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The Multiplier Effect of Consumption Function on Aggregate Demand in Nigeria: Aftermath of the Global Financial Recession

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Abstract:
This paper constructed a highly simplified model to highlight the effect of macroeconomic variables on aggregate demand and the multiplier effect on the Nigerian economy. Quarterly data between 2009 and 2014 were used and the OLS technique was employed to examine this effect in the aftermath of the global financial recession. The study found out that the adverse effect of the global financial crises was minimal on national income in Nigeria. The comparative analysis reveals that the Nigerian economy performed better in the post global financial recession era than in the preceding period. Consumption, Investment, Government Expenditure and Balance of Trade contribute positively to the growth of aggregate demand within the study period; however, the level of investment in Nigeria is not significant. The multiplier reveals that a ₦1 increase in investment will eventually increase income by ₦3.13 if the MPC is 0.68. The MPC of 0.68 supports Keynes' postulation of the income-consumption relationship and proves that income is a determinant of private consumption expenditure in Nigeria. The study recommends that; the government should respond to the shortcomings in investment by implementing demand management policies through the use of fiscal and monetary policies to make short run adjustments to the level of aggregate demand; second, there is need for regular intervention to cater for market imperfections and slow adjustment which could constrain the multiplier; and finally, the macroeconomic objective of full employment should be pursued as this constitutes the last resort by which total production could be permanently raised.

Keywords: Aggregate demand, consumption function, multiplier, global financial recession, Keynes psychological law

1. Introduction

The downtrend in world economic activities raises a lot of concerns in achieving macroeconomic stability in local economies. This can be traced to the recent implosion of the global financial system which led to economic deceleration and an abrupt fall in international trade. It is believed that global economic growth weakened further after the eruption of the global financial crises which reflected external and domestic challenges in major developing countries. Vulnerability of poor nations increased due to liberalized financial sectors severely affected by imperfections in international financial markets and weak fundamentals, which were precipitated by the difficult adjustment processes faced by world economies to mitigate these macroeconomic imbalances.

The performance of the Nigerian economy was overcast in 2009 by the global financial and economic crisis, which was precipitated in 2007 by the collapse of the sub-prime lending market in the United States. The crisis led to the crash of most other sectors and markets across with consequent effect on developing economies especially oil-export dependent countries like Nigeria. The spiral effect of the global economic crisis on the Nigerian capital market continued in 2009 with the exorbitant lending rate mounting pressure on the stock market as a result of massive borrowed fund in the market. The rush by stock investors to liquidate their investment to repay their loans in order to avoid the excessive lending rate caused the Nigerian stock market to crash. Sere-Ejembi (2008) noted that it is not the global financial crisis and the speculative subprime mortgage bubbles and bust alone that is responsible for the crash of the stock market, other contributory factors lent support. Some of which are; margin lending by the Deposit Money Banks (DMBs), stock price appreciation that had no correlation with the fundamentals in the quoting companies, and local investors opting to invest in foreign capital markets to take advantage of the low stock prices.

Faced with the global financial crisis and economic recession, governments rediscovered the power of public finance (Hall, 2010). They used it to rescue the bankrupt banks, and to create more economic activity to hold back the worst forces of recession. According to Saibu and Apanisile (2013), the policy measures adopted by governments were mainly on three broad fronts namely: monetary policy, fiscal policy and trade policy. In Nigeria, the thrust of saving the economy from the economic crises was vested on the monetary authority. The Monetary Policy Rate (MPR) and Cash Reserve Ratio were adjusted downward, which resulted in lowering the inter-bank rate and increasing the core credit to the private sector. The CBN also injected about ₦620 billion to help banks recover

from financial insolvency. In addition, the bank proposed the establishment of an Asset Management Company of Nigeria (AMCON) to take over the non-performing assets of banks (CBN, 2009).

In spite the advances made by the governments to mitigate the adverse effects of the external shock, most private and public enterprises still blame the poor performance (not achieving the desired growth rate) of the Nigerian economy on the *global financial recession* – eight years after its emergence. According to the world economic outlook (UN, 2013),

- "four years after the eruption of the global financial crisis, the world economy is still struggling to recover. During 2012, global economic growth has weakened further. A growing number of developed economies have fallen into a double-dip recession. Those in severe sovereign debt distress moved even deeper into recession, caught in the downward spiralling dynamics from high unemployment, weak aggregate demand compounded by fiscal austerity, high public debt burdens, and financial sector fragility. Growth in the major developing countries and economies in transition has also decelerated notably, reflecting both external vulnerabilities and domestic challenges."

With Nigeria being in the ranks of a developing economy, it is important to ask: has the performance of the Nigerian economy worsened after the global economic crises or otherwise? Statistics reveal that the Nigerian economy performed better in the face of the global economic crises compared to the immediate preceding years. The country recorded Real GDP growth rates of 6.96%, 7.98%, 7.43%, 6.58%, 6.89% and 6.22% between 2009 and 2014 against growth rates of 6.58%, 6.51%, 6.03%, 6.45%, 5.98% for the period 2004 to 2008 (CBN, 2014). Since in the face of the financial recession (leading to the crash of the stock market), there have been relatively more significant increases in income growth rate; does this mean the capital market is inactive in facilitating investments for economic growth? Even though statistics prove otherwise, it is pertinent to examine the aftermath effect of contagion due to the high degree of integration between Nigeria and other countries in connection to the role of macroeconomic variables in the adjustment processes required to propel the economy on the path of stability.

Income-consumption relationship has had wide reaching effects on the successful functioning of households, businesses and macroeconomic decisions. According to Akekere and Yousuo (2012), the decisions and actions of the respective economic units in an economy determine the level of expenditure, income, production and distribution of goods and services in that economy. Consumption is not just dependent on income, but also some exogenous factors which in turn determine income such as trade, government expenditure and investment. These variables have improved significantly overtime in terms of growth, but this growth rate is unsatisfactory to the populace because such postulations sound as mere truism in the face of economic, political and social decay in the country. The economy still remains stagnant buttressed by unacceptable levels of inflation, high unemployment, high exchange rate, low index of trade openness, low value of currency, and widespread/extreme poverty. Some economists and policy makers have found a satisfactory reason for slow development in the face of growth – "***the global financial recession.***" This however is paradoxical vis-a-vis the statistics obtained.

