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GLOBAL FINANCIAL CRISIS AND MACROECONOMIC PERFORMANCE IN NIGERIA: A STRUCTURAL VAR APPROACH

T.P. Ogun

Department of Economics, Faculty of Social Sciences,
Obafemi Awolowo University, Ile-Ife, Nigeria.
E-mail: tpogun@oauife.edu.ng;
peaceogun2001@yahoo.com.

ABSTRACT

The paper investigated the impact of the recent global financial crisis on macroeconomic performance in Nigeria. Specifically, the impact of international shocks to domestic output, government expenditure, exports and domestic credit to the economy were examined. The paper employed secondary data for the period 1970:1-2009:4 and the Structural Vector Autoregressive (SVAR) econometric technique was employed in the analysis. The study explicitly found that following the global financial crisis, an international shock to the domestic economy immediately led to a slight and insignificant decline in output, export demand and domestic credit, while government expenditure showed no response at the earlier period of the crisis. This implies that though the crisis has not seriously affected the Nigerian economy in the short-run, its impact on the long run may be devastating. The study suggested active government regulation to cushion the effect of the crisis.

Keywards: Global, Financial Crisis, Macroeconomic Performance, SVAR

INTRODUCTION

Since the mid-2007, the world economy has been thrown into the abyss of unprecedented financial and economic crisis, thereby engendering global economic downturn. In explaining the proximate cause of the current financial turmoil, economists and policy makers have largely attributed it to the bursting of the United States housing bubble which peaked in approximately 2006. Prior to the housing bubbles, the savings glut in the United States resulting from high inflow of liquidity from the rest of the world, the global imbalance in savings and investment as well as the easy monetary policy pursued in the United States initially led to high demand for consumer credit(Mohan, 2007, Taylor, 2009). This increased demand led to asset inflation and housing boom. From mid-1990 to 2006, the price of the typical American house increased astronomically rising by 124% between 1997 to 2006 and subsequently falling in the summer of 2006 leading eventually to the subprime crisis (Martin, et.al, 2008). Given that the events in one sector of the macroeconomy tend to spread to other sectors, the sub-prime loans which were repackaged as structured credit products or securitized mortgages (such as Collaterised Debt Obligations, Special Purpose Vehicles etc,) in the United States and their consequential accelerating default coupled with investors loss in confidence in these mortgages resulted in liquidity crisis. The liquidity crises also led to banking crises and stock market crash in the United States[1].

In developed and emerging economies, the reverberations of global financial crisis are immediate and well documented. All major advanced economics with high financial integration fell into recession, while activity in emerging and developing economies has slowed down abruptly (IMF, 2009). The economic downturn in developed countries has also led to sharp reduction in world trade, deterioration in fiscal position and increase in unemployment rate.

With respect to developing countries, particularly in Africa, their low integration with global financial markets initially led to wide speculations that these countries would experience little or no devastating effect of the global financial. However, recent developments in these countries have shown that these countries are not in any way insulated from the contagious effect of the crisis. In its most recent regional analysis on Africa, the IMF estimated that average economic growth in Africa would slow from an average of 6.5% per year between 2002 and 2007 (a historic high) to 1% in 2009, before recovering to 4% in 2010. This crisis is also expected to dampen prospects for reducing African poverty, as at least 7% annual growth is generally considered necessary for outpacing population growth and making significant progress in alleviating poverty (AFDB, 2009).

Though African countries, in general, have been experiencing the negative impact of the financial crisis, some countries in this continent are certainly going to be much affected than others due to the heterogeneous nature of these economies and their different level of financial integration with the rest of the world, Moreover, at the country level, one also expect that the financial crises will have differential impact on various sector and macroeconomic variables in the economy.

This paper investigates the impact of the global financial crisis on the performance of key macroeconomic indicators in Nigeria. Though the issue of global financial crises has attracted substantial attention across the globe, little is known about the performance of macroeconomic variable under this crisis in Nigeria. Specifically, the study explores the

[1] The collapse of Bear Stearns in the United States in 2008 is a typical example.

behavior of domestic output, government expenditure, exports and domestic credit to the economy during the global financial crisis in Nigeria. The basic research questions addressed in the paper include the following: what is the response of output to international shock during the global financial crisis? How does government expenditure, exports and domestic credits respond to shocks emanating from the financial crisis? The answer to the first question is vital since it will provide information about the performance of the economy during the global financial crisis. The second question is also crucial since it provides information about whether the financial crisis has had differential impact on various sectors as well as macroeconomic variables during the period of the crises.

The rest of the paper is arranged as follows: The second section focuses on the theoretical framework and the survey of relevant literature on the impact of global financial crises. In the third section, the empirical methodology employed in the paper is examined. Section four analyses and presents the results obtained in the course of the study. In the fifth section, we conclude the discussion and examine the policy implication of the study.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical framework for the study

In attempt to empirically investigate the impact of the global financial crisis on macroeconomic performance in Nigeria, this paper starts by employing the theories of business cycle fluctuations. The business cycle is an irregular and non-repeating up-and-down movement of business activity that takes place around a general rising trend and that shows great diversity (Parkin, 1996). Different theories of business cycle emphasize different outside forces and different cycle mechanisms. Although there are different theories of the business cycle, they all agree about one aspect of the cycle: the central role played by investment and accumulation of capital.

