



A FORECAST OF THE DYNAMIC RESPONSE OF THE NIGERIAN ECONOMY TO THE 2007/2008 GLOBAL FINANCIAL CRISIS

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Abstract

The financial and economic Tsunami that erupted and shook the world in 2007/2008 is by now legendary. If anything, it has underscored the importance of planning in the recovery of the global economy, but perhaps more important, in containing the negative consequences of future shocks at the local level. However, this can only be done on the basis of sound understanding of the character of the present (2007/2008) crisis and how it is likely to impact on Nigeria economy in the immediate future. Using impulse response functions and variance decomposition techniques, this paper forecasts the dynamic response of the Nigerian economy to impulses both from within and outside the domestic economic system, triggered by the 2007/2008 global financial meltdown. It was found that the crisis is likely to be more severe not in the short-run but starting from 2015. Also, that in order to contain future shocks, there would be the need to fundamentally restructure the external sector of the economy.

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Introduction

The financial and economic Tsunami that erupted in the United States and shook the world in 2007/2008 is by now legendary. By January 2009 when the initial waves settled, much of the industrialized world had plunged into a deep recession. The complex of vicious circles which seems to have contributed to this crisis included high oil prices, high food prices and the collapse of a substantial housing bubble centred in the United States (US), which sparked off an inter-related and ongoing financial crisis. Around the world, many large and well-established investment and commercial banks suffered massive losses and even faced bankruptcy. The recession is the worst since the Great Depression of the 1930s (Lightman, 2007; Finch, 2009).

It has been alleged that the huge increases in commodity and asset prices came as a consequence of an extended period of easily available credit and that the primary cause of the downturn was exceptionally financial. This has led to increased unemployment, and other signs of contemporaneous economic downturns in major economies of the world. Indeed, in December 2008, the US National Bureau of Economic Research (NBER) declared that the United States had been in recession since December 2007, and several economists expressed their worry over the fear that there might not be an end in sight for the downturn and that recovery may not appear until as late as 2011. The recession is the worst since the Great Depression of the 1930s (Lightman, 2007; Finch, 2009).

When viewed from a global standpoint, especially taking into account the instability generated by speculative trade, the implication of this crisis is far-reaching. The crisis could potentially disrupt the very foundations of the international monetary system. The repercussions on people's lives not only in industrialized economies but in other corners of the world might be devastating. Indeed, the crisis is not limited to the meltdown of financial markets, its (real) economics can better be appreciated when viewed from national rather than international standpoint as the former's institutions, productive structures and livelihoods are also in danger.

As far as the consequences of the crisis in developing world were concerned, particularly Africa, there is divided opinion. While some commentators and economists, like Professor Soludo and Shah (2009) believed that because of Africa's generally weak integration with the rest of the global economy, it might mean that many African countries would not be affected from the crisis, at least in the short run. In Professor Soludo's opinion, Nigeria still had the opportunities to contain them unlike the situation in the 1980s.

Others like ActionAid and Raja (2008) opined that Africa countries, especially the wealthier ones who did not have some exposure to the rest of the world would still face some problems as in the long run, it could be expected that foreign investment in Africa would reduce as the credit squeeze took hold. Furthermore, foreign aid, which was important for a number of African countries, was likely to diminish.

The critical questions that should be asked are: can the Nigerian economy insulate itself from this crisis as hypothesized by some authors? If not, what are the

channels through the impact of the crisis will filter through the economy? And lastly, can we really quantify the impacts of the crisis on the Nigeria economy? These are the research questions this paper seeks to answer.

Theoretical Framework

The long-run expansion of industrialized market economies has been accompanied by cyclical fluctuations in economic activity. The general feature of the cycle is that an expansion of economic activity is followed by a contraction, which is in turn succeeded by a further expansion. Explaining the cause and occurrence of trade cycles has been a major preoccupation of academics for a very long time. There are basically three schools of thought that try to explain the causes and occurrence of global economic crisis. These are the Western liberal school, the Marxian school and the neo-Marxian school. The fundamental difference between these schools does not lie in the growing sense of the increasing fragility of capitalism or its enduring strength but in the longer-term prospect of its self-destruct or perpetuate survival (Shutt, 1998).

The liberal school theorists have sought to explain the central feature of the cyclical behavior of industrialized, market economies. They see it as the regular recurrence of expansion and contraction in the process of long-run economic growth. Thus it appears that expansion generates factors which bring about its own end and induce a period of contraction. Similarly, the process of contraction generates the conditions for recovery. These aspects of the cycle have encouraged the development of liberal theories concentrating on factors endogenous/local to the cycle in terms of its internal dynamics (Levačić & Rebman, 1982). There is another liberal approach to trade-cycle theory which does not rely so intimately on internal factors. It analyses cyclical adjustment paths that are generated by the impact on the economic system of exogenous/stranger factors, such as population changes, the accumulation of new inventions (Schumpeter, 1939), the opening up of new territories or changing patterns of international trade/globalization (Levačić and Rebman, 1982).

These two approaches are not too different and a very clear classification of endogenous and exogenous factors cannot be made, as this distinction depends on what behavioural relationships are included in the model of the economy with which one is working. Essentially, for Keynesian economists, the existence of trade cycles is *prima facie* evidence of the failure of market co-ordination and so provides a rationale for active government intervention intended to stabilize the economy. Keynesian explanations of the trade cycle emphasize the part played by disturbances in real variables, particularly in private-sector investment leading to ineffective demand and loss of business confidence in the economy (Domar, 1946; Harrod, 1939; Hicks, 1950; Keynes, 1936; Samuelson, 1939). In sharp contrast, monetarist economists see changes in the supply of money which originates from actions by the financial system through the monetary authorities as a primary causal factor (Friedman, 1958; Friedman and Schwartz, 1963; Tobin, 1965).

The explanation of trade cycle by the radical school (Marxian and neo-Marxian) can best be understood by examining the main thesis of Karl Marx's *Das Capital*

(Marx, 1986), Lenin's classic on imperialism (Lenin, 1917), and their criticisms by the neo-Marxists (Alavi 1964; Amin, 1973a; 1973b; Baran and Sweezy, 1966; Emmanuel, 1972; Frank, 1972;) as well as the polemical counterattacks by the modern mainstream Marxists which found its most elegant articulation in Nabudere's *Political Economy of Imperialism* (Nabudere, 1978).

The Marxian school considers economic crisis as indicative of and taking of a state of general overproduction. In other words, capitalist economic crisis is the mechanism by which equilibrium between production and circulation of goods is forcefully restored (Marx, 1986). Marx was therefore able to show that contrary to the fundamental theorem of Say's law, partial gluts are always possible in a capitalist system, and that instead of being corrected, they tend to result in general (globalized) overproduction and crises. Marx offered several hypotheses concerning the manner in which an economic crisis, which will reveal itself in the form of overproduction, may be triggered. Thus, with the passage of time, economic crises will become increasingly severe, "putting the existence of the entire capitalist society on trial each time more threatening" (Marx, 1986).

The difference between Marxists and neo-Marxists is not so much disagreement on methodology or the inherent tendency for the capitalist system to breed crises, but source, nature and manifestation of exploitation, especially as it affects the relationship between industrialized economies on the one hand and less developed or developing countries on the other. This seems to have been sparked off by Lenin's declaration that "imperialism is the highest stage of capitalism". Neo-Marxists disagreed with this. Though they accept that capitalism is still a global system, contrary to Lenin's contention it has triumphed over imperialism as the world following the wars of independence has changed from being a single capitalist entity to one fragmented and polarized along two poles, 'centre/metropole' and 'the periphery' countries with the erstwhile economic relations of 'colonial masters and the colonies' to one characterized by an 'unequal exchange'.

Nabudere (1978) was able to demonstrate that the centre-periphery argument does not facilitate good understanding of the real essence of capitalism as a production system driven by multilateral finance capital on a global scale. The implication of this is obvious: as long as the neo-Marxist position is accepted, it becomes difficult for us to appreciate that developing countries like Nigeria can hardly insulate themselves from the excruciating impact of the current global recession.

As a summary from the preceding review of theories, we can identify three basic facts about capitalist global economic crises. One, they are an inherent and recurrent feature of the world capitalist production and finance. Two, they often emanate from the irreconcilable internal contradiction of capitalism resulting from the interplay of 'glorified greed' (insatiable pursuit of profit) and technological progress. Three, the crises manifest themselves in discrepancies in planned and actual private investment, overproduction and under-consumption.