The study is therefore keen to investigate the performance of the Nigerian economy after the global financial recession by examining "the multiplier effect of the consumption function on aggregate demand in Nigeria." The study thus specifically sets to investigate first, the relative performance of macroeconomic variables in pre and post global financial recession; second, the effect of fundamental macroeconomic variables on aggregate demand management in Nigeria; and thirdly, the multiplier effect of aggregate demand on marginal propensity to consume in Nigeria. The rest of the paper is structured as follows. Section two presents the literature review on the theoretical underpinning and empirical studies. Section three presents the methodology of the research while section four analyses result of the data. Section five concludes the paper and attempts some policy recommendations.

2. Review of Related Literature

2.1. The Multiplier Process

The concept of the multiplier process became important in the 1930s when John Maynard Keynes suggested it as a tool to help governments to achieve full employment. This macroeconomic was "demand management approach" designed to help overcome a shortage of business capital investment and measures the amount of government spending needed to reach a level of national income that would prevent unemployment. The higher the propensity to consume domestically produced goods and services, the greater the multiplier effect. The government can influence the size of the multiplier through changes in direct taxes and the propensity to purchase imports which leaks away from the circular flow of income and spending.

The multiplier process also requires that there is sufficient spare capacity in the economy for extra output to be produced. If the Short Run Aggregate Supply (SRAS) is inelastic, the full multiplier is unlikely to occur because increases in aggregate demand will lead to higher prices rather than a full increase in real national output. In contrast, when the SRAS is perfectly elastic, a rise in aggregate demand causes a large increase in national output. An initial change in aggregate demand can have a much greater final impact on the level of equilibrium national income (Riley, 2007). This is commonly known as the *multiplier effect* and it comes about because injections of demand into the circular flow of income stimulates further rounds of spending (i.e. Mr. A's spending is Mr. B's income) – and this can lead to much bigger effect on equilibrium output and employment.

Consider a ₦50 billion increase in business capital investment in Nigeria say for a production plant. This will offset a chain reaction of increases in expenditures. Firms that produce the capital goods that are purchased will experience an increase in their incomes and profits. If they in turn collectively spend about 3/5 (0.6) of that additional income, then ₦30 billion naira will be added to the income of others. At this point, total income has grown by (₦50 billion + (0.6 X ₦50 billion). The sum will continue to increase as the producers of the additional goods and services will also realize an increase in their incomes. If they in turn spend 60% on more goods

and services, the total income will then be (₦50 billion + (0.6 X ₦50 billion) + (0.6 X ₦30 billion). This process can continue indefinitely with the additional rise in spending and income as a fraction of the previous addition to the circular flow.
Thus, multiplier effects can be seen when new investments and jobs are attracted into a particular region. The final increase in output and employment can be far greater than the initial projection of demand because of the inter relationships within the circular flow.

2.2. Theoretical Framework
Consumption function is a mathematical expression of the relationship between aggregate consumption expenditure and aggregate disposable income, expressed as $C = f(Y)$. The private demand for goods and services accounts for the largest proportion of aggregate demand in an economy and plays a crucial role in the determination of national income. The total volume of private expenditure in an economy depends, according to Keynes, on the total current disposable income of the people and the proportion of income which they decide to spend on consumer goods and services (Dwivedi, 2008).
To summarise his view, it is helpful to consider the relationship between income and consumption in terms of the average and marginal propensities to consume. The Average Propensity to Consume (APC) over any given period of time is simply the ratio of consumption expenditure to disposable income:
$$APC = \frac{C}{Yd}$$ . . . . . . (1)
where: C = expenditure on goods and services for consumption and
Yd   = disposable income.
If all income is spent on consumption, then the APC = 1.
The Marginal Propensity to Consume (MPC) is the proportion of any change in income which is allocated to consumption:
$$MPC = \frac{\Delta C}{\Delta Yd}$$ . . . . . . (2)
Where: Δ refers to the change in each.
If the MPC were 0.7 then, given a rise in disposable income of ₦10, the rise in planned consumption of goods and services would be ₦7.
Keynes assumed that with no income, an individual will either borrow or spend some of his savings, i.e., dissave, in order to continue consumption expenditures. In a sense therefore, the APC in this situation is infinite because a positive expenditure on consumption is divided by zero income. Keynes himself felt that as income rises, the proportion of any rise which an individual spends on consumption will tend to be lower the higher the level of income. In relative terms, a rich person would spend less of a ₦10 increase in income on consumption than a poor person would; the MPC declines as income rises.
As mentioned above, this relationship between aggregate consumption demand and the aggregate disposable income is expressed through a 'consumption function' expressed as:
$$C = a + bY$$ . . . . . . (3)
Where: C = aggregate consumption expenditure;
Y = total disposable income, a is a constant term; and
b = ΔC/ΔY, i.e., the proportion of marginal income spent on consumption.
Given this *consumption function*, it may be added here that the original Keynesian function assumes a decreasing ratio between average and marginal propensities to consume and income. According to Keynes (1936), the consumption function stems from a 'fundamental psychological law'. It states that:
- "the fundamental psychological law which we are entitled to depend with great confidence both a prior from our knowledge of human nature and from the detailed facts of experience, is that men (women) are disposed as a rule and on the average to increase their consumption as their income increases, but not by as much as the increase in their income."