According to Keynes (1936) the main source of economic fluctuations is volatile expectations. A change in expected future sales and profits (which he described as animal spirits), at first, changes the demand for new capital and changes the level of investment thereby producing a multiplier effect. The changes in investment changes aggregate expenditure, real GDP and disposable income which further changes consumption expenditure and aggregate demand changes by a multiple of the initial change in investment. The second effect of the Keynesian business cycle focuses on the response of real GDP to changes in aggregate demand. Given that the economy is initially in equilibrium corresponding to the point of intersection of horizontal short-run aggregate supply curve (SAS) and a horizontal long-run aggregate supply curve (LAS). The fall in aggregate demand(AD) arising from pessimistic expectation about future sales and profits, assuming that the wage rate is sticky, leads to a fall in investment, AD shifts to the left, real GDP decreases unemployment rate rises, surplus labour occurs and the economy remain in unemployment equilibrium until a rise in animal spirit raises investment. When animal spirit increases, AD rises and real GDP rises but below the potential GDP. At the point above the potential GDP, unemployment falls below the natural rate money wage rate rises, the price level also rises, the SAS shifts upward and the real GDP growth slows down and the economy settles down at initial equilibrium level.

Following the monetary explanation attributed to Milton Friedman, the growth rate of the quantity of money is recognizes as the main impulse propelling business cycle fluctuation. In the monetary theory, a decrease in the rate of growth of money supply (brought about by the actions of monetary authorities) when the demand for money remains constant initially leads to a rise in interest rate. In this situation, financial assets denominated in local currency become more attractive relative to those denominated in foreign currencies, demand for foreign currencies increases, and exchange rate appreciates, exports become more expensive causing a fall in net export resulting to a leftward shift in aggregate demand(Mishkin, 2001)[2]. The main assumption in the monetary theory of business cycle fluctuation is that the money way rate is temporarily sticky and it is also assumed that the SAS is upward sloping. Given these assumptions, a fall in aggregate demand due to either reduction in net export or investment when AD remains the same, leads to a fall in real GDP and increases the unemployment rate and the money wage rate and inflation rate eventually falls. Since the monetarists also assume that real GDP deviation from its potential level is temporary, a fall in wage rate and the price level eventually restores the economy to full employment level.

At these juncture, one can infer that the fundamental cause of business cycle fluctuations following Keynesian and monetary schools is the swing in aggregate demand propelled by shocks emerging either from the real sector or the monetary sectors of the economy. With the failure of the Keynesian economics in the mid-1960, Lucas (1976) and Sergent (1973) pioneered the rational expectation model of business cycle fluctuation. As distinct from the Keynesian and Monetarist aggregate demand theories, the new classical rational expectation theory regards unanticipated fluctuation in aggregate demand as the main source of economic fluctuation. When there is unanticipated decrease in aggregate demand and money wage remain unchanged, real GDP and price level decreases. The decrease in price level increases the real wage rate and unemployment falls. Moreover, if the decrease in aggregate demand is anticipated and the price level is expected to fall, both firms and workers will agree to lower money wage rate, therefore, preventing the real wage from rising and avoiding a rise in the unemployment rate. In another dimension, if there is anticipated increase in aggregate demand and the price level rises, both firms and worker agree to raise the money wage rate thereby preventing the real wage rate from falling and avoiding a fall in the unemployment rate below the natural rate. The new classical theorists, therefore, maintain that only unanticipated fluctuations in aggregate demand (that are not taken into cognizance in wage agreements) can cause changes in real GDP. Anticipated increases in aggregate demand changes the price level but leave the real GDP and unemployment unchanged.

Building upon the new classical and Keynesian theory, the new Keynesian business cycle theory regard both anticipated and anticipated fluctuations in aggregated demand as sources of economic fluctuations. First, the theory assumes that households and firms are influenced by rational expectation formed in the past. Second, the theory also assumes that prices and wages are sticky and do not adjust instantaneously to change in economic conditions. The New Keynesian economics emphasized that after making long-term wage contracts, both firms and workers might anticipate a change in aggregate demand, which they expect will change the price level. Because of the contractual nature of wage agreements previously entered into, both firms and workers are unable to change money wages, thereby making them to be sticky. Therefore, New Keynesians argue that macroeconomic

[2] It could be observed that the depreciation in exchange rate can also lead to a fall in aggregate demand via its effect on the balance sheet of both financial and nonfinancial firms when a substantial amount of domestic debt is denominated in foreign currency.

stabilization by the government (using fiscal policy) or by the central bank (using monetary policy) can lead to a more efficient macroeconomic outcome than a laissez faire policy would (Parkin, 1996).

Recent development in business cycle theory also gave birth to the Real Business Cycle (RBC) theory. The RBC theory is the latest incarnation of the classical view of economic fluctuations. It assumes that there are large random fluctuations in the rate of technological change. In response to these fluctuations, individuals rationally alter their levels of labor supply and consumption. The business cycle is, according to this theory, the natural and efficient response of the economy to changes in the available production technology (Mankiw, 1989). In essence, shocks to aggregate supply (supply shocks) play a key role in RBC theory and these shocks include technological innovations that change the production function, changes in labour supply and changes in the relative price of important inputs such as oil. As these shocks affect the production capacity of the economy, on top of creating short-run fluctuations around the trend path of GDP, they can have lasting or even permanent effects that change the trend path itself.

The survey of theoretical literature, at this juncture, have identified two main factors that can lead to business cycle fluctuation. These are aggregate demand shock and aggregate supply shock. In this paper, we maintain that the main explanation to the current financial crisis can be found in the rational expectation school which emphasized the role of unanticipated fluctuation in aggregate demand as the basic source of economic fluctuation.

Literature Review

In an attempt to explain the impact and causes of recent global financial crisis, several empirical studies have been carried out. Karshenes (2009) examined the impact of the global financial crisis on Less Developed Countries (LDCs) economies. The author noted that the financial crisis had led to immediate reverberations in developing countries which are closely linked to the global financial markets due to the rapid flight of capital from emerging markets to advanced economies particularly the United States. One of the main mechanism through which LDCs had been affected, following the author, was the sharp reduction in world trade and the rapid decline in commodity prices. The author also identified the decline in Foreign Direct Investment (FDI) as the second channel through which these countries had been affected, while the third channel was the slowdown in migrant workers remittance flows. The author concluded that the impact of the global financial crisis on different LDCs varied and depends on the nature of their trade specialization.