With this general background knowledge of the workings of capitalism and the origin and nature of global economic crises, it is easier now to appreciate the basic features of the Nigeria economy and to pre-empt the channels through which the

current global economic crisis will impact on the Nigerian crisis. The Nigeria economy has been dominated by heavy reliance on oil. Following the oil boom of the 1970s, Nigeria neglected its strong agricultural and light manufacturing bases in favour of an unhealthy dependence on exports of crude oil. By 2002, oil and gas exports accounted for more than 98% of export earnings and about 83 percent of federal government revenue (CBN, 2005). New oil wealth, the recurrent decline of other economic sectors, and the adoption of an economic model fueled massive migration to the cities and led to increasingly widespread poverty, especially in rural areas. Agriculture has suffered years of mismanagement, inconsistent and poorly conceived government policies, and the lack of basic infrastructure. Yet, the sector accounts for about 30% of GDP and two-thirds of employment. Agriculture provides a big chunk of non-oil growth, which in 2006 reached nine percent.

A collapse of basic infrastructure and social services since the early 1980s moved hand-in-hand with this development. Oil dependency created the impression that it generates great wealth through government contracts and spawned other economic distortions. The country's high propensity to import means roughly 80% of government expenditures is recycled into foreign exchange. Cheap consumer imports, resulting from a supposedly overvalued Naira, in addition to high domestic production cost due largely to erratic electricity and fuel supply, have pushed down industrial capacity utilization to less than 30%. Many more Nigerian factories would have closed except for the relatively low labor costs (10 – 15%). Revenue generation in Nigeria is the almost exclusive reliance for revenue by government at the three tiers on statutory allocation, the latter itself dependent on oil rents.

Oil receipts are the most obvious and direct channel through which the global financial meltdown will transmit into the Nigerian economy. This is so because oil export is the biggest foreign exchange earner and largest contributor to federation account. For example in the 2008 budget, crude oil sales was expected to contribute a whopping \$15.40 billion to a projected total revenue of \$27.65 billion, as against \$12.48 billion in 2007; while petroleum profits tax was estimated to add up \$8.42 billion compared to \$11.69 billion in 2007. These estimates were done when oil price was hovering around \$98 per barrel. Now that the price has dropped to less than \$50 per barrel coupled with credit crunch, we should expect less in oil revenue; and since the three tiers of government depend on federation account for the larger part of their funding, government spending will be curtailed; and that spells doom for Nigeria since the government is the biggest spender and largest employer of labor in the economy.

Non-oil exports have over the last ten years showed remarkable improvement both as contribution to GDP as well as alternative foreign exchange earner. The possible gains in the area could be wiped out if the current financial meltdown should prolong, as the global industrial demand for such items which are essentially raw materials in nature could be affected by squeeze on western credit and business sentiments.

Nigeria is essentially a net importer of goods and services from other countries, whether as consumer items or trade merchandize. As the economy is dominated by the informal sector which is largely in the trade and commerce sub-sector, the global

meltdown would most likely affect domestic consumption adversely first through substitution and income effects. This is clearly demonstrated by the happenings in the Nigerian capital market. Many Nigerian business players blame foreign hedge funds for a stock-market crash, which has sent Nigerian equity prices down 70% from their high in March, 2008. They say foreign money raced out of Nigeria as the global economy soured, leaving surprised Nigerian investors helpless and hastening the economic downturn here.

Domestic investment has two sides. One side tells the story of local investors who prefer to invest in assets abroad. Studies have shown that most Nigerian investors prefer to invest in financial or real assets (mortgage) abroad; and unfortunately these are the hardest hit by the recent financial meltdown. The other side of the story is foreign investors'. The credit crunch occasioned by the current financial meltdown is likely to dry up crucial direct investment from overseas; reduce remittances sent back home from Nigerian emigrants; and a stampede of foreign money out of Nigerian stock exchange by indigenous investors abroad (Nigerians in Diaspora) or foreign investors.

Lastly, current economic crisis may likely filter into the Nigeria economy through the finance and banking channel following the Bank Consolidation Reforms, as Nigerian banks have been compelled to go 'global', thereby accessing world class financial services and linking up with global players in major financial capitals around the world. Once there is a major crisis in the international financial, it will be too difficult for local banks to insulate themselves from it.

Methodology and Model Specification

On the strength of the above characterization of the Nigeria economy, we hypothesize national income (Y_t) to be a function of domestic consumption (C_t), domestic private investment (I_t), government spending (G_t), changes in the general price level (P_t) and net exports ($X_t - M_t$). In turn, domestic consumption is influenced by a number of variables, such as national income and its past values, changes in the price level and imports aptly captured by movements in the foreign exchange (FX_t). Domestic private investment is also hypothesized to be a function of past values of national income, interest rate (R_t), changes in the general price level, foreign private investments (FI_t), population growth (POP_t) and political stability or absence of it (PI_t). Government spending is taken to be dependent on taxes (T_t), oil revenue (OR_t), Nigeria's Organization of Petroleum Exporting Countries (OPEC) oil production quota (OP_t), external borrowing (ED_t), domestic borrowing (DD_t) and again political stability or the absence of it. Inflation is assumed to depend on past values of itself, national income and high-powered money or money stock (M_t), industrial harmony or disputes (TD_t) and generalized political stability or the absence of it. Net exports is taken to be a function of the movement in the world oil market price (PO_t), changes in the foreign exchange rate, national income, domestic crude oil production and agricultural production (AP_t). Symbolically we have the following system of multiple equations:

$$C_t = f(Y_{t-1}, R_t, P_t, FX_t) \quad (1)$$

$$I_t = f(Y_{t-1}, Y_{t-2}, P_t, PI_t, FI_t, R_t) \quad (2)$$

$$G_t = f(T_t, OR_t, OP_t, PO_t, PI_t, ED_t, DD_t) \quad (3)$$

$$P_t = f(Y_{t-1}, P_{t-1}, M_{t-1}, FX_t, TD_t, PI_t) \quad (4)$$

$$X_t - M_t = f(PO_t, FX_t, Y_t, OP_t, AP_t) \quad (5)$$

$$Y_t = f(C_t, I_t, G_t, P_t, X_t - M_t) \quad (6)$$

The aggregate consumption equation (1) consists of a multiplier with a lag distribution of national income. The investment equation (2) contains both the multiplier and an accelerator. By explicitly including past values of national income, inflation and money stock, the inflation equation (4) acknowledges both the Keynesian and Monetarist's arguments regarding the role of money and expectation in fueling inflationary spiral. An equation (5) is also specified for the external sector of the economy. Finally, the model is completed with the gross national product (*GNP*) accounting identity in equation (6).

In a simulation exercise like this, it is common to see the specification and evaluation of the behavior relationships in a model been guided by a particular theory as well as the estimation procedure often suggested by proponents of such theory. We have however seen in the previous section that there are several contending theories that try to explain global economic crisis, each with its strengths and potential pitfalls. For our purpose, as a matter of fact, the Marxian theory is too complicated to allow one to precisely derive a specification from first principle, despite its elegance and supposedly compelling analytical superiority. On the other hand, though the approaches under the liberal school are not dissimilar, a very clear classification of endogenous and exogenous factors cannot be made, as the distinction depends on what behavioral relationships are included in the model of the economy with which one is working (Levačić and Rebman, 1984). Besides each of the theories might be consistent with several alternative lag structure; but these lag structures can result in models with very different dynamic behavior or disagreement about what is the 'right' theory.

As a result, we chose to allow the data to specify the dynamic structure of the model used in this study. We therefore employed the vector autoregressions (*VARs*) modeling and estimation technique to accomplish it. According, we specified a simple *VARs* model with the following endogenous variables ((Y_t) , (C_t) , (I_t) , (G_t) , (P_t) and $(X_t - M_t)$; and exogenous variables (FX_t) , (R_t) , (FI_t) , (POP_t) , (T_t) , (OR_t) , (OP_t) , (ED_t) , (DD_t) , (TD_t) , (PO_t) and (AP_t) .

Historical data for the period 1970 – 2007 from several sources (but particularly, Central Bank of Nigeria Statistical Bulletin, National Bureau of Statistics and other publications) were used for the study. 2008 -2020 was then used as forecast time

horizon. In analyzing the forecast results, we took into cognizance the fact while the United Nations Millennium Development Goals (*MDGs*) year (2015) is just eight years away from the beginning of the forecast period, the target year for the Vision 20/2020 is about 13 years.