In other words, as income increases, consumption also increases but less than proportionately. This Keynesian hypothesis of income consumption relationship was later termed as the ***absolute income hypothesis***. Following Keynes hypothesis, a great deal of empirical work was undertaken which sought to test the absolute income model against the then newly available data. Foremost in this area was a study by Simon Kuznets published in 1946 (Binks and Jennings, 1986). Also some early empirical studies (Tobin, 1951 and Smithies, 1945) based on cross section and time series data have supported the hypothesis. Publication of these findings led to a number of alternative formulations of the consumption function, the three most important of which are considered below.
The ***Relative Income Hypothesis*** was presented in a revised version by James Duesenberry in 1949. In it he refers to the 'emulative' and 'imitative' characteristics of consumption activity. He believed that in the long run, people based their consumption expenditure on that of the people with whom they tended to associate. In the short run, people would tend to use their past peak income as a benchmark to determine their level of consumption expenditure. Thus, if income fell, they would spend a higher proportion of the new level of income on consumption in an attempt to preserve their relative standard of living. This behavioural pattern is consistent with the Keynesian notion of MPC < APC and also with the findings of Kuznets.
Two further theories of consumption behaviour relevant to modern macroeconomics are the ***Permanent Income Hypothesis*** proposed by Milton Friedman (1957) and the ***Life-cycle Hypothesis*** developed by Ando and Modigliani (1963). Although the objective of the theories was the same as that of Duesenberry, namely, to reconcile empirical evidence, they both made two important theoretical developments. First, emphasis was changed from consumption expenditure to consumption itself, and second, the main determinant of this consumption was seen to be wealth, not current disposable income. The implication of the former is that to consider an individual's or an economy's consumption simply in terms of expenditures on goods and services will be a misinterpretation of the

actual level of consumption while for the latter, the constraint on the level of consumption an individual or economy can enjoy is therefore not current income but some measure of wealth based on all past, current and future incomes.

Thus, from theoretical evidence, increases in consumption may be influenced by any of the factors listed above. It is therefore important to investigate the implication this portends for the Nigerian economy that has witnessed sustained economic growth for the past decade and an upward review of its minimum wage within this same period. In this light, it has spurred this research to evaluate the validity of Keynes psychological law vis-a-vis income-consumption relationship in Nigeria.

2.3. Empirical Review

Ezeji and Ajudua (2015) examined the determinants of aggregate consumption expenditure in Nigeria. The model used was derived from the Keynesian consumption function where gross consumption expenditure, income, interest rate, inflation rate and exchange rate were used as variables. The study showed positive relationship between consumption and income and proved that the Nigerian consumption function conforms to Keynesian consumption model and also incorporates the idea of other well-known theories as, interest rate, price level and exchange rate were significant variables explaining consumption behaviour in Nigeria. Policies to combat inflation, employment creation to increase purchasing power in the hands of more Nigerians and a check on the continuous depreciation of the naira were suggested recommendations.

Apere (2014) in his study examined private consumption expenditure function in Nigeria using the Keynes absolute income hypothesis. Data were collected for private consumption expenditure and national income for the period 1981 – 2012. The error correction model revealed a positive relationship between private consumption expenditure and national income. The study concluded that the Nigerian consumption function follows the Keynesian postulation with a high marginal propensity to consume out of income (0.92). The multiplier effect of an autonomous change in government or investment expenditure was 12.5 indicating the importance of a viable fiscal policy in the economy. A strong public-private partnership was therefore recommended to raise national income.

Akekere and Yousuo (2012) investigated the impact of change in Gross Domestic Product (income) on Private Consumption Expenditure in Nigeria from 1981 – 2010 using regression analysis. The result conforms to a priori indicating a positive significant impact of Gross Domestic Product (income) on Private Consumption Expenditure with a slope of 0.67. The study recommends that government should induce private expenditure toward human capital development which will enhance macroeconomic stability. They also advised that measures should be taken to address the high rate of the marginal propensity to the import of the household sector.

Nwabueze (2009) in a study causal relationship between gross domestic product and personal consumption expenditure of Nigeria found out that gross domestic product has no significant effect on personal consumption expenditure in Nigeria. A non significant value of 0.0514 was obtained as a slope coefficient. This was further evidenced by the value of the coefficient of determination which was only 0.035 implying that gross domestic product only explained about 3.5% of the personal consumption expenditure of Nigeria. The study concludes that the effect of increasing the gross domestic product of Nigeria does not necessarily lead to higher consumption expenditure. The study recommends that the Nigerian Federal government needs to increase investment in inventories, state and local spending, increase productivity, diversify the economy and industrialise the country to have various consumer goods and services.

Banuso and Odior (2012) presented a Dynamic Macroeconomic Stochastic Model on Macroeconomic Volatility and Government Consumption Expenditure (GCE) and its Implication for Public Welfare. They used simultaneous equation models to capture the dynamic interactions among the data and a structural economic model to describe the contemporaneous relationship between the variables between the period of 1980 – 2008. They found out that an economic shock to inflation effect is stronger on the GCE at longer horizon. Also inflation innovations play a larger role in explaining GCE forecast error variance in the short run than they do in the long run and this generates negative net effects on public welfare in the short run than long run.

Tapsin and Hepsag (2014) conducted an analysis of household consumption expenditure in EA-18. They considered household expenditure as a primary indicator of economic well-being. The study analyses the household consumption expenditure in EA-18 using panel data between 2000 and 2012. From the model, some deviations from assumptions and meaningful results are gained. They found out that GDP is meaningful and positive on 99% trust level and concluded that a 1-dollar increase in GDP will increase the household consumption by 0.566 dollar.

3. Methodology

3.1. Theoretical Model
Keynes stated:

- The fundamental psychological law . . . is that men (women) are disposed, as a rule and on average, to increase their consumption as their income increases, but not as much as the increase in their income.

In short, Keynes postulated that the *Marginal Propensity to Consume (MPC), i.e.* the rate of change of consumption for a unit (say, a naira) change in income, is greater than zero but less than 1. Although Keynes postulated a positive relationship between consumption and income, he did not specify the precise form of the functional relationship between the two. For simplicity, a mathematical economist might suggest the following form of the Keynesian consumption function:

$$Y = \beta_0 + \beta_1 X \quad 0 < \beta_1 < 1 \qquad . \qquad . \qquad . \qquad (4)$$

where Y = consumption expenditure and X = income, and where β_0 and β_1, known as the **parameters** of the model, are, respectively, the **intercept** and **slope** coefficients. The slope coefficient β_1 measures the MPC.