Griffith-Jones and Ocampo (2009) also explored the impact global financial crisis on developing countries. These authors reiterated that the global financial crisis can be seen as been driven by the reversal of three positive shocks that developing countries experienced during recent boom. These shocks include rapid growth of migrant remittances, private capital flows and trade. With respect to remittances, these authors noted that while some countries such as Latin America had experienced a slowdown in migrant remittances, particularly in 2007 and 2008, other area such as Gulf countries continued to boom in 2008. Moreover, the study also revealed that the effect of private capital flow to developing countries also occurred through volumes and associated costs of such flows while the slowdown in trade volume since mid-2007 also served as a channel of transmission of crises to exporters of manufactures. These authors concluded that national responses should aim at mitigating the contractionary effects from abroad and rethink their trade strategies, while global responses

should be directed at correcting the regulatory deficit of global finance, reforming the International Monetary Fund (IMF) and coordinating global macroeconomic policy for growth and poverty reduction.

In another study, Nissanke (2009) investigated the effects of the on-going financial crisis on the developing countries focusing principally on its implications for industrial development and welfare. The fall-outs from the global financial crisis, following the author, had been felt throughout a wide range of industrial activities irrespective of their nature and size of operations. Those sub-sector of the industrial sectors identified to be severely affected by the global crisis include motor vehicles and transport equipment, basic metals and steel, chemical and chemical products, rubber products and construction materials. The author maintained that the current financial crisis was the outcome of governance as well as market failure and concluded that the international monetary and financial system under the current regime is grossly inadequate to take on a task of financial intermediation for productive investment and economic development in the developing countries.

The United Nations Economic Commission for Africa (ECA, 2009) also examined the impact of the global financial crisis on African countries. In this study, the responses to the crisis (in terms of the recent policy measures taken by African government and regional organization to cushion its effect) as well as the way forward was encapsulated. The commission observed that the financial crisis had taken place at a time when the region was slowly recovering from the negative effect of the fuel and food crisis. Those policy measures put in place in response to this crisis include interest rate reductions, recapitalization of financial institutions, measures to increase liquidity of banks and firms, fiscal stimulus, trade policy changes, and regulatory reforms. The commission further noted that measures adopted differ from country to country depending on available fiscal space as well as the degree of vulnerability to the crisis. The commission concluded that measures that could mitigate the current crisis in African countries should focus on enhancing resource availability and reforming the international financial system.

Kryticous (2009) studied the impact of the global financial crisis on the Zambian economy. With the fall of copper prices in this economy in 2007, a significant depreciation of currency was witnessed and the current account deficit was more than doubled in 2008. Lower copper prices also contributed to weak fiscal position as the Zambian government relied heavily on increased tax revenue introduced in 2008. The author found that the global economic crisis had led to drastic reduction in mineral export prices and a fall in the inflow of foreign direct investment in Zambia due to tightening of financial market in the US and Europe.

Nurudeen and Obi (2009) focused on the responses of African governments to the global financial crisis and lessons to be learned on account of the crisis. The authors maintained that the root cause of the global financial crisis was the failure of the neo-liberal policies of multilateral institutions (World Bank and IMF) and excessive government regulation for the crisis. The author also noted that the crisis took its toll on the African continent, as many countries continue to experience decline in their exports and export revenues, fall in inflow of international capital and remittances, widening current account and budget deficits, companies reporting huge losses and cutting jobs, to mention only few. These authors recommended among others government regulation of the financial market to prevent market failure, adoption of fiscal stimulus to restore banks capacity to lend, reduction of cash and liquidity ratio by monetary authorities, and increase in trade among African countries.

Ekpo and Afangideh (2009) examined the impact, policy responses and implication of the global financial crisis on Nigeria. They also reviewed the received economic doctrine which has fundamentally contributed to the crisis and called for a re-thinking of the dominant economic dogma which emphasized minimal government and freedom of private resources owners to seek maximum private profits even at the expense of the generality of people. The paper maintained that regulation of the economy is necessary to avoid the crisis that could emanate from market failures. Adamu (2009) also opined that the risk of global recession had heightened significantly and volatility of commodity prices, which is the mainstay of most developing countries, had increased. Given the deteriorating situation in developing countries, the author recommended that the federal government should come up with intervention policies that will minimize these effect and jumpstart the economy.

The review of literature presented here so far has indicated that though some studies have examined the causes, impacts and responses of the Nigerian government to the global financial crises, only few studies to our knowledge has investigated the impact of the crisis on crucial macroeconomic variables such as real GDP, government expenditure, exports and domestic credit to the economy. Moreover, none of these studies have examined the differential impact of the crisis on these macro-variables. Another problem of these studies is that their inferences are principally based on cross country studies carried out by International Monetary Funds (IMF) and African Development Banks projections. Given these caveat in the literature, this study sheds light of the impact of the global financial crisis on crucial variables that determine macroeconomic performance using the Structural Vector Autoregression (SVAR) econometric techniques.

