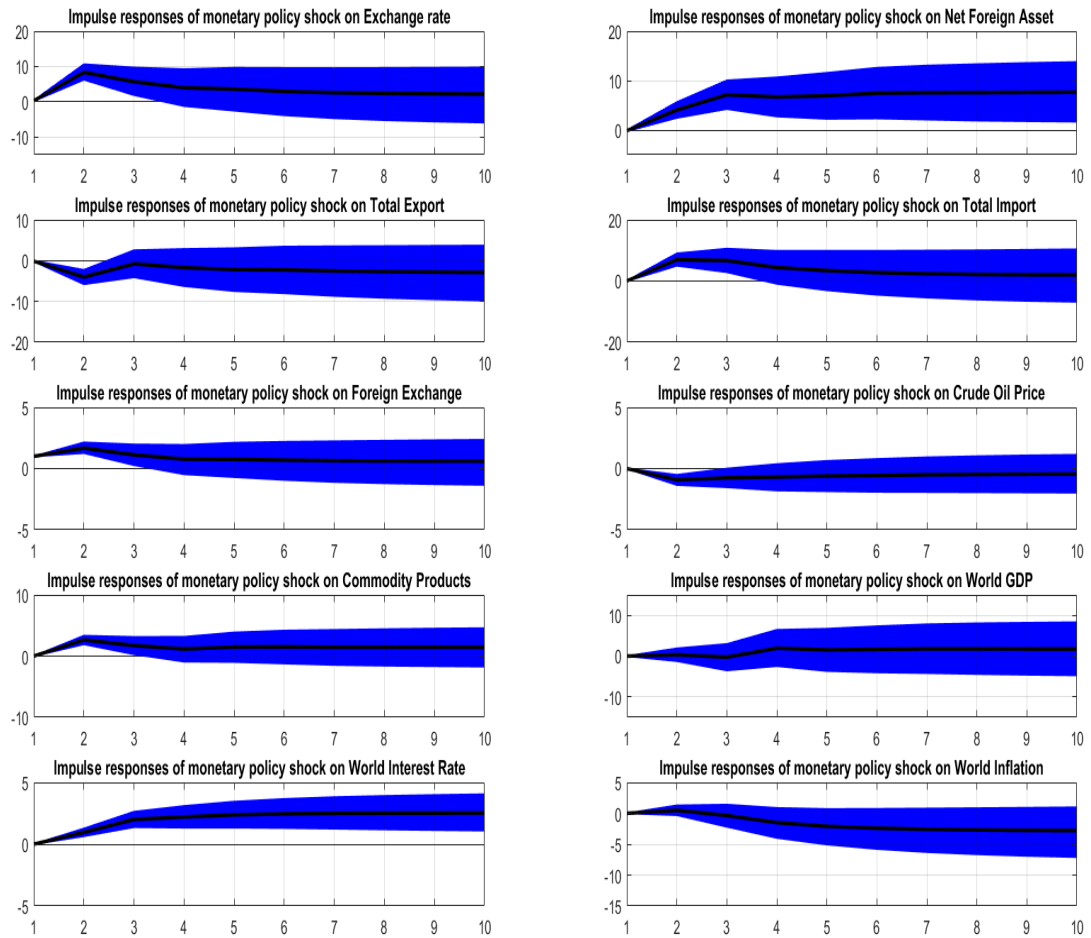


Fig.3: The Response of Nigeria External Indicator to the Monetary Policy Shock

The study concluded that monetary policy has not played a fundamental role in enhancing export diversification in Nigeria.

However, the monetary policy shock on net foreign asset and world interest rate are statistically significant and there is positive relationship among them throughout the quarters. The impact of monetary policy on world interest rate and net foreign asset is positive and likely factor responsible for the shock in the money supply include Government’s monetary stabilization measures. Compared with previous study by Gunes and Madhusudan (2018) find out that monetary policy shock tends to have persistent effect on long-term bond yield, corporate bond spread, and aggregate bank deposit and loans.

Conclusion

This study examined the impact of domestic and external shock on macroeconomic fluctuations in Nigeria using FAVAR approach. Quarterly data between 1985-2016 was used to conduct the FAVAR procedure. A major finding of the study is the fact that the export sector that is supposed to be the engine of growth for the economy is exhibiting weak linkages with the rest of the economy. Thus, the study reveal that external variables are liable to economic variations. The study therefore 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.

Recommendation

Based on the findings, the study recommends the following;

- i. 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.
- ii. The study also recommends the need for a major policy design to encourage value addition of the nation's export commodities.
- iii. 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.
- iv. The need to reduce aggregate terms of trade volatility by changing the composition exports.

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