One of the important properties of the consumption function is that at all levels of income MPC < APC. This implies that if disposable income falls, people will protect their living standards by not cutting consumption expenditure proportionally, and that, conversely, as disposable income rises consumption will not rise proportionally. The acceptance of these ideas led, in the 1940s, to the formulation of the *stagnation thesis*. This implied that as national income grew, the relative contribution of consumption would fall because the APC was falling.

Keynes believed that the macro economy is dynamic: it is always changing and is therefore in a perpetual state of disequilibrium. Economic variables are influenced in various ways by the level and rate of change of aggregate demand. In order to explain how the macro economy may have behaved in the past, it is necessary to construct a highly oversimplified model of it to highlight the role of the main forces at work and the ways in which they affect each other. It is this aggregate demand management that the study also sought to examine its response to changes in fundamental macroeconomic variables.

Aggregate demand consists of several different elements, each of which needs separate consideration, because they differ in terms of the main variables which influence them. Four separate elements will be considered below; these are:

  i.   Consumption demand
  ii. Investment demand
  iii. Government demand
  iv. Trade

The sum of these is regarded as National Income.

This accounting identity can be formalised as:

$$Y = C + I + G + (X - M) \qquad\qquad . \qquad . \qquad . \qquad . \qquad (5)$$

Where: Y   =   National Income
        C   =   Consumption Expenditure
I   =   Investment Expenditure
        X   =   Export Income
        M   =   Import Expenditure
Thus (X – M) =   The balance of trade

Assuming that the relative importance of I and (X – M), i.e. I/Y and $(X - M)/Y$, are unlikely to change, it follows that income growth will stagnate unless government expenditures are increased, that is, G/Y rises as income rises so as to counteract the relative decline in consumption. It was for this reason that Keynes saw a central role for both the consumption function and government in his model of the macro economy.

It should be noted that all these variables are incorporated in the analysis of *"real terms."* This means that their value is measured in terms of the goods and services they represent, irrespective of changes in prices. Prices determine the final '*nominal*' value of goods and services.

3.2. Specification of the Model of Consumption and Aggregate Demand
The purely mathematical model of the consumption and aggregate demand function assumes that there is an *exact* or *deterministic* relationship between the variables in question. But relationships between economic variables are generally inexact. To allow for the inexact relationships between the macroeconomic variables, the researchers modified the deterministic consumption and aggregate demand functions.

3.2.1. Aggregate Demand Function (Model)
The econometric model of the aggregate demand function is specified as:

$$GDP = \beta_0 + \beta_1 TCE + \beta_2 GFCF + \beta_3 GEX + \beta_4 BOT + \mu \quad . \qquad . \qquad (7)$$

Where: GDP   = Gross Domestic Product
        TCE   = Total Consumption Expenditure
        GFCF = Gross Fixed Capital Formation
        GEX   = Government   Expenditure
        BOT   = Balance of Trade
        μ   = Error term
Note: TCE, GFCF, GEX and BOT are proxies for consumption, investment, government expenditure and trade respectively

3.2.2. Consumption Function (Model)
The econometric model of the consumption function is thus specified as follows:

$$PCE = \beta_0 + \beta_1 GDP + \mu \quad 0 < \beta_1 < 1 \qquad\qquad . \qquad . \qquad . \qquad (6)$$

Where: PCE   =   Private Consumption Expenditure
        GDP   =   Gross Domestic Product (by Income)
        μ =   Error term
$\beta_0 - \beta_4$ are parameters to be estimated
Note: PCE and GDP are used as proxies for consumption and income respectively.

3.3. Method of Study
The Ordinary Least Square (OLS) method is used examine the multiplier effect of consumption function on aggregate demand in Nigeria after the global recession era and. Exploratory Data Analysis is also used to examine the relative performance of macroeconomic variables in pre and post global financial recession. To estimate the econometric models, quarterly data were obtained from CBN Statistical Bulletin between 2009 and 2014. This is the immediate post global financial recession, hence the time span. Regression analysis is therefore used as the main toolto obtain plausible numerical estimates of the parameters given andto give empirical content to both functions.

4. Results and Discussion

4.1. Performance of the Nigerian Economy in the Immediate Pre and Post Global Financial Recession
Apart from the global financial crisis being an acclaimed global phenomenon, there are other evident reasons that led to the second stock market 'prices' crash in Nigeria. Some of these reasons include: pull out of foreign investors who already had troubles in their local economies; the impact of Deposit Money Banks (DMBs), which overheated the financial system following the 2004 increased minimum capital requirement for DMBs by 1150%, from ₦2bn to ₦25bn; hasty recovery efforts of DMBs; and structural deficiencies in the Nigerian stock market.

This global financial recession has been the most used reason as to why the economy is not developing in spite the tremendous growth recorded in the past few years. The table below highlights the figures of key macroeconomic variables 6 years before and after the global financial crisis to enable inter temporal comparison on their performances as a build up to examine the impact of the global financial recession on aggregate demand and income multiplier in Nigeria. The variables are; Gross Domestic Product (GDP), Total Consumption Expenditure (TCE), Gross Fixed Capital Formation (GFCF), Government Expenditure (GOVE), Balance of Trade (BOT), and Private Consumption Expenditure (PCE).

Year	GDP	TCE	GFCF	GOVE	BOT	PCE
Immediate Pre Global Financial Crises						
2003	8,742.65	7,495.03	865.88	1,226.0	1,007.7	7,044.5
2004	11,673.60	9,423.55	863.07	1,426.2	2,615.7	8,637.7
2005	14,735.32	12,078.16	804.40	1,822.1	4,445.7	11,075.1
2006	18,709.79	13,117.98	1,546.53	1,938.0	4,216.2	11,834.6
2007	20,940.91	18,375.53	1,936.96	2,450.9	4,397.8	16,243.7
2008	24,665.24	18,961.88	2,053.01	3,240.8	4,794.5	16,090.5
Post Global Financial Recession						
2009	25,236.06	22,250.89	3,050.58	3,453.0	3,125.7	18,981.0
2010	34,494.58	27,001.26	4,012.92	4,194.6	3,847.5	22,845.1
2011	38,016.97	27,820.73	3,908.28	4,712.1	4,240.8	22,840.8
2012	41,177.82	24,388.86	3,357.40	4,605.4	5,372.8	19,536.1
2013	42,396.77	24,510.80	3,397.35	5,185.3	5,822.6	19,550.6
2014	43,397.33	24,633.35	3,437.78	4,578.06	2,421.7	19,565.1