Since *VARs* contains the same right-hand side variables of each equation, there is no issue of simultaneity and ordinary least-squares (*OLS*) is an appropriate efficient estimator for the study (Pindyck and Rubinfeld, 1991); Greene, 2003; Gujirati, 2004). To estimate equations (1) to (5), we subjected the data series to the relevant statistical tests of stationary and co-integration using the statistical packages, *EViews* Version 4.0. We then used the impulse response function and variance decomposition techniques to evaluate the dynamic response of the model to internal and external shocks.

Results and Discussion

Table 1 reports the results of Augmented Dickey-Fuller (*ADF*) unit root test. 13 out of 19 variables were stationary to the order $I(0)$, while six were to the order $I(1)$ at one percent, five percent and ten percent significant level. With this results we conclude that in spite of the fact that six variables are stationary at $I(1)$, all the variables in the model are co-integrated. This is confirmed by the Johansen co-integration test conducted on the variables in the model.

The results from estimating the equations in our *VARs* by *OLS* are shown in Table 2. With *R*-squared statistic ranging from 0.861601 to 0.999995, the fit to all the equations is quite good. Only about a quarter of the lagged variables in the model were significant. This is typical of *VARs*; rather than choose specific lags for each variable, we simply included all the lags (up to two) for each endogenous variable. Similarly, for the 13 exogenous variables included in the model, only about 17% turned out statistically significant.

All these notwithstanding, the results show that current national income has been significantly responsive to lagged values of itself, domestic consumption, domestic private investment and government spending; as well as current values of non-oil revenue and changes in the foreign exchange rate within the historical period under study. The results also show that current domestic consumption has been responsive to the lagged values of itself and government expenditure. It is equally responsive to variation in non-oil revenue, domestic oil production and stock of money. As for domestic private investment, lagged values of domestic consumption, government spending and net exports in addition to changes in oil production and revenue as well as industrial harmony/dispute turned out to be statistically determining influences.

The variables that had significant influence on government spending over the historical period covered by this study include activities in the external sector (net exports and changes in foreign exchange rates), past investment decisions, changes in the general price level and past government spending and industrial disputes. Inflation was only responsive to lagged values in national income and itself. Three variables in all had significant influence over net exports within the historical period of the study, namely, the current values of non-oil exports.

In this study, we are interested in forecasting the dynamic response of the Nigeria economy to the current global economic ‘meltdown’, taking into cognizance that the *MDGs* year is just eight years away from 2007/2008; as well as Vision 20/2020. Accordingly, using the 1970 – 2000 as the reference period, we simulated for all the endogenous variables to test the forecasting (predictive) power of the model.

Figure 1 shows the actual and fitted values, as well as the residuals, for national income, domestic consumption, domestic private investment, government spending, inflation and net exports equations. Except for the inflation and net exports equations, this suggests a very good fit. Observe that for the most part, the simulated variable tracks both the trend and turning points in the actual variable for the period 1970 – 2000. This is quite typical of *VARs* and we will expect the model to be useful in short- to medium-term forecasting.

As *ex post* forecast was then performed for the period 2000 – 2007. Figure 2 shows within-sample (or *ex post*) forecasts for the national income, domestic consumption, domestic private investment, government spending, inflation and net exports for the last seven years of our historical period.

Like for the period, 1970 – 2000, except for net exports, all simulated (fitted) series tracked both the trend and turning points of each actual series of the endogenous variables very well; meaning that the model does a better job of mimicking the trend and turning points in the data for the *ex post* forecast period. This can be seen from the relative low values of forecast errors (root mean square error, mean absolute error, mean absolute percentage, Theil inequality coefficient, variance proportion and covariance proportion) of the period (2000 – 2007) when compared with those of the preceding period (1970 – 2000), reported in Table 3.

Impulse Response Functions

Impulse response function determines how each endogenous variable responds to a shock in that variable and in every other endogenous variable. In our case, we are particularly interested in how the global economic ‘meltdown’-induced shock in either national income, domestic consumption, domestic private investment, government spending, inflation or net exports affects itself and any other component or components. One standard-deviation shock is equivalent to one-year disturbance occasioned by the global economic crisis. In other words, it shows how the impact of one-standard shock (in monetary or percentage terms) on any component of the economy will filter through the economy to affect every other sectors, and eventually feedback to the original sector itself.

To calculate the impulse responses, was increased, for one year only, the error term in national income, domestic consumption, domestic private investment, government spending, inflation and net exports equations individually by one-standard deviation, and then in each case we calculated the immediate and future effects of these changes on other variables. To determine the initial impact of the response, we estimated the covariances among the six error terms and then converted them to their Naira equivalents and reported them as residual covariance matrix in Table 4.

Figure 3 depicts the responses of national income, domestic consumption, domestic private investment, government spending, inflation and net exports to one annual shock in national income and domestic consumption, that is, \$78.25 and \$198.81, respectively. Except for the response of domestic private investment to the annual shock in national income, the general trend was oscillatory and explosive especially from the seventh period (2014). In other words, \$78.25 and \$198.81 changes in national income and domestic consumption would generate instability in the economy between 2008 and 2020; it would likely be mild in the short-run (2008 – 2014), but become pronounced as we move towards the year 2020.

Figure 4 shows the outcome of the prediction of the dynamic behavior of the economy to one-annual shock in inflation of 6.27% and net export of \$4,131.70. As for inflation, the effects would be generally confined to the initial value, except for the later part of the forecast period (2016 – 2020). This is not the case with the impact of the shock in net exports on the economy. The severity of the instability would likely start from the beginning of the forecast year and become more pronounced as we march towards the MDGs target year only to become explosive as we get closer to the year 2020.

Variance Decomposition

Variance decomposition breaks down the variance of the forecast error for each variable into components that can be attributed to each of the endogenous variables. Tables 5 and 6 show the variance decomposition for various components of the Nigerian economy, national income, domestic consumption, domestic investment, government spending, inflation and net exports. Section I of Table 4 shows the variance decomposition for national income for the thirteen-year period under study. The second column in the table gives the standard errors of forecast for horizons of 2008, 2009, 2010, and so on. Figures were initially calculated in Nigeria's local currency, Naira (₦) but later converted to US dollars (\$). In 2010, \$1 exchanged for ₦152.25. For the 2008 forecast, the standard error was \$444.87. For 2008, the standard error was \$728.18, because it included the effects of uncertainty over 2008 forecast of domestic consumption, domestic investment, government spending, inflation and net exports. The third column of section I shows the percentage of the national income forecast that can be attributed to shocks in national income alone, as opposed to other components of the economy. The fourth column shows that percentage of the national income that can be attributed to shocks in consumption; and the fifth column shows the percentage attributable to domestic investment; and so on.

In 2008, the percentage forecast variance could be largely shared by shocks in net exports and government spending. To be precise, about 66% of the forecast variance could be attributable to shocks in net exports; while 26.1% and 6.1% could be attributable to shocks in government spending and consumption. Only a meager 1.8% could be traceable to shocks in national income.

By the MDG target year (2015), about 88 per cent of the forecast variance would be attributable to net exports shocks, while 4.0%, 3.6% and 2.5% of forecast variance

will be attributable to government spending, national income and consumption, respectively.

If our forecast target were to be 2020, the same target year for the Vision 2020, about 71.5%, 11.9%, 8.7%, 4.2% of forecast variance would be attributable to shocks in net exports, domestic consumption, government spending and inflation, respectively; while only 3.5% would be attributable to shocks in national income or gross domestic product.

Similar analysis can be done for the variance decomposition of domestic consumption, domestic investment, government spending, inflation and net exports. The trend seen in the behavior of forecast variance in response to shocks in the national income case was similar to that observed for domestic consumption, and to some extent domestic investment and government spending, for the various forecast target years (section II of Table 4). Similar trend was observed for inflation and net exports.

From the above analyses, the following conclusions can be drawn: the initial impacts of shocks from the current global financial crisis are likely to be initially concentrated on domestic consumption and net exports; but as time passes, they are likely to impact on government spending and national income, though to a lesser degree. However, the full impact of the shocks would likely be confined to domestic consumption, net exports and government spending.

The current financial meltdown would therefore impact on Nigeria economy within the period, 2008 – 2020. If the historical simulation results are correct and forecasts are true, we should expect the current global economic ‘meltdown’ to hit the economy hard; however not in the short-term, but starting from 2015.