METHODOLOGY

The Model

To investigate the impact of the global financial crisis on crucial macroeconomic variables in Nigeria, the study adopts the Structural Vector Autoregression (SVAR) econometric technique. SVAR are a multivariate, linear representation of a vector of observables on its own lags and (possibly) other variables as a trend or a constant. Sims (1980) have used this econometric technique to document the effects of money on output while Blanchard and Quah(1989) have employed it in assessing the relative importance of supply and demand shocks on business cycles. The SVAR econometric framework also tests the relative importance and dynamic effect of various shocks on variables of interest. Given that the dynamics of the economy could be typically approximated by a system of linear equations, the n-variate SVAR representation, assuming ρ lags, could be explicitly summarized as

$$A_0 y_t = A_1 y_{t-1} + \ldots\ldots\ldots\ldots + A_\rho y_{t-\rho} + CD + Be_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where $y_t = (y_{1.t}, y_{2,t}, \ldots\ldots y_{n,t})'$ is an nx1 dimensional vector of endogenous non-policy and policy variables. A and C are parameter matrices of order n x n. D_t contains all deterministic variables which may constist of a constant, linear trend, seasonal dummy variables as well as other specified dummy variables. Moreover, e_t is an nx1 dimensional vector of structural shocks or innovation in policy and non-policy variables which is assumed to be $i.i.d.N(0, \Omega)$ where Ω is the variance-covariance of e_t which is symmetric and positive

definite and A_0 , A_1,...,A_ρ are n x n dimensional coefficient matrices. The matrix A_0 represents the contemporaneous relations between the components of y_t.

Given that A_0 is invertible, the reduced form VAR representation of the structural equation (1) above is

$$y_t = \pi_0 + \pi_1 y_{t-1} + ...+ \pi_\rho y_{t-\rho} + \varepsilon_t .....(2)$$

Where $\pi_0 = A_0^{-1}.CD$, $\pi_1 = A_1 A_0^{-1}, \pi_\rho = A_\rho A_0^{-1}$ and $\varepsilon_t = e_t A_0^{-1}$. The covariance of ε_t is represented by the matrix $\Sigma = A_0^{-1}\Omega(A_0^{-1})'$ and is also symmetric and positive definite since Ω is positive definite and A_0 is invertible.

A necessary (but not sufficient) condition for the estimation of the structural VAR (1) is that the number of parameters in it must not be greater than that in the reduced form VAR (2). This implies that it must be possible to recover the structural parameters in (1) from the parameters in the reduced -form VAR. Since y_t is nx1 dimensional vector, the Structural VAR (1) above has n, $(\rho+1)n^2$ and $n(n+1)/2$ parameters in the deterministic term, D, the coefficient matrix, (A_0, A_1,.....,A_ρ) and the covariance matrix Ω respectively. This gives a total of $\{n + (\rho+1)n^2 + n(n+1)/2\}$ parameters. Moreover, with respect to the reduced–form VAR in (2) there are n, $n^2\rho$ and $n(n+1)/2$ parameters in (π_0,π_1.....π_ρ) and covariance, **Σ** respectively. Thus, the number of structural parameters to be estimated exceeds that of the reduced-form VAR and equals

$$\{n + (\rho+1)n^2 + n(n+1)/2\} - \{n + n^2\rho + n(n+1)/2\} = n^2$$

Under the above scenario, the structural VAR in (1) is unidentified and the implication of this, following Gujarati (1995) is that the reduced-form VAR equation may be compatible with different structural equations or different models, making it difficult to say precisely which particular model is being investigated. This problem is therefore known as the identification problem. To avoid this problem, imposition of n^2 restrictions is required.

Drawing from the theoretical and empirical literature, the model for this study is represent by a five component vector y_t of endogenous variables defined as

$$y_t = (y, g, x, cr, y_{us}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where y is the real gross domestic product, proxy for the level of output produced in the economy, g denotes government consumption expenditure, x is the export of goods and services, cr connotes banking sector credit to the domestic economy, while y_{us} is the foreign level of output, proxied by the U.S real GDP. The inclusion of variable y_{us} is to capture the impact of the global financial shock engendered in the U.S on the Nigerian economy.

In equation (3) all variables are in logarithmic form. Moreover, to achieve identification of the SVAR, matrix B is assumed to be diagonal and of order 5 x 5, while matrix A has the following non-recursive structure

$$\begin{array}{c} \begin{matrix} y & g & x & cr & y_{us} \end{matrix} \\ \begin{bmatrix} 1 & * & * & * & * \\ * & 1 & * & * & * \\ 0 & 0 & 1 & 0 & * \\ * & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{array}$$

The non-recursive identification scheme above is just-identified and the asterisks (*) symbolize freely estimated parameters[3]. The first line is the equation for output and it shows that real GDP depends on government expenditure on the economy, export demand, credit to private sector (which affect investment behavior) and foreign income (y_{us}). The second line indicates that government expenditure depend on real income proxied by the real GDP, export, credit to the domestic economy as well as foreign income (y_{us}). Given a monocultural economy that depends heavily on export of oil, it is expected that the link between government expenditure will be a direct one. The third line shows that export demand depends on the level of foreign income proxied by the U.S real GDP. As income of foreigners increases, one expects increase in export demand. The forth line symbolizes credit to the domestic economy, which depends on real national income (proxied by real GDP). As national income rises and given that substantial proportion of saving has investment outlet, one expect a positive relationship between income and credit to the economy. The fifth line regards foreign income as exogenous since it is assumed that it is not affected by all other variables included in the model.

To analyze the model represented by equation (3) the impulse response functions are used. The IRFs trace out the response of current and future values of each variable to a one-unit increase in the current value of one of the VAR errors, assuming that the errors are equal to zero.

Data Measurement and Sources

In order to achieve the objectives of the paper, quarterly data covering the period 1970:1-2009:4 were employed. This period covers the period of economic regulation (1970-1985), the period of economic deregulation and global financial crisis (1986-2009). The main justification for the use of quarterly data are first, the estimation using the SVAR technique requires a large database; and second, there is the desire to minimize any problems with temporal aggregation(Christiano and Eichenbaum, 1987).

In the study, real GDP in Nigeria and the United States is measured as the nominal GDP deflated by the consumer price index(2005=100). In the absence of quarterly GDP in Nigeria, the Gandolfo(1981) algorithm of for the interpolation of annual GDP series into quarterly series was used[4]. This interpolation is justified on the ground that it is quite robust and based on Orderly Statistical Theory which is not confined to any variable type whether stock or flow.