Table 1: Performance of Selected Macroeconomic Variables (₦'billion)
Source: CBN Statistical Bulletin

The table above shows the performance of selected macroeconomic variables in the pre and post global financial crises era. The table reveals that before the crises GDP averaged ₦15.8 trillion between 2003 and 2008. The highest GDP value within that period was recorded in 2008 i.e. ₦24.7 trillion while the least was ₦8.7 trillion in 2003. This reveals that the value of goods and services produced increased within the time period. The table further shows that the growth of the economy performed better in the post crises period than the former with an average of ₦37.46 trillion (more than twice the former average). GDP increased consistently from 2008 to 2014 with the highest value of transaction (₦43,397.33) recorded in 2014. The trend for both periods is depicted below:
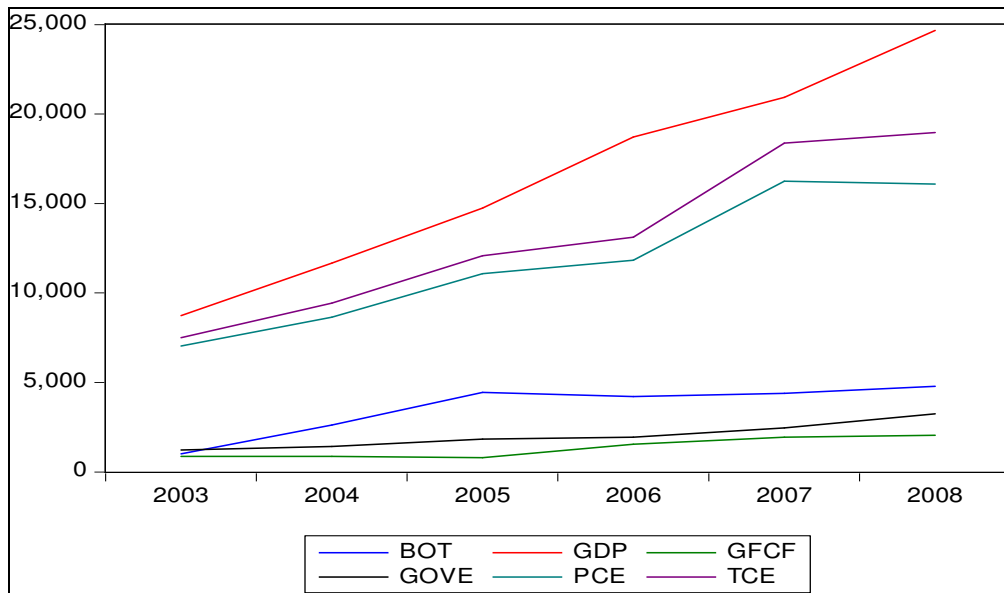
Figure 1: Performance of Macroeconomic Variables in Pre Global Financial Recession
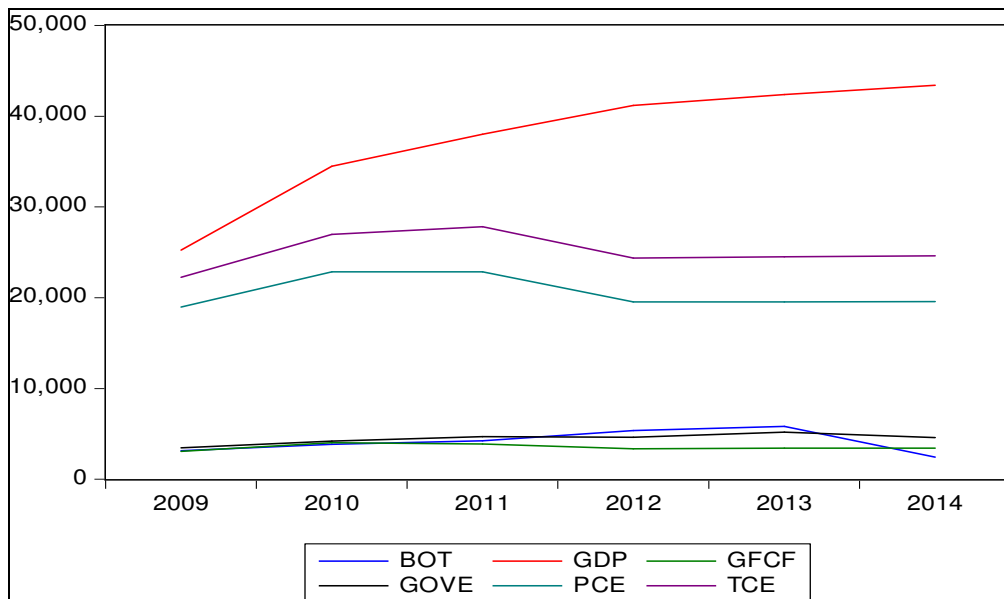*Source: Eviews8Output.*

Figure 2: Performance of Macroeconomic Variables in Post Global Financial Recession
Source: Eviews8 Output.

Total Consumption Expenditure increased from ₦7.5 trillion in 2003 to ₦19 trillion in 2008 with a steady increase within this period. The post crises era also recorded increases in TCE until 2011 before dropping in 24.4 trillion in 2012. It however increased minimally to ₦24.5 trillion in 2013 and ₦24.63 trillion in 2014. Even though the post crises era recorded slower growth than the preceding era, statistics reveal that consumption expenditure was higher in this period. GFCF recorded slow growth in both periods. The pre-recession era recorded steady but slow growth between 2004 and 2008. In the post-recession era however, GFCF recorded both negative and positive revisions within the time period – with the highest as ₦4 trillion in 2010, which then slumped into decline till 2014.