What is clear from the above analysis is that the shocks coming on the heels of the current financial meltdown would filter through the Nigeria economy via the external sector. In other words, Nigeria would be most vulnerable to the current financial meltdown due to its ‘openness’ to external economic and financial links.

Concluding Remarks

It is apparent from the above analysis that if the issues raised by the conclusions from the findings of this study are not seriously addressed, the impacts of the current global economic ‘meltdown’ will be too devastating to be contemplated. Of paramount importance is the exposure of Nigeria economy to the shocks in the external sector. This might be because the activities of this sector revolve around imports and exports. The strategic approach should therefore be one that addresses the lopsided nature of our exports dominated by crude oil and oil-related activities as well as re-orienting consumption pattern away from imports. The suggestion is that we can only hope to achieve all this by making manufacturing, mechanized agriculture and other industrial sectors as the main hub of economic activity in the drive to reviving Nigeria economy. In view of this, the following recommendations are made:



1. Diversification of the economy through the systematic modernization of the agricultural sector, and designing an industrial policy which places emphasis on reinvigorating the manufacturing sector as the hub of the economy;
2. However, industrial breakthrough will be impossible without paying special attention to critical heavy industries such as iron and steel and petrochemicals. In addition, the strategy should include the promotion of linkages between the various sectors of the economy, so that the objective of meeting up with the needs of local markets will at the same time be the core of objective of creating jobs and wealth, and the reduction of poverty; and
3. Government spending should place emphasis on the modernization of old and provision of new infrastructure, especially but not limited, to electricity generation and distribution. In this regard, priority should be given to existing industrial estates and export processing zones in the country.

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Appendices
Table 1
Unit root test for endogenous and exogenous variables (1970 -2007)

Variable (tau t-stat)	Augmented Dickey-Fuller Test			Phillips-Perron Test	Remarks
	0	1	2		
National Income (Y_t)	3.740013	-1.029758	-5.192113	-7.073336	I(0)*
Consumption (C_t)	3.322063	-1.133293	-4.470560	6.245450	I(0)**
Domestic Investment (I_t)	0.386765	-4.596654	-20.71304	0.580303	I(0)*
Government Expenditure (G_t)	9.571583	2.301327	-5.377957	11.96442	I(0)*
Exports (X_t)	-4.156961	-9.900845	-12.21498	-5.958267	I(0)*
Imports (IM_t)	6.965361	1.248980	-4.671368	4.262843	I(0)*
Money Supply (M_t)	7.517917	0.776234	-8.479185	0.674816	I(0)*
Non-oil Revenue (NOR_t)	4.065482	-2.325963	-5.748248	2.573147	I(0)*
Crude Oil Production (OP_t)	-2.470228	-4.894610	-7.884750	-2.892049	I(1)**
Oil Revenue (OR_t)	-1.013084	-4.583674	-4.828621	0.634606	I(1)**
Population (POP_t)	1.690228	-2.584119	-7.4539	4.484611	I(1)**
Price of Crude Oil (PO_t)	-1.171151	-5.316506	-8.707325	-2.334178	I(1)*
Inflation (P_t)	-3.439907	-5.845546	-7.546701	-3.051131	I(0)*
Interest Rate (R_t)	-1.665089	-6.493487	-9.887414	-2.028050	I(1)*
Taxes (T_t)	0.032673	-4.209398	-6.310619	2.583554	I(1)*
Foreign Direct Investment (FI_t)	-2.394439	-7.223257	-12.01156	-6.316833	I(0)*^
Agriculture Production (AP_t)	2.764372	-1.922713	-6.408652	4.838144	I(0)**
Domestic Debts (DD_t)	2.843221	-1.724614	-6.577824	7.042133	I(0)**
External Debts (ED_t)	-2.773887	-8.584767	-9.077577	-3.531075	I(0)**
Critical Level					
1 %	-3.6228	-3.6289	-3.6353	-3.6171	
5 %	-2.9446	-2.9472	-2.9499	-2.9422	
10 %	-2.6105	-2.6118	-2.6133	-2.6092	

* - significant at 1 %

** - significant at 5 %

*** - significant at 10 %

^ - observed with trend

Table 2
VARs Parameter Estimates

Sample (adjusted): 1972-2007

Included observations: 36 after adjusting endpoints

 $n = 36; N = 720; k = 150; \text{degree of freedom (df)} = N - k = 420; 5\% \text{ critical value} = 1.960$

	Y_t	C_t	I_t	G_t	P_t	X_t-M_t
$Y_t(-1)$	-0.875738 (-5.43215)	-0.622935 (-1.52090)	-0.224863 (-2.75541)	-0.136435 (-6.34287)	-0.000175** (-2.06488)	17.36454 (1.95516)
$Y_t(-2)$	0.575740* (4.46481)	-0.630331 (-1.92400)	-0.087230 (-1.33632)	-0.011085 (-0.64428)	1.01E-05 (0.14836)	34.60410* (4.87108)
$C_t(-1)$	0.110949 (0.72829)	0.835998* (2.15998)	0.213969* (2.77464)	0.043032* (2.11707)	6.04E-05 (0.75305)	-8.463054 (-1.00840)
$C_t(-2)$	0.447956* (6.58716)	-0.328908 (-1.90369)	-0.144884 (-4.20876)	0.006077 (0.66980)	2.23E-05 (0.62175)	18.75247* (5.00544)
$I_t(-1)$	4.416145* (4.66132)	-3.208736 (-1.33309)	-0.621527 (-1.29597)	-0.170741 (-1.35072)	0.000401 (0.80401)	3.912767 (0.07497)
$I_t(-2)$	2.723001 (1.85808)	3.246359 (0.87191)	0.554076 (0.74689)	0.645204* (3.29970)	0.000627 (0.81279)	-113.8157 (-1.40975)
$G_t(-1)$	-6.784158 (-2.60861)	7.234560 (1.09493)	1.656555 (1.25832)	1.145452* (3.30104)	0.000353 (0.25793)	-452.7838 (-3.16028)
$G_t(-2)$	8.121123* (6.55263)	7.540411* (2.39472)	1.732890* (2.76211)	0.166286 (1.00558)	-0.000280 (-0.42873)	-123.2037 (-1.80445)
$P_t(-1)$	17.28059 (0.03141)	-300.3108 (-0.21483)	447.6667 (1.60726)	220.2712* (3.00041)	0.153753 (0.53084)	-17168.13 (-0.56638)
$P_t(-2)$	-855.6131 (-1.52870)	-465.4379 (-0.32732)	81.21133 (0.28664)	-43.78918 (-0.58637)	-0.428937** (-1.45584)	-13509.52 (-0.43813)
$X_t-M_t(-1)$	-0.008920 (-2.53146)	0.015816 (1.76678)	0.005747* (3.22199)	0.001240* (2.63811)	1.73E-06 (0.93120)	-1.434002 (-7.38735)
$X_t-M_t(-2)$	-0.060313 (-4.58871)	0.010395 (0.31128)	0.004528 (0.68054)	-0.001999 (-1.13970)	-1.25E-05 (-1.80510)	-1.864017 (-2.57424)
Constant	-102947.9 (-1.11105)	-310932.9 (-1.32082)	-72552.88 (-1.54683)	-23719.10 (-1.91857)	-21.31887 (-0.43708)	10743146* (2.10461)
PI_t	14824.98 (0.90460)	6633.805 (0.15933)	-12390.35 (-1.49354)	-4484.884 (-2.05104)	5.201817 (0.60297)	210164.7 (0.23278)
FI_t	-4.060712 (-2.78315)	3.191619 (0.86101)	0.946922 (1.28209)	-0.969534 (-4.98034)	-0.000645 (-0.83980)	-19.73040 (-0.24547)
R_t	2057.203	10074.45	803.5749	-72.96963	0.388356	-63997.28