In the study, data are obtained from the Central Bank of Nigeria's (CBN) statistical Bulletin (various issue) and the International Monetary Fund's International Financial Statistics (various years).

[3] The adoption of a non-recursive identification in the paper is justified because the impulse response functions derived from it does not depend on the ordering of the variables in the SVAR system.

[4] Asogu (1996) examines the various nonparametric methods of interpolating annual statistical series into quarterly time series.

EMPIRICAL RESULTS

Preliminary Analysis

For the purpose of investigating the impact of the global financial crises on macroeconomic variables of interest, two different VAR models were estimated in the study. The first model is estimated using data series for the period 1970:1 to 2006:4 while the second model employed 1970:1 to 2009:4 series. After the estimation, the impulse responses from both models are compared and inferences drawn about the impact of the crisis[5]. In the paper it is assumed that the ultimate effect of the global financial crisis in the US ultimately manifested in economic recession which is the fluctuation of the real GDP around its trend line. Since this global financial crisis started in 2007, we expect the impact of the shock to output in the United States to manifest in different impulse responses for the two estimated models.

Before the estimation, a preliminary analysis known as stationarity and cointegration tests were carried out. This is necessary given the recent innovation in econometric which shows that most macroeconomic time-series are non-stationary in their levels and are adequately represented by first difference (Hall, 1978; Nelson and Plosser, 1988). In this study, the Augmented Dickey-Fuller test which is associated with Dickey and Fuller (1979) is used to determine the presence of unit root. If variables are found to be of unit roots, a cointegration test is further carried out to determine whether a long-run relationship exist among variables. In testing for cointegration, the order of the reduced form VAR is determined and the maximum likelihood approach proposed by Johansen (1988) and Johansen and Joselius (1990) was adopted. Under this approach two likelihood ratio test statistics (that is, the trace and maximal eigenvalue tests) are used to test the null hypothesis that at most r-cointegrating relationship exists between variables.

Table 1 shows the result of the unit root test. The analysis indicates that the null hypothesis that each of the variables is of unit root against the alternative that is not, cannot be rejected for all the data series in their level at either the 5% and 1% significant levels. This means that all variables employed are non-stationary and their levels can become arbitrarily large or small so that there is no tendency for them to revert to their mean level. Table 1 also indicates that when the variables are first difference and ADF test statistics applied they become stationary at either the 1% or 5% significant level.

Given that the variables employed in the study are of unit root, the Johansen and Joselius maximum likelihood cointegration technique is further applied. From Table 2, the trace statistic rejects the null hypothesis of no cointegrating relationship among variables against the alternative hypothesis of one cointegrating vector among variables y, g, x, cr and y_{us}. However, using the maximal eigenvalue, the null hypothesis of no cointegrating relationship among variables cannot be rejected. This implies that the trace and maximal eigenvalue test is inconclusive as to whether a long term relationship exists among variables employed in the study. In light of the cointegration result, the paper concludes that there is no cointegrating relationship among the variables.

In the light of the discovery that all the variables selected for the study are of unit root but not cointegrated, the empirical strategy in the literature has adopted two main procedures. First, the impulse response and forecast error variance decomposition, upon which the

[5] This approach follows Darrat and Webb (1986) that generated forward-lengthening sub-periods by extending sample endpoints by increment of recent quarters to model the effect of financial innovation on interest elasticity of money demand.

dynamic analysis of the impact of global financial crises on the economy is based could be estimated from a SVAR model with variables in first difference. The other empirical strategy, following Benkwitz, et. al. (2001) is to estimate a SVAR model with variables in levels (irrespective of the order of integration and cointegration properties) and appropriate confidence interval for the IRFs obtained using a suitable Bootstrap procedure. Under the bootstrapping technique, the SVAR model is initially estimated and the estimated coefficients and fitted residuals are saved. The residuals are reshuffled with replacement, and the artificial data set are created using the estimated VAR as the true data generating process. In this paper, a series of 1000 such simulations are undertaken. With each of the 1000 data sets, the model is re-estimated and the IRFs are calculated.

Since the issue of the stability of the reduced-form VAR has been deemed to be very crucial in an attempt to draw meaningful inference from SVAR model, this study computes the inverse or characteristic roots of the reduced-form VAR. Figure 1 indicates that reduced-form VAR is stable since all the inverse roots fall within the unit circle.

Impulse Response Analysis

In order to investigate the impact of the shock in current global financial crises on the Nigerian economy, the two SVAR models were estimated and the IRFs from these models were used as analytical tools. At first, SVAR was estimated using sample data covering the period 1970:1-2006:4 and later estimated using data for the period 1970:1-2009:4. In recovering the SVAR parameters from their reduced form VAR, a non-recursive identification scheme was employed. Table 3 shows the estimated IRFs which indicate the direction and size of the effect of a one standard deviation shock to United States real GDP. Panel A shows the responses of domestic output (y) and exports (x) to shocks to foreign income(y_{us}) . As the table shows, a one standard deviation in foreign income can be approximated as 0.39% decrease in domestic output(real GDP) using the 1970:1-2006:4 sample. By increasing the sample endpoint by increments of twelve (12) quarters to 2009:4 which comprised the period of global financial crisis, the SVAR estimates shows that a one standard deviation shock to foreign income immediately leads to 0.41% decrease in domestic output. This means that the global financial crisis does not immediately lead to a substantial reduction in domestic output until after the 12^{th} quarter of the simulation period. With respect to exports, shock to foreign income immediately leads 0.79% decrease in this variable when 1970:1-2006:4 sample was used. However, by extending the sample to 2009:4, a one standard deviation shock to foreign income leads to 1.08% decrease in exports. This result implies that the global financial crisis, though negatively affect domestic income, does not significantly affect export demand in Nigeria.