Government expenditure has been more or less static. It averaged ₦2 trillion in the pre crises era and ₦4.5 trillion in the post crises era. GOVE was higher in the succeeding period to stimulate the economy out of the financial recession. The Nigerian economy witnessed a favourable balance of trade in both periods. Trade relations however did not differ significantly in both periods as statistics show that BOT averaged ₦3.6 trillion between 2003 and 2008: and ₦4.1 trillion between 2009 and 2014. Private consumption expenditure accounts for more than 80% of total consumption expenditure in both periods. PCE increased steadily between 2003 and 2007, before dropping from ₦16.2 trillion in 2007 to ₦16 trillion in 2008. After the occurrence of the crises, PCE increased to ₦19 trillion in 2009, further to ₦22.8 trillion in 2010. It then dropped for two consecutive years to ₦19.53 trillion in 2012 then increased minimally to N19.55 trillion in 2013 and further to ₦19.57 trillion in 2014.

The summary of the descriptive statistics shows that the Nigerian economy via selected macroeconomic variables performed better in the face of the global financial crises than in the preceding period. Even though the Nigerian economy has reflected external vulnerabilities and domestic challenges, growth in the Nigerian economy has not decelerated notably as postulated by UN (2013) in their world economic outlook.

4.2. Data Analysis
In order to avoid nonsensical regression estimates which may lead to spurious results, the data is subjected to unit root test to examine the stationarity of the data series. The result of the Augmented Dickey-Fuller (ADF) test is presented below:

Variable	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Prob.	Order of Integration
PCE	-4.12	-3.77	-3.00	-2.64	0.0046	I(1)
GDP	-5.71	-3.77	-3.00	-2.64	0.0001	I(1)
TCE	-3.38	-3.77	-3.00	-2.64	0.0232	I(1)
GFCF	-8.51	-3.77	-3.00	-2.64	0.0000	I(1)
GEX	-18.58	-3.77	-3.00	-2.64	0.0000	I(1)
BOT	-4.49	-3.77	-3.00	-2.64	0.0020	I(1)

Table 2: Stationarity Test
Source: Eviews8 Output.

The ADF statistic values for PCE, GDP, TCE, GFCF, GEX and BOT are -4.12, -5.71, -3.38, -8.51, -18.58 and -4.49 respectively. The associated one sided p-values (for 24 observations) are less than 0.05. The result also shows that the statistic t_α value is greater than the critical values at 1%, 5%, and 10% for all the variables, so we reject the null hypothesis at the conventional test size. Thus, the variables are stationary at first difference series.

The finding that the macro time series contains a unit root has spurred the non stationary time series analysis. Engle and Granger (1987) pointed out that a linear combination of two or more non stationary time series may be stationary. If such a stationary linear combination exists, the non stationary time series is said to be cointegrated. The stationary linear combination may be interpreted as a long run equilibrium relationship between the variables. The Johansen system framework is employed to test for the presence of cointegrating relationships among the non stationary variables. The result is presented below:

Null Hypothesis	Trace Statistic	0.05 Critical Value	Null Hypothesis	Max-Eigen Statistic	0.05 Critical Value
r = 0*	89.24	69.82	r = 0*	38.81	33.87
r ≤ 1*	50.43	47.86	r ≤ 1	24.39	27.58
r ≤ 2	26.04	29.80	r ≤ 2	17.69	21.13
r ≤ 3	8.34	15.49	r ≤ 3	8.33	14.26
r ≤ 4	0.01	3.84	r ≤ 4	0.01	3.84

Table 3: Co integration Test
Source: Eviews8 Output.

Note: r represents number of co integrating vectors. Trace statistic indicates 2 cointegrating equations while Max-Eigen statistic indicates 1 co integrating equation. * denotes rejection of the hypothesis at the 0.05 level

The Trace test and Max-Eigen value test shows a long run equilibrium relationship between the variables. Thus, the null hypothesis of no co integrating equation is rejected since their statistics are greater than their respective critical values for the co integrating equations at 5% significance level. This implies a stationary linear combination, as such the non stationary time series are co integrated. The application of the OLS technique will therefore yield informative, non-spurious and dependable results.

The cumulative sum of the recursive residuals shows that there is stability in the equation within the sample period. The result is shown below:
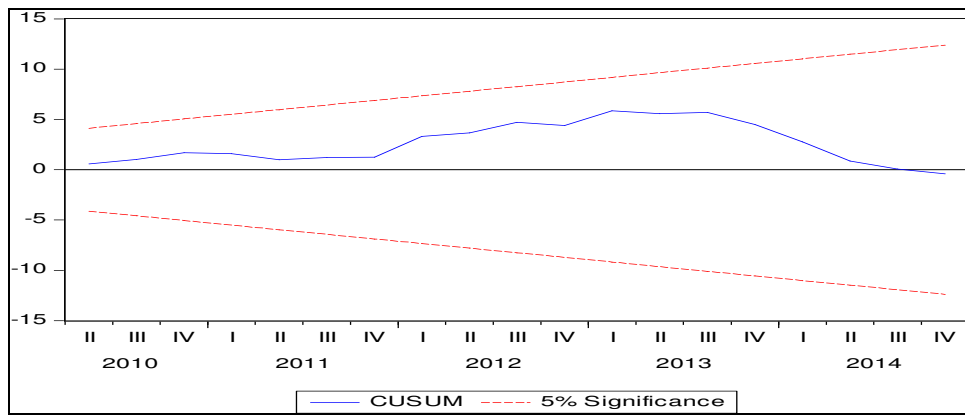
Figure 3: CUSUM test
Source: Eviews8 Output.

Movement of recursive residuals inside the critical lines is suggestive of coefficient stability. This further substantiates the long run equilibrium relationship between the variables.

4.2.1. Effect of Macroeconomic Variables on Aggregate Demand in Nigeria
The estimated aggregate demand model is given as:

$$GDP = \beta_0 + \beta_1 TCE + \beta_2 GFCF + \beta_3 GEX + \beta_4 BOT + \mu$$

The numerical values of the theoretical parameters are given below:

Variable	Coefficient	Standard Error	T Statistic	Prob.
Regression Estimates				
C	-3,613.82	2,852.89	-1.27	0.2206
TCE	0.96	0.13	7.40	0.0000
GFCF	2.07	1.50	1.38	0.1822
GEX	6.38	1.80	3.53	0.0022
BOT	1.45	0.25	5.70	0.0000
Diagnostic Statistic				
R^2	0.89	$F_{0.05}$	2.87	
Adj. R^2	0.87	DW	1.74	
F*	39.69	D_L	0.805	
Prob (F Stat)	0.0000	D_U	1.528	

Table 4: Regression Analysis
Source: Eviews8 Output.