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	(0.88274)	(1.70152)	(0.68116)	(-0.23467)	(0.31656)	(-0.49847)
OR_t	-0.316488 (-1.02556)	-0.391602 (-0.49947)	0.587869* (3.76318)	0.053721 (1.30469)	-0.000191 (-1.17479)	5.812636 (0.34190)
NOR_t	9.643517* (17.8109)	2.725239* (1.98114)	-0.626423 (-2.28554)	0.151135* (2.09207)	0.000482 (1.69049)	123.4875* (4.13994)
OP_t	21.82931 (0.98890)	151.1265* (2.69471)	23.29817* (2.08499)	5.652863 (1.91929)	-0.002718** (-0.23390)	-3399.534 (-2.79546)
PO_t	344.5065 (0.44244)	-2053.297 (-1.03793)	-389.1482 (-0.98728)	-162.3620 (-1.56280)	0.422069 (1.02971)	60160.52 (1.40246)
ED_t	-0.749929 (-2.93606)	-0.401963 (-0.61943)	-0.090755 (-0.70192)	-0.140550 (-4.12418)	-0.000218 (-1.62224)	-3.733579 (-0.26533)
DD_t	0.410628 (0.88810)	1.083813 (0.92263)	0.639795* (2.73353)	0.331731* (5.37724)	5.11E-05 (0.20996)	-48.31967 (-1.89696)
M_t	-0.954177 (-2.06857)	3.468362* (2.95956)	-0.190361 (-0.81525)	0.001571 (0.02552)	-0.000187 (-0.76996)	-13.95760 (-0.54926)
FX_t	36772.69* (2.59543)	-11384.95 (-0.31628)	-2942.371 (-0.41025)	2681.539 (1.41850)	10.83326 (1.45251)	349837.9 (0.44820)
TD_t	15.31728 (0.35352)	148.9136 (1.35277)	45.64839* (2.08125)	17.61631* (3.04723)	0.015105 (0.66228)	-4763.221 (-1.99550)
AP_t	-0.396287 (-0.13051)	-1.297072 (-0.16813)	0.918624 (0.59763)	0.347026 (0.85654)	0.000683 (0.42739)	-141.5718 (-0.84629)
R-squared	0.999995	0.999942	0.999896	0.999983	0.861601	0.996442
Adj. R-squared	0.999981	0.999797	0.999634	0.999940	0.515603	0.987549
Sum sq. resid.	5.11E+09	3.30E+10	1.31E+09	90970191	1416.024	1.55E+13
S.E. equation	22605.32	57431.56	11443.01	3016.127	11.89968	1245344.
Log likelihood	-388.9588	-422.5256	-364.4498	-316.4472	-117.1794	-533.2822
Akaike AIC	23.05327	24.91809	21.69166	19.02484	7.954411	31.07123
Schwarz SC	24.19692	26.06174	22.83531	20.16850	9.098064	32.21489
Mean dependent	2889937.	2339857.	301375.3	205027.8	20.27778	3006222.
S.D. dependent	5235300.	4035650.	598409.9	390717.2	17.09759	11160471
Determinant Residual Covariance	1.48E+41		Log Likelihood	-2012.907	Akaike Information Criteria	120.4948
Schwarz Criteria	127.3568					

Table 3

Forecast errors for endogenous variables (1970 – 2007)

Variable	National Income		Domestic Consumption		Domestic Private Investment	
	1970-2000	2000-2007	1970-2000	2000-2007	1970-2000	2000-2007
Forecast Period	1970-2000	2000-2007	1970-2000	2000-2007	1970-2000	2000-2007
Root Mean Squared Error	95147.18	813471.8	169941.5	669835.9	10118.13	76251.75
Mean Absolute Error	51230.08	731947.3	122693.2	591903.8	7227.043	48599.56
Mean Absolute Percentage Error	59.63671	8.604442	202.9101	7.320716	34.50637	4.027261
Theil Inequality Coefficient	0.034307	0.032938	0.080078	0.034904	0.054989	0.027298
Bias Proportion	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Variance Proportion	0.001578	0.004875	0.008879	0.007033	0.004636	0.002758
Covariance Proportion	0.998422	0.995125	0.991121	0.992967	0.995364	0.997242
Variable	Government Spending		Inflation		Net Exports	
	1970-2000	2000-2007	1970-2000	2000-2007	1970-2000	2000-2007
Forecast Period	1970-2000	2000-2007	1970-2000	2000-2007	1970-2000	2000-2007
Root Mean Squared Error	6369.089	9.97E-07	11.95334	1.140290	7064158.	8323619.
Mean Absolute Error	4584.616	8.01E-07	9.791562	0.790446	5275046.	7152961.
Mean Absolute Percentage Error	109.2964	9.55E-11	88.37165	9.992863	352419.8	680.4400
Theil Inequality Coefficient	0.039692	5.44E-13	0.227077	0.042294	0.317840	0.199615
Bias Proportion	0.000000	0.000009	0.000411	0.023807	0.000000	0.000000
Variance Proportion	0.002160	0.003780	0.280837	0.059349	0.109003	0.050340
Covariance Proportion	0.997840	121877197.7	0.718752	0.916843	0.890997	0.949660

Table 4

Residual Covariance Matrix*

	National Income (\$)	Domestic Consumption (\$)	Private Investment (\$)	Government Spending (\$)	Inflation (%)	Net Exports (\$)
National Income (\$)	78.25	-90.25	-48.38	-13.04	1.04492611	468.9954
Domestic Consumption (\$)	-90.25	198.81	79.46	33.06	-1.41707718	-876.727
Private Investment (\$)	-48.38	79.46	39.61	16.65	-0.3720197	-397.829
Government Spending (\$)	-13.04	33.06	16.65	10.44	0.19402299	-176.69

Inflation (%)	1.04	-1.42	-0.37	0.19	0.04118227	7.507455
Net Exports (\$)	469.00	-876.73	-397.83	-176.69	7.50745484	4310.701

Note: Figures were initially calculated in Nigeria's local currency, Naira (₦) but later converted to US dollars (\$). In 2010, \$1 exchanged for ₦152.25.

Table 5

Variance decomposition for national income, consumption and domestic private investment (2008 – 2020)

Section A - Variance Decomposition of national Income (Y_t) in US \$:							
Period	S.E.	Y_t	C_t	I_t	G_t	P_t	X_t, M_t
2008	444.87087	0.01201142	0.0402469	0.00052963	0.1715927	0	0.43272
2009	728.178654	0.00456225	0.1116155	0.02010566	0.07884717	0.013812	0.42800
2010	855.381281	0.10851113	0.08620039	0.02183888	0.05831656	0.0696749	0.31237
2011	1870.46962	0.02280638	0.0265113	0.00477051	0.01371578	0.0164274	0.57261
2012	2791.23218	0.03216569	0.06538989	0.00219753	0.07416789	0.0093951	0.47362
2013	3508.15435	0.02865903	0.16636276	0.00383172	0.06517732	0.0744353	0.31846
2014	5061.60197	0.04694663	0.11025287	0.00394309	0.06114141	0.0648899	0.36974
2015	13415.5074	0.02351755	0.01646788	0.00187623	0.0263295	0.0098858	0.57878
2016	17287.7767	0.02512424	0.10296795	0.00329218	0.05615744	0.0197995	0.44957
2017	22077.1626	0.02998083	0.15726851	0.00310644	0.0923873	0.0914	0.28282
2018	43260.197	0.02380618	0.08267015	0.00382349	0.03196282	0.0409975	0.47361
2019	84699.6453	0.03535201	0.02335523	0.00131504	0.02679036	0.0115408	0.55851
2020	118240.992	0.02269231	0.07797209	0.00152205	0.05740599	0.027531	0.46979
Section B- Variance Decomposition of Domestic Consumption (C_t) in US \$:							
Period	S.E.	Y_t	C_t	I_t	G_t	P_t	X_t, M_t
2008	235.05793	0	0.33586956	0.02617314	2.8973318	0	0.0045628
2009	290.591	0.004109	0.22195645	0.01742876	3.94249049	0.0035397	0.0148842
2010	489.39639	0.0404795	0.32619225	0.01379819	1.39004	0.029399	0.1077132
2011	912.94844	0.0416335	0.11064696	0.00505681	0.74049574	0.0175296	0.4077765
2012	1592.8158	0.0155315	0.10781833	0.00301337	0.48058492	0.0188707	0.4634432
2013	2104.1235	0.0094756	0.21778135	0.00176164	0.81004918	0.0631427	0.2835152
2014	3937.7373	0.0205848	0.10142437	0.00666363	0.28926951	0.0440412	0.455126
2015	7327.2381	0.0354827	0.03171635	0.00306352	0.17316177	0.0137706	0.5554367
2016	10870.943	0.0225869	0.06319075	0.00208614	0.54636774	0.0217426	0.4924815
2017	14052.624	0.017911	0.16695527	0.00542348	0.96354754	0.0734458	0.296566
2018	25562.496	0.0360772	0.08732125	0.00368966	0.3343682	0.0517121	0.4445224
2019	49854.785	0.0326159	0.024336	0.00121255	0.19107049	0.0137693	0.5657423
2020	75681.918	0.0209856	0.06047119	0.00080347	0.61956072	0.0213532	0.4911433
Section C - Variance Decomposition of Domestic Investment (I_t):							
Period	S.E.	Y_t	C_t	I_t	G_t	P_t	X_t, M_t
2008	48.4109425	0	0	0.7103862	0.0122427	0	0.5734166
2009	59.6996453	0.073085	0.0685146	0.4671361	0.0439225	0.0098514	0.4146506
2010	75.9822003	0.0761519	0.0917024	0.557521	0.0404348	0.0745454	0.3181363
2011	89.4515599	0.0586727	0.0842916	0.4134375	0.1148947	0.0593159	0.2982279
2012	196.419179	0.0122262	0.0260721	0.1092902	0.0260177	0.0124425	0.569109
2013	214.606174	0.0553732	0.0635719	0.1277659	0.0378826	0.0104352	0.4767539
2014	285.908046	0.0399334	0.0363423	0.0728296	0.0702856	0.0397399	0.4632183
2015	434.099573	0.0187422	0.1495764	0.0750645	0.060526	0.02883	0.3916211
2016	782.022332	0.0566991	0.0500679	0.0231394	0.0432128	0.0287243	0.4757926
2017	1072.52348	0.0329062	0.0851744	0.0153864	0.0274414	0.0334807	0.4762705
2018	1711.22627	0.0131168	0.0801622	0.0090672	0.1096056	0.041206	0.4118156
2019	3168.58982	0.0100548	0.1079461	0.0723751	0.0392273	0.0358734	0.4564635
2020	4764.91166	0.058626	0.0481879	0.0337003	0.020914	0.0262499	0.4994611