To know the impact of the global financial crisis engendered in the United States on government spending and domestic credit to the economy we also examine Table 3 panel B. From panel B, a one standard deviation shock to foreign income immediately leads to 0.42% increase in government expenditure when the 1970:1-2006:4 is used. Besides, when the 1970:1-2009:4 sample is used, a one standard deviation shock to foreign income also immediately lead to 0.42% increase in government expenditure. This implies that the global financial crisis did not immediately affect government expenditure. During the crisis, government expenditure initially rises only to decline slightly after the 4^{th} quarter of the simulation period. With the global financial crisis, a shock to foreign income does not significantly affect government expenditure. Coming to domestic credit to the economy, the impulse responses in panel B also shows that a shock to foreign income initially leads to a fall

in domestic credit to the economy followed by rising trend and a declined after the 12th quarter.

By showing the impulse responses graphically, the impact of the global financial crisis on output, government expenditure, exports and domestic credit can be easily discerned. Figure 2 indicates that following the financial crisis, domestic output, exports and government expenditure declined slightly relative to the pre-crisis period. Moreover, a shock from foreign income initially leads to a little decline in domestic credit followed by rising trend and a declined. The slow responses of domestic output, government expenditure, exports and domestic credit to the financial crisis at the initial period of the crisis can be attributed to steady revenue on oil from the international market, the little integration of the Nigerian

financial markets to international market and the initial positive attitude of financial managers and policy makers that Nigeria would not be affected by the crisis.

CONCLUSIONS AND POLICY IMPLICATIONS OF THE STUDY

The global financial crisis which began in 2007 has caused recession in major advanced economics with high financial integration, while activity in emerging and developing economies is slowing abruptly. The immediate cause of this problem have been largely attributed to the bursting of the United States housing bubble which peaked in approximately 2006 while its root cause has been linked with the pre-2007 savings glut in the United States resulting from high inflow of liquidity from the rest of the world, the global imbalance in savings and investment as well as the easy monetary policy pursued in the United States. African countries, in particularly, with low integration with global financial market, which have been speculated to be insulated from this crisis have also suffered the contagious effect of this crisis recently. Since the effect of the financial crisis ranges from country to country and may have different sectoral impact at the country level, this study empirically investigates the impact of the financial crisis on macroeconomic performance in Nigeria. Using aggregate data from the Nigerian economy and applying SVAR econometric methodology, the paper reveal that the global financial crisis have led to immediate but insignificant decline in output and export demand. Moreover, while government expenditure does not seem to be affected by the crisis, credit to the domestic economy initially fall following international shock, rises and declines after.

At this juncture, one can ask: what are the policy implications of this study? First, the experience from developing countries, recently, is that in quest for deregulating and globalizing their economies, these countries have opened up their financial markets. This situation, though may not have a serious short-run adverse effects, could be devastating in the long-run. Second, experiences have shown that markets do fail. Market failure, therefore called for regulation of the financial market to ameliorate the detrimental effect international shocks. Lastly, reliance on monetary and fiscal policies may not lead to achievement of macroeconomic objectives. The experience in the United States has shown that the easy monetary policy pursued by the Fed also contributed to the crisis. This calls for caution in economic policy management in the Nigeria.

References

Adamu, A.(2009). The Effects of Global Financial Crisis on Nigerian Economy. *www.rrojasdatabank*.info/crisisdb/onnigeria09.pdf

African Development Bank(AFDB)(2009). Impact of the Crisis on African Economies-Sustaining Growth and Poverty Reduction: African Perspectives and Recommendations to the G20. *A report from the Committee of African Finance Ministers and Central Bank Governors established to monitor the crisis.*

Asogu, J. O. (1996). Quarterly Interpolation of Annual Statistical Series using Robust Non-Parametric Methods. *Central Bank of Nigeria Economic and Financial Review*, 35 (2): 154-70.

Benkwitz, A., H. Lutkepohl, and Wolters, J. (2001). Comparison of Bootstrap Confidence Intervals for Impulse Responses of German Monetary Systems. *Macroeconomic Dynamics*, Vol. 5, pp. 81-100.

Blanchard, O.J. and Quah, D.(1989). The Dynamic Effects of Aggregate Demand and Supply Disturbances. *American Economic Review* 79, 655-673.

Christiano, L.J. and Eichenbaum, M.(1987). Temporal Aggregation in Structural Inference in Macroeconomics. *Carnegie-Rochester Conference Series on Public Policy*, 26, 63-130

Darrat, A.F and Webb, M.A(1986). Financial Changes and Interest Elasticity of Money Demand: Further Test of the Gurley and Shaw Thesis. *Journal of Development Studies*, pp. 724-730.

Dickey, D.A. and Fuller, W.A. (1979). Distribution of the Estimators for Autoregressive Time Series with a Unit Root. Journal of the American Statistical Association, 74, p. 427–431.

Ekpo, A.H. and Afabgideh, U.J. (2009). Global Economy in Crisis: A Re-Thinking of Received Economic Doctrine with Some Evidence from Nigeria. *AERC Global Financial Crisis Workshop Reference Papers No. GFC_09. http://www.aercafrica .org/publications/item.asp?itemid=590&category=*

Gandolfo, G.(1981). *Quantitative Analysis and Econometric Estimation of Continuous Time Dynamic Models*. Amsterdam, North-Holland.

Griffith-Jones, S. and Ocampo, J.A. (2009). The Financial Crisis and Its Impact on Developing Countries. *International Policy Centre for Inclusive Growth, Working Paper No. 53*.

Gujarati, D.N.,(1995): *Basic Econometrics*, McGraw-Hill International Editions.