Table 3 is the aggregate demand function. It shows that 0.96 is the partial regression coefficient of TCE and tells us that with the influence of GFCF, GEX and BOT held constant, as TCE increases, say, by a naira, on average, GDP goes down by 96 kobo. To make more economic meaning, if total consumption expenditure increases by ₦100, aggregate demand will also increase by ₦96. The coefficient 2.07 tells us that holding the influence of other variables constant, on average, aggregate demand goes up by about ₦207 as investment increases by ₦100. From the model, government expenditure has more impact on aggregate demand than other explanatory variables. The coefficient of 6.38 suggests that a ₦100 increase in GEX, on average, other things being equal, will engender a ₦638 increase in GDP. BOT also shows a positive impact on GDP. Its coefficient of 1.45 implies that, ceteris paribus, on average, GDP will rise by ₦145 if BOT increases by ₦100. The intercept value of -3,613,82 means that if the values of TCE, GFCF, GEX and BOT were fixed at zero, the average level of GDP would be a negative value of about ₦3.6 trillion naira.
The coefficients of the explanatory variables conform to a priori having the expected positive signs showing there is a direct relationship between TCE, GFCF, GEX, BOT and GDP. Under the null hypothesis that the true population value of each regression coefficient individually is zero, we find that the *p* values of TCE, GEX and BOT are not statistically different from zero. This implies that the probability of obtaining a *t* value or greater for TCE (7.40), GEX (3.43) and BOT (5.70) is 0.0000 (TCE), 0.0022 (GEX) and 0.0000 (BOT) respectively, which is practically zero. This means that TCE, GEX and BOT are statistically significant. However, the coefficient of GFCF is not equal to zero and therefore is not statistically significant. The result shows that the probability of obtaining a *t* value of 1.38 or greater is 0.1822 is which is statistically different from zero.
The study also finds out that TCE, GFCF, GEX and BOT are jointly significant. The F statistic shows the overall significance of the estimated regression line. The result reveals that the *p* value of obtaining an F value of as much as 39.69 or greater is simultaneously equal to zero, leading to the rejection of the hypothesis that together TCE, GFCF, GEX and BOT together have no effect on aggregate demand.

The adjusted R^2 value of 0.87 means that about 87% of the variations in aggregate demand is explained by TCE, GFCF, GEX and BOT. This is quite high considering that the maximum value of R^2 can at most be 1. This shows that our regression line fits the data quite well. The coefficient of about 0.87 shows that consumption, investment, government expenditure, trade and national income are highly positively correlated.

The Durbin-Watson d test of autocorrelation shows the absence of serial correlation. The aggregate demand model shows the estimated d value to be 1.74, d_L = 0.805 and d_U = 1.528 at the 5 percent significance level. Since the computed d value of 1.74 lies above d_U (i.e. d_U< d < 4 – d_U), we accept the hypothesis of no autocorrelation (of the first order), positive or negative in the residuals.

4.2.2. Effect of Aggregate Demand on Marginal Propensity to Consume in Nigeria
The consumption model is given as:

$$PCE = \beta_0 + \beta_1 GDP + \mu 0 < \beta_1 < 1$$

Replacing, the theoretical parameters with their numerical estimates, the linear regression becomes:

PCE = – 3,386.47 + **0.68GDP**
S(b$_i$) = (2,302.46)(0.14)
t*=(-1.47)(5.03)
Prob. =(0.1555)(0.0000)
R^2 = 0.53, Adjusted R^2 = 0.51, DW = 0.21

Table 5
Source: Authors' Computation, E-views8.

The estimated d value of 0.21 suggests there is positive serial correlation in the residuals. In this empirical analysis, the time series regression involved quarterly data (derived from monthly data) which introduces smoothness into the data by dampening the fluctuations. This smoothness lends to a systematic pattern in the disturbances thereby introducing autocorrelation. However, the Hodrick-Prescott (HP) filter is a widely used smoothing method to obtain long term trend component of the series. The smoothened series is shown below:
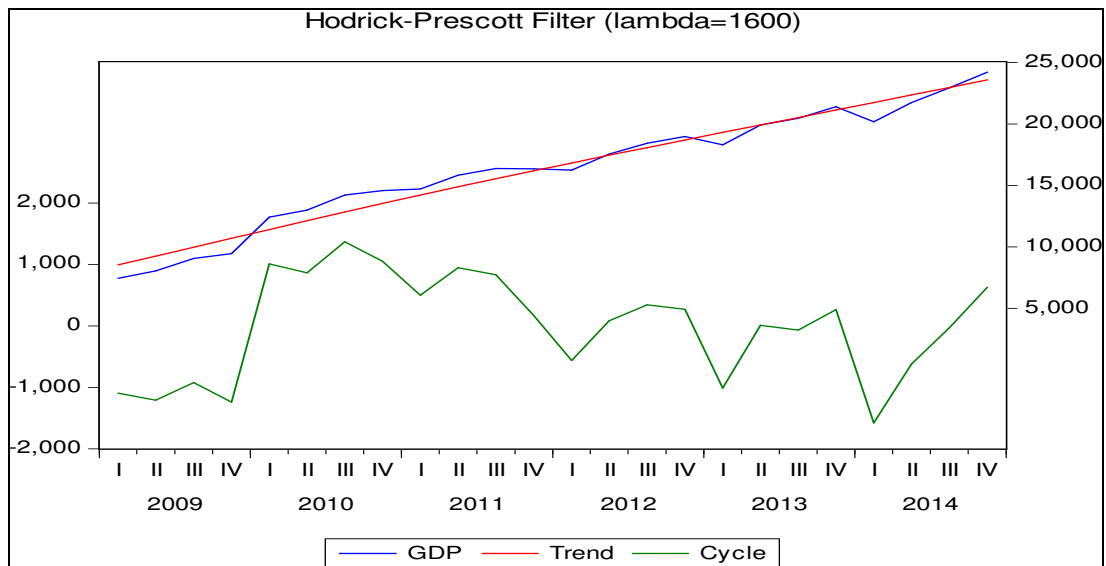

Figure 4: Hodrick-Prescott Filter
Source: E-views8 Output.