Table 6

Variance decomposition for government spending, inflation and net export (2008 – 2020)

Section D - Variance Decomposition of G_t in US \$:							
Period	S.E.	Y_t	C_t	I_t	G_t	P_t	X_t, M_t
2008	12.4713087	0	0	0	0.6568144	0	0
2009	34.7302387	0.0457899	0.0962765	0.0018692	0.0861107	0.0396181	0.3871502
2010	48.5125164	0.0680328	0.0525515	0.0031063	0.0545523	0.0231079	0.4554638
2011	100.932665	0.0161224	0.0408876	0.0010947	0.0508673	0.0223406	0.5255017
2012	131.490952	0.0094998	0.1861752	0.0025686	0.0814938	0.0524864	0.3245906
2013	220.276685	0.0421497	0.0902499	0.0036533	0.0318458	0.0541286	0.4347872
2014	428.087464	0.0308624	0.0248582	0.0017004	0.0151828	0.0143359	0.5698748
2015	662.678993	0.0216261	0.056861	0.0011362	0.06966	0.0177916	0.4897396
2016	874.047994	0.0188882	0.1741367	0.0053291	0.0825123	0.0727612	0.3031868

2017	1472.08825	0.0437416	0.0897058	0.0031745	0.0348463	0.0558942	0.429452
2018	3151.93221	0.0276004	0.0203022	0.0011655	0.0199548	0.0121992	0.5755924
2019	4527.14136	0.0213971	0.0743038	0.0011434	0.0660866	0.0216674	0.472216
2020	5908.05403	0.0213034	0.1706372	0.0040388	0.0939477	0.0798823	0.287005

Section E - Variance Decomposition of P_t US \$:

Period	S.E.	Y_t	C_t	I_t	G_t	P_t	X_t, M_t
2008	0.0463752	0.01729492	0.03633573	0.06762621	0.0669981	0.29773951	0.17082
2009	0.08157314	0.01452448	0.05315199	0.03713636	0.02231059	0.10599494	0.4236961
2010	0.12025255	0.03032167	0.0492365	0.02818208	0.04500692	0.04892196	0.4551453
2011	0.14362745	0.02471404	0.108787	0.0227003	0.03637383	0.10887665	0.3553626
2012	0.1941579	0.01357977	0.06884703	0.01371115	0.23230929	0.0793514	0.2490158
2013	0.55349392	0.01238439	0.05715634	0.00767589	0.02921344	0.01684604	0.5335383
2014	0.72207291	0.06334491	0.04746835	0.00571467	0.04853842	0.01214364	0.4796045
2015	1.10051363	0.02857738	0.07170036	0.00280282	0.05583928	0.04412786	0.4537668
2016	1.47944893	0.01870793	0.19037859	0.00294741	0.09319672	0.06914903	0.2824347
2017	3.0892775	0.03340923	0.05819176	0.00258956	0.02178042	0.034158	0.5066855
2018	5.04292545	0.03275298	0.03688317	0.0010699	0.01999805	0.01397165	0.5521387
2019	7.64132677	0.01674109	0.06850411	0.00078868	0.08297787	0.02927121	0.4585316
2020	11.0815829	0.01661369	0.16255744	0.00629892	0.07298562	0.06391967	0.3344391

Section F - Variance Decomposition of X_t, M_t US\$:

Period	S.E.	Y_t	C_t	I_t	G_t	P_t	X_t, M_t
2008	7031.90805	0	0	0	0.00464872	0	0.6521657
2009	8006.92282	0.0320796	0.036224	0.0016271	0.00533379	0.0061133	0.5754367
2010	15238.7061	0.0095242	0.0308703	0.0007994	0.12218798	0.0067648	0.4866678
2011	30029.6814	0.0041152	0.1403396	0.0087321	0.03166816	0.0074622	0.4644971
2012	36154.2332	0.0853899	0.100397	0.0123847	0.05495155	0.0333483	0.3703429
2013	55376.0328	0.0440302	0.0760887	0.0053801	0.02342391	0.0544256	0.4534659
2014	79091.087	0.0280929	0.09451	0.0037694	0.13395461	0.0388761	0.3576115
2015	160057.09	0.0163752	0.074468	0.0086704	0.03286925	0.0301673	0.4942643
2016	204255.856	0.0648172	0.0535392	0.0053308	0.02139798	0.0230309	0.4886983
2017	395755.396	0.0193019	0.0217397	0.0014289	0.04531942	0.0162917	0.5527327
2018	506744.539	0.011951	0.1699176	0.0058048	0.084107	0.0425923	0.3424418
2019	768472.906	0.0525122	0.112201	0.0035589	0.03987689	0.0723379	0.3763276
2020	1490968.8	0.0304922	0.029819	0.0015314	0.01182154	0.0192984	0.5638519