Hall, R.E.(1978). A Stochastic Life-Cycle Model of Aggregate Consumption. *Journal of Political Economy*, 86; 971-987.

International Monetary Fund(2009): The Implication of the Global Financial Crisis for Low-IncomeCountries.*http://www.imf.org/external/pubs/ft*/books/2009/ *global*fin/globalfin.pdf *(Accesed 2009)*.

Johansen, S. and K. Juselius (1990) Maximum Likelihood Estimation and Inferences on Cointegration - with applications to the demand for money. *Oxford Bulletin of Economics and Statistics, Vol*. 52, pp. 169–210.

Johansen, S.,(1988) Statistical Analysis of Cointegrated Vectors. *Journal of Economic Dynamic and Control*, Vol. 12, pp. 231 -254.

Keynes, J.M. (1936). *The General Theory of Employment, Interest and Money,* Harcourt Inc. New York.

Karshenes, M. (2009). The Impact of the Global Financial and Economic Crisis on LDC Economies. *www.unohrlls.org/UserFiles/File/.../UNLDC2.pdf*

Kryticous, N.P.(2009). The Impact of the Global Financial Crisis on the Zambian Economy. Open Society Initiative for Southern Africa. www.docstoc.com/.../The-Impact-of-the-Global-Financial-Cri.

Lucas, Robert (1976), Econometric Policy Evaluation: A Critique. In Brunner, K.; Meltzer, A., *The Phillips Curve and Labor Markets, Carnegie-Rochester Conference Series on Public Policy*, **1**, New York: American Elsevier, pp. 19–46

Mankiw, N.G.(1989): Real Business Cycle: A New Keynesian Perspective. *Journal of Economic Perspectives, Volume 3, Number 3-Summer,* Pages 79-90.

Martin N. B., Robert E. L, and Matthew S. J.(2008). The Origin of the Financial Crisis. Fixing finance series, Paper 3 *Initiative on Business and Public Policy, Brookingshttp://www.brookings.edu/~/media/Files/rc/papers/2008/11_origins* crisis baily litan/11 origins crisis baily litan.pdf (Accessed, 2008).

Mishkin, F.S(2001). The Transmission Mechanism and the Role of Asset Prices in Monetary Policy. *National Bureau of Economic Research Working Paper 8617,* http://www.nber.org/papers/w8617.

Mohan, R.(2007). India's Financial Sector Reforms: Fostering Growth While Containing Risk. *Address by Dr Rakesh Mohan, Deputy Governor of the Reserve Bank of India, at Yale University, New Haven, 3 December 2007.*

Nelson, C.R. and Plosser, C.(1982). Trends and Random Walks in Macroeconomic Time-Series. *Journal of Monetary Economics*, 10, 139-162.

Nissanke, M.(2010). The Global Financial Crisis and the Developing World: Transmission Channels and Fall-Outs for Industrial Development. *United Nations Industrial Development Organization, Working Paper, 06/2009.*

Nuruden, A. and Obi, B.(2009). Responses By African Governments to the Global Economic and Financial Crisis and Lessons. *www.aercafrica.org/documents/...* /AbundObiRespon.pdf

Parkin, M. (1996). *Economics*. 3rd ed. New York:Addison Wesley.

Sims, C.A. 1980. Macroeconomics and Reality. *Econometrica* 48, 1-48.

Taylor, J. (2009). The Financial Crisis and the Policy Responses: An Empirical Analysis of What Went Wrong. *National Bureau of Economic Research Working Paper 14631*

United Nations Economic Commission for Africa(ECA)(2009). The Global Financial Crisis: Impact, Responses and Way Forward. *www.un.org/regionalcommissions/*

crisis/ecaway.pdf

Table 1: Unit root test (ADF Test)

Variables	Levels	First difference	Critical value (5%)	Critical value (1%)
Panel A: Nigeria -unit root for stationarity with constant only, sample 1970:1-2008:4				
y	-1.7446	-6.0643	-2.86	-3.43
g	-0.3657	-5.3767	-2.86	-3.43
x	-0.6966	-6.5358	-2.86	-3.43
cr	-2.5194	-5.9138	-2.86	-3.43
y_{us}	-1.5008	-5.5315	-2.86	-3.43
Panel B: Nigeria-unit root tests for stationarity with constant and trend, Sample 1970:1-2008:4				
y	-2.716	-6.0289	-3.41	-3.96
g	-1.9761	-5.3254	-3.41	-3.96
x	-2.8394	-6.51	-3.41	-3.96
cr	-2.9332	-5.8697	-3.41	-3.96
y_{us}	-3.5488	-5.7114	-3.41	-3.96

Note: Mackinnon critical values for rejection of hypothesis of a unit root.

Table 2: Cointegration test

Cointegration results (unrestricted constant)

Estimates of trace test and λmax tests , var lag 2

Rank	Alternative r	Trace test	C.V(95%)	p-value	λmax test	C.V(95%)	p-value
0	1	74.33	70.49	[0.0193]	31.66	33.64	[0.0882]
≥1	2	42.67	48.88	[0.1409]	19.73	27.42	[0.3720]
≥2	3	22.94	31.54	[0.2572]	14.33	21.12	[0.3521]
≥3	4	8.61	17.86	[0.4098]	8.43	14.88	[0.3444]
≥4	5	0.18	8.07	[0.6719]	0.17	8.07	[0.6720]