The smoothened series is shown in the upper part of the graph while the normal cycle is shown in the lower part. Technically, the graph above shows a two-sided linear filter that computes the smoothed series *s* of *GDP* by minimising the variance of *GDP* around *s*. The filter is used to isolate the cyclical component of the time series by specifying a range for its duration. The weighted moving average of GDP was extracted while the remaining cycles were filtered out to correct serial correlation in the time series.
The figure below shows that the regression line does not fit the data quite well in that the data points are dispersed from the regression line.
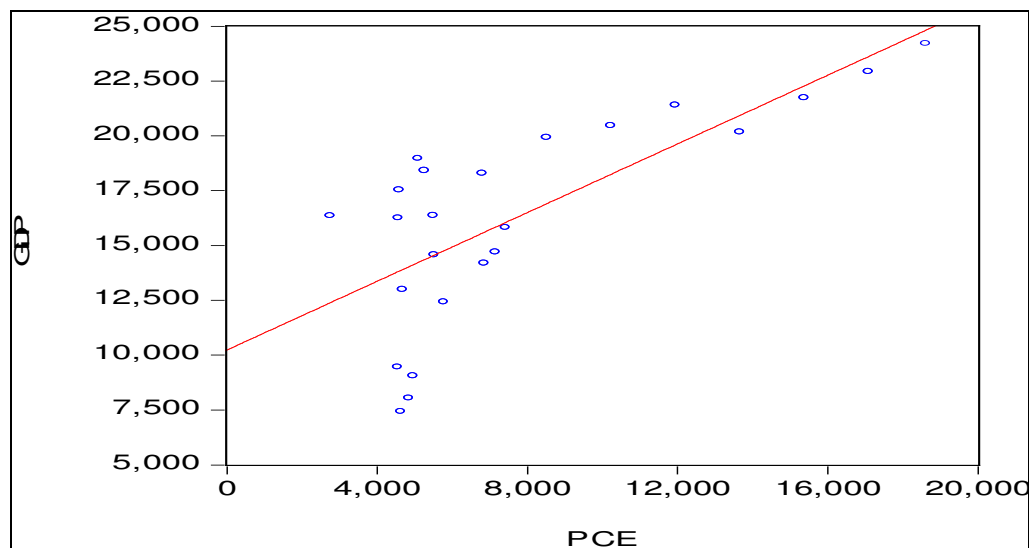
Figure 5: Regression Line
Source: E-views8 Output.

From this figure, we can see that for the period 2009 – 2014, the slope coefficient (i.e. the MPC) is about 0.68, suggesting that for the sample period an increase in real income of one naira (₦1) led, on average, to an increase of about 68 kobo in real private consumption expenditure. In other words, ₦100 increase in income, on average, will lead to a ₦68 increase in private consumption expenditure. According to Keynesian theory, MPC is expected to lie between 0 and 1. Thus, the regression equation supports Keynes' postulation of the income-consumption relationship. The intercept value is negative, which has no viable economic meaning. Literally, it means, if GDP were zero, the average value of private consumption expenditure would be a negative value of about 68 billion naira. The adjusted R^2 of 0.51 means 51% of the variation in private consumption expenditure is explained by variation in income. The coefficient shows that GDP and PCE are moderately correlated. The estimated *t* value reveals that the probability of obtaining a *t* value of 5.03 or greater is practically zero. Hence, the coefficient of GDP is significant.

As these results suggest, income has a positive and significant relationship with private consumption expenditure. Hence, statistically, GDP (income) is an important determinant of PCE in Nigeria.

4.2.3. The Effect of the Multiplier on the Nigerian Economy
The critical value in this computation is the MPC because the multiplier depends on it. The quantitative estimate of the MPC provides valuable information in predicting the future course of income, consumption expenditure and employment following a change in government's fiscal policies. As macroeconomic theory suggests, a change in income following a one naira change in investment is given by the *income multiplier*, which is given as:

$$m = \frac{1}{1 - MPC}$$

Since the MPC obtained is 0.68, the multiplier becomes 3.13. That is, if the government were to increase its expenditure by ₦1 to lift the economy out of a recession, income would eventually increase by ₦3.13 if the MPC were 0.68. Thus, an increase (decrease) of a naira in investment will eventually lead to more than a three times increase (decrease) in income.

5. Summary of Findings and Recommendations
The study reveals that the aggregate demand and consumption functions are significant and is useful for policy formulation in Nigeria. The national income model shows that government expenditure is the major determinant of aggregate demand. Total consumption expenditure, investment, government expenditure and balance of trade contribute positively to the growth of aggregate demand in Nigeria; the level of investment in the country is however not significant. Aggregate demand is an important determinant of Private Consumption Expenditure (PCE) in Nigeria and postulates a positive and significant relationship with PCE, which is in line with Keynes' psychological law. The multiplier shows that a ₦1 change in investment will lead to an eventual ₦3.13 (threefold) increase in income with an MPC of 0.68. The Exploratory Data Analysis shows that the Nigerian economy performed better in the post global financial recession era than in the preceding period. Based on the findings of this research, the study recommends that:

The government should respond to the shortcomings in investment by implementing demand management policies through the use of fiscal and monetary policies to make short run adjustments to the level of aggregate demand. Fiscal expansion on economic infrastructure and monetary expansion through buying securities from the public (thus paying out money into circulation) and lowering interest rates is a needed quantum in stimulating private investment.

There is need for regular intervention to cater for market imperfections and slow adjustment which could constrain the multiplier. Short run policies may be adopted, but the overall long term effect would be achieved by regularly updating fiscal and monetary policies.

Finally, supply side policies to raise productivity are recommended as a means of raising total output. Full employment constitutes the last resort by which total production could be permanently raised.

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