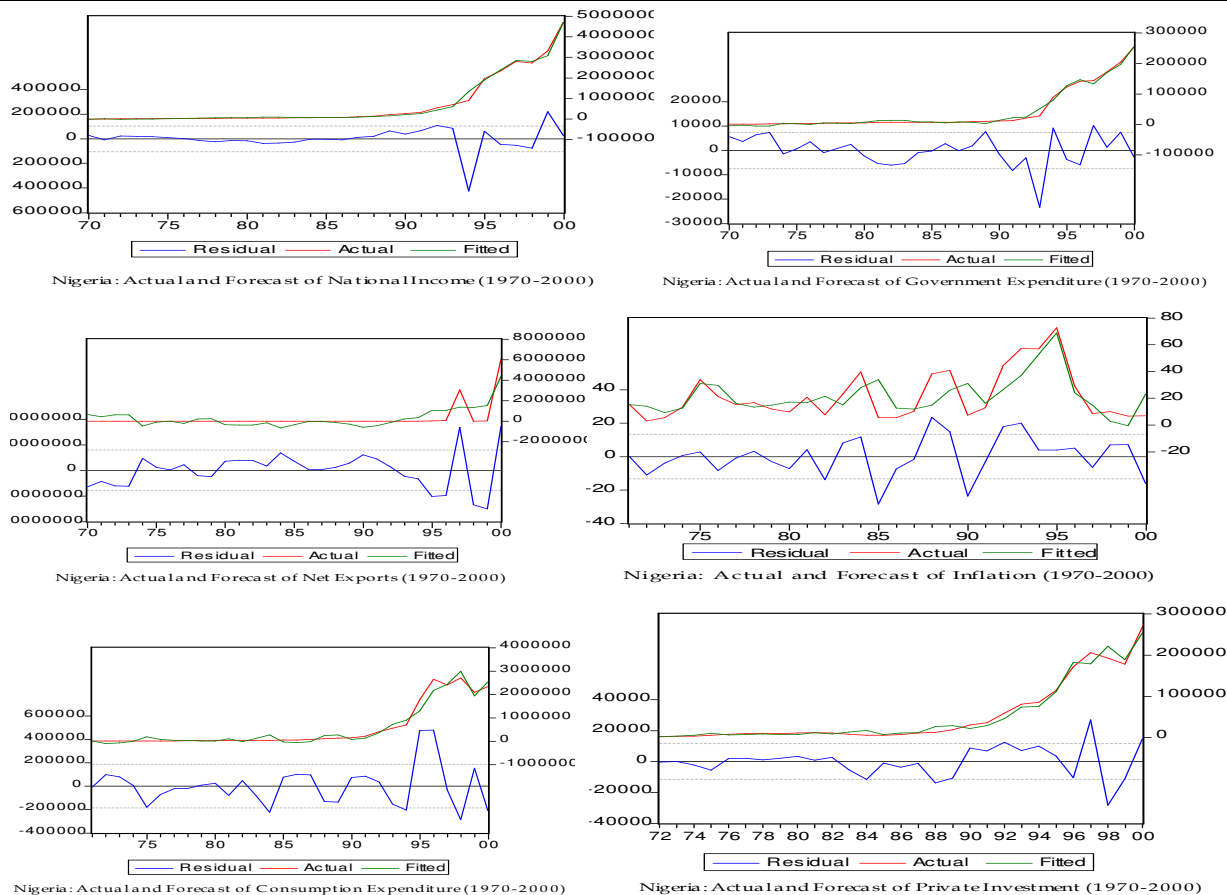


Figure 1: Actual and fitted forecast of endogenous variables in the Nigerian economy for the period 1970 – 2000.

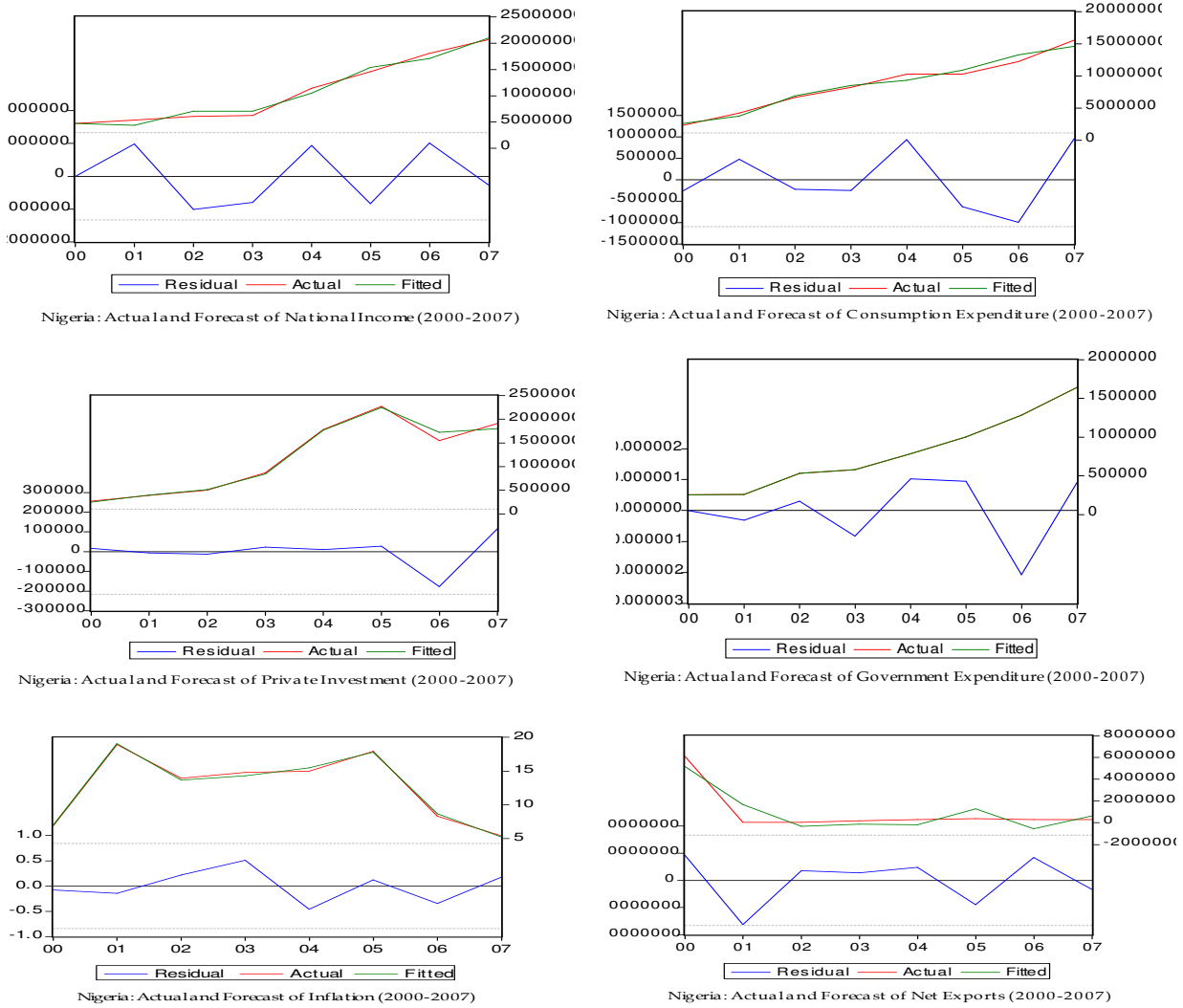


Figure 2: Actual and fitted forecast of endogenous variables in the Nigerian economy for the period 2000 – 2007.

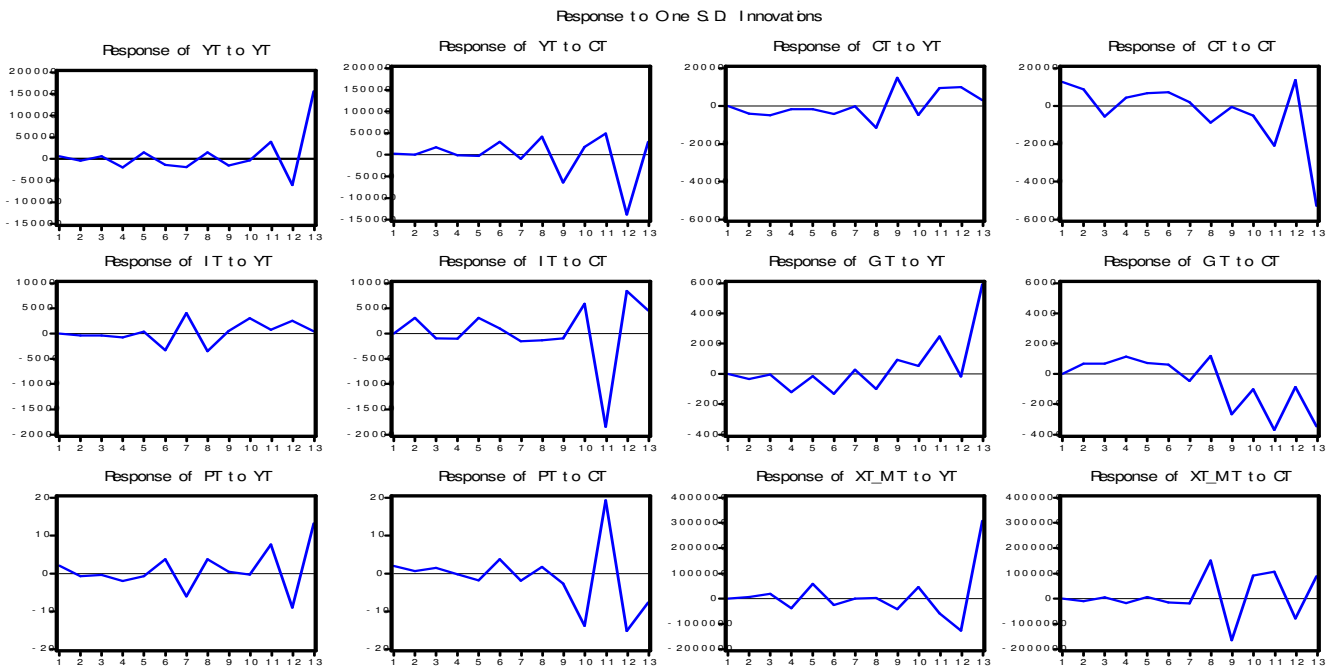


Figure 3: Responses to one-standard-deviation shock in national income and domestic consumption for the period, 2008 – 2020.