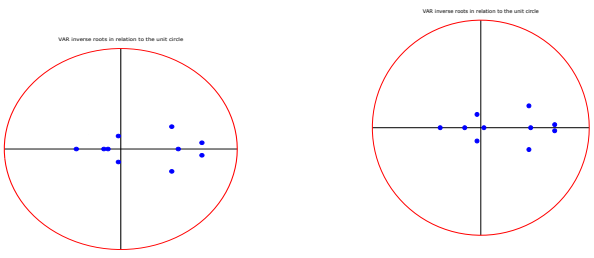

Figure 1. Panel A : sample 1970:1-2006:4 Panel B: sample 1970:1-2009:4

Table 3: Structural VAR Impulse Response

Panel A:				
time	y_{us} =>y_b	y_{us} =>y_a	y_{us} =>x_b	y_{us} =>x_a
0	-0.0039	-0.0041	-0.0097	-0.0108
1	-0.0036	-0.0041	-0.0131	-0.0154
4	-0.0054	-0.0023	0.0050	-0.0015
8	-0.0063	0.0006	0.0222	0.0126
12	-0.0109	-0.0057	0.0017	-0.0083
14	-0.0131	-0.0094	-0.0083	-0.0184
16	-0.0145	-0.0120	-0.0143	-0.0241
Panel B:				
time	y_{us} =>g_b	y_{us} =>g_a	y_{us} =cr_b	y_{us} =>cr_b
0	0.0042	0.0042	0.0012	-0.0028
1	0.0098	0.0107	-0.0028	-0.0028
4	0.0116	0.0169	0.0004	0.0044
8	0.0004	0.0079	0.0111	0.0205
12	-0.0058	-0.0021	0.0158	0.0244
14	-0.0078	-0.0062	0.0158	0.0228
16	-0.1010	-0.0099	0.0148	0.0201

Note: Impulse response functions of the SVAR model (non-recursive identification scheme).

Source: Author's calculation.

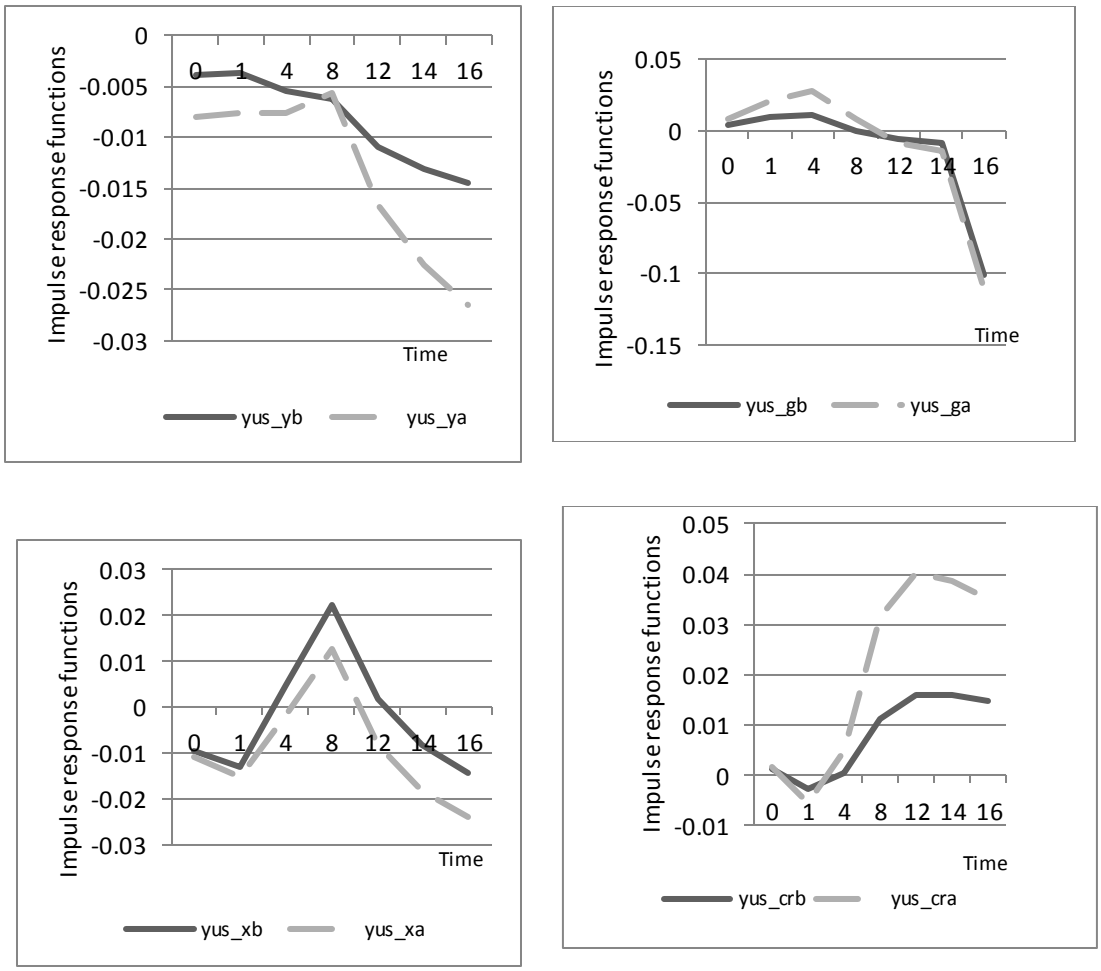

Figure 2: Impulse response function before and during global financial crisis

Notes: yus_yb = response of domestic output(y) to foreign income (yus) before the crisis

Yus_ya = response of domestic output(y) to foreign income (yus) during the crisis

yus_gb = response of government expenditure (g) to foreign income (yus) before the crisis

yus_ga = response of government expenditure (g) to foreign income (yus) during the crisis

yus_xb = response of exports (x) to foreign income (yus) before the crisis

yus_xa = response of exports (x) to foreign income (yus) during the crisis

yus_crb = response of domestic credit (cr) to foreign income (yus) before the crisis

yus_crs = response of domestic credit (cr) to foreign income (yus) during the crisis