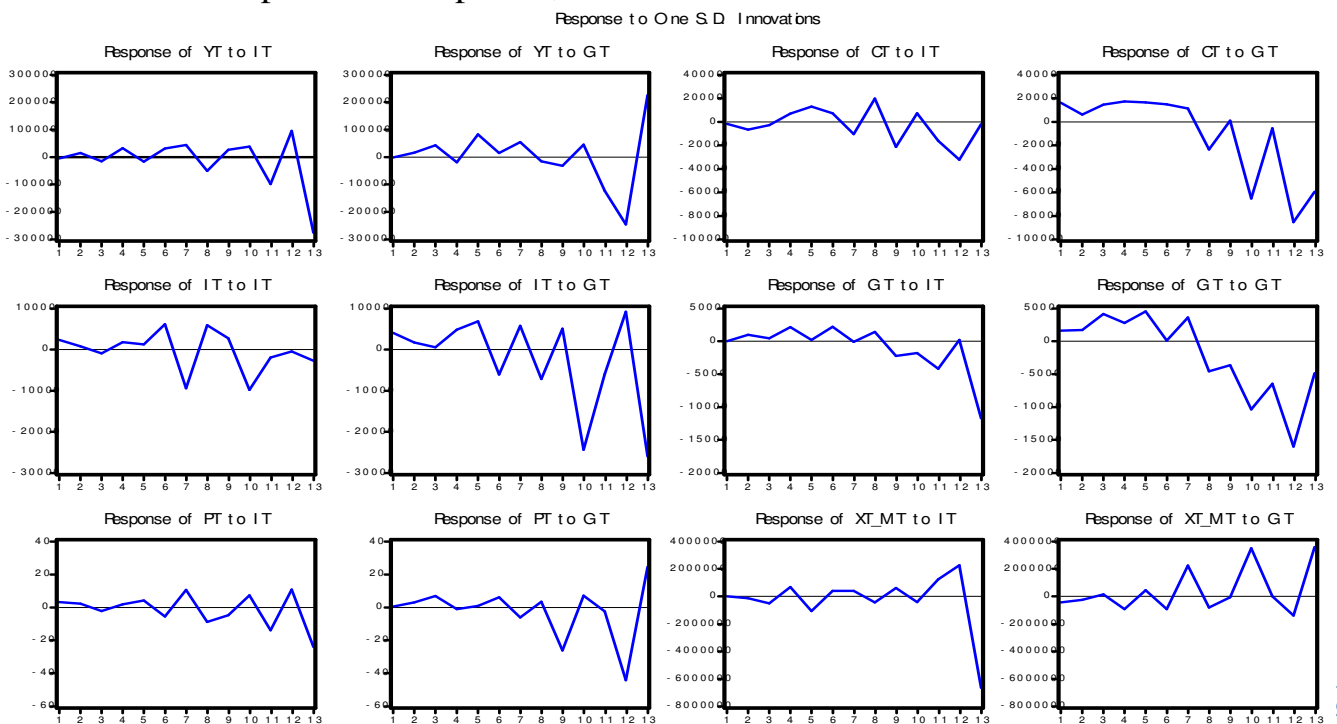


Figure 4: Responses to one-standard-deviation shock in government spending and domestic investment for the period, 2008 – 2020

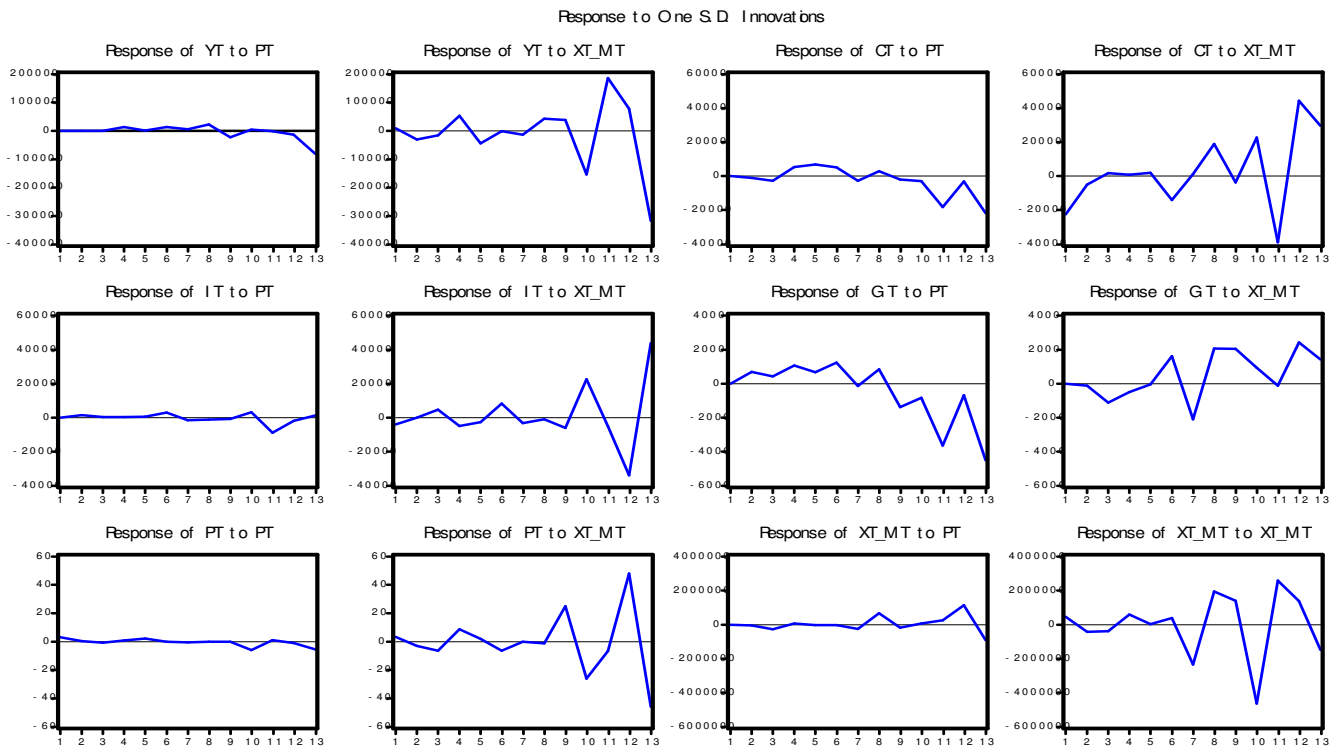


Figure 5: Responses to one-standard-deviation shock in inflation and net exports for the period, 2008 – 2020.



ПРОГНОЗ ДИНАМИЧЕСКОГО ОТКЛИКА НИГЕРИЙСКОЙ ЭКОНОМИКИ НА МИРОВОЙ ФИНАНСОВЫЙ КРИЗИС 2007-2008 ГГ.

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Аннотация. Финансово-экономический кризис, который разразился и потряс мир в 2007-2008 гг. к настоящему является легендарными. Во всяком случае, он подчеркнул важность планирования в восстановлении мировой экономики, но, возможно, более важно, в сдерживании негативных последствий будущих потрясений на местном уровне. Однако это может быть сделано только на основе чёткого понимания характера прошедшего (2007-2008 гг.) кризиса и каким образом он, скорее всего, повлияет на экономику Нигерии в ближайшем будущем. Использование функций импульсных характеристик и методов разложения дисперсии, в настоящей статье показывает прогноз динамического отклика экономики Нигерии на импульсы как изнутри, так и за пределами её внутренней экономической системы, вызванного 2007-2008 гг. глобальным финансовым кризисом. Было установлено, что кризис, вероятно, будет более тяжёлым не в краткосрочной перспективе, начиная с 2015 года. Кроме прочего, для того, чтобы содержать будущие потрясения, было бы необходимо принципиально реструктурировать внешний сектор экономики.

Ключевые слова: Американский кризис (Meltdown); финансовый кризис; Нигерия; прогноз; экономическая рецессия.