2013

ECONOMIC OUTLOOK FOR THE NIGERIAN ECONOMY (2013-2016)

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Table of Contents

FOREWORD

An economic projection is a means of scientific procedure that offers insights into the potential trends in the key drivers of an economy. It enables responsive and responsible governments to monitor performance and review course of actions in order to achieve macroeconomic goals. The need for regular economic projections cannot be overemphasized in that they, inter alia, provide information about the future and serve as a barometer for evaluating probable future outcomes of current policies and programmes.

Evidenced-based policy making is gaining wide acceptance among policymakers, academics and public commentators. It has been recognized that public policy decisions should be informed by careful analysis using sound and transparent data. This concept of evidenced-based policy-making is broad based in terms of scope and dimension. It involves the use of data and appropriate models to evaluate issues of national importance, develop and design policy interventions, make informed policy choices, forecast possible future outcomes, monitor policy implementation and finally, evaluate policy impact. This approach has been generally acknowledged as an effective way of promoting development-oriented policy decisions as their outcomes can be regularly assessed with veritable policy options.

It is in the light of these benefits that we have continued to provide regular forecasts on selected macroeconomic performance indicators that will guide policy makers in pursuit of plausible policy thrusts for the Nigerian economy. It is my hope that the review of economic developments in 2012, and the macroeconomic projections for 2013 and beyond contained in this document will serve as a useful guide to policy makers, researchers, investors and the general reader on the likely direction of the Nigerian economy in the medium term.

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February 2013.

EXECUTIVE SUMMARY

Under the presumption of resilience witnessed in 2012, the Nigerian economy is expected to expandmoderately in 2013. This is primarily predicated on the stated intent by government to pursue macroeconomic stability in 2013. The macroeconomic variables considered for this forecast includethe nation's real gross domestic product, value of total merchandise trade and the inflation rate. The forecast technique employed is the macro-econometric modelling which largely hinges on the Keynesian IS-LM-BOP framework.The projection results are obtained over the period of 2013 to 2016.

In light of the floods which occurred during the second half of 2012, preliminary estimates for the fourth quarter of 2012 indicate that the economy grew by 7.01% compared to 6.48% growth recorded in the preceding quarter. Overall growth in real GDP in 2012 is therefore estimated at 6.61% and is expected forecast to rise to 6.75% in 2013. This forecast, while slightly below initial projections, is not faroff from historical growth patterns of the Nigerian economy over recent years. On the sectorallevel, the contributions of the agricultural sector maintains the highest contributor followed by the wholesale and retail tradeand the crude oiland natural gas sector. The current reforms being undertaken by the government, particularly theenergy and agricultural reforms,are expected to drive fairly high growth rates in the agricultural and industrial sectors of the economy.

In relation to prices, the inflation rate is expected to moderate significantly over the period under review. Inflation rate stood at 12.0% in December 2012, compared to 12.6% recorded in January 2012. The inflation rate is projected to maintain about 9.8% on the average over 2013. These projections are driven by the assumptions that the CBN will continue to promote moderate monetary policy and domestic fuel price stability.

Similarly, the external sector suggests a fairly stable trend over the period under review. While declining imports may drag the value of total merchandise trade over 2013, exports are projected to drive upwardly with the former contributing more proportionately to total merchandise trade than imports. This trend promises a favourable balance of trade position for the economy. Beyond 2013, total merchandise trade growth is projected on the average at 23.1% drawing largely on increasing demands for both exports and increasing imports.

Part I: A review of developments in 2012

a. **Introduction**

This section provides a review of economic developments in Nigeria and trends in the major macroeconomic variables during 2012 vis-à-vis 2011. The variables discussed in this section include Gross Domestic Product (GDP), Inflation, the Value of Total Trade, Imports and Exports.

b. **Gross Domestic Product**

The Nigerian economy faced numerous challenges which impacted overall economic activity in 2012. Declines in the real growth rates of economic activity were experienced in both the oil and non-oil sectors. Oil production was less than expected due to security challenges, and floods which occurred in the latter part of the year, while the non-oil sector (notably Agriculture, Wholesale & Retail Trade) was mostly affected by the floods and weaker consumer demand.

Revised data for 2012 indicates that Real GDP grew by 6.34 percent in the first quarter and 6.39 percent in the second quarter of 2012. The rate of economic activity was slightly higher than the initial estimates of 6.17 percent and 6.28 percent respectively, as published in early 2012. Nevertheless, the revised growth rates were lower than those recorded in the corresponding quarters of 2011,that is 6.96 percent and 7.50 percent respectively. Therefore the economy declined by 0.62 percentage points and 1.11 percentage points respectively in the first two quarters of the year compared to corresponding quarters in 2011.

According to the Nigerian National Petroleum Corporation (NNPC), oil production was estimated at 2.37 million barrels per day (mbpd) during the first half of 2012, as against 2.48mbpd produced in the first half of 2011. The 4.4% decline in crude production levels was attributed to disruptions in production due to cases of oil theft and vandalization in the oil producing areas.

On the other hand, non-oil sector was affected by the incidence of flooding, as well as muted consumer demand for the most part of the year, as seen in the Wholesale and Retail Trade, Telecommunication and Post sectors while infrastructure challenges still hampered Manufacturing. However, the Manufacturing sector did record a slight uptick in the second quarter as a result of positive

developments in the power sector. Real Estate, as well as Building and Construction sectors also performed better than anticipated. Table 1 and Figure 1 provide sectoral growth rates for 2011 and 2012

Table 1: Sectoral growth summary for 2011 and 2012

Sectoral Growth (%)	2011				2012			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4^f
Agriculture	5.31	5.7	5.76	5.68	4.37	4.21	3.89	3.83
Solid Mineral	12.9	11.85	12.43	12.85	11.65	11.72	12.61	12.68
Crude Petroleum & Natural Gas	0.05	0.98	-0.26	-0.08	-2.32	-0.73	0.08	-0.17
Manufacturing	6.13	7.2	7.84	7.63	5.17	7.59	7.78	7.71
Telecommunication & Post	32.14	34.1	35	36.39	34.06	29.38	31.57	32.5
Finance & Insurance	4.07	4.37	4.04	3.42	3.57	5.01	4.08	3.47
Wholesale and Retail Trade	10.06	11.43	11.8	11.92	8.42	8.65	9.62	10.76
Building and Construction	13.19	11.98	10.88	12.09	13.28	12.73	11.52	12.6
Hotel and Restaurants	12.2	12.39	11.96	12.01	11.45	12.3	12.33	12.69
Real Estate	9.51	10.54	10.86	11.16	9.34	10.81	10.24	11.1
Business and Other Services	8.62	11.03	8.52	9.81	7.67	11.26	9.11	10.69
Other sectors	4.68	4.6	5.04	5.5	4.97	4.84	5.25	5.78
Real Growth at Basic Prices	**6.96**	**7.5**	**7.37**	**7.76**	**6.34**	**6.39**	**6.48**	**7.09**
Non - Oil Growth	**8.52**	**8.72**	**8.76**	**9.1**	**8.14**	**7.63**	**7.55**	**8.23**

Figure 1: Sectoral Growth, 2011-2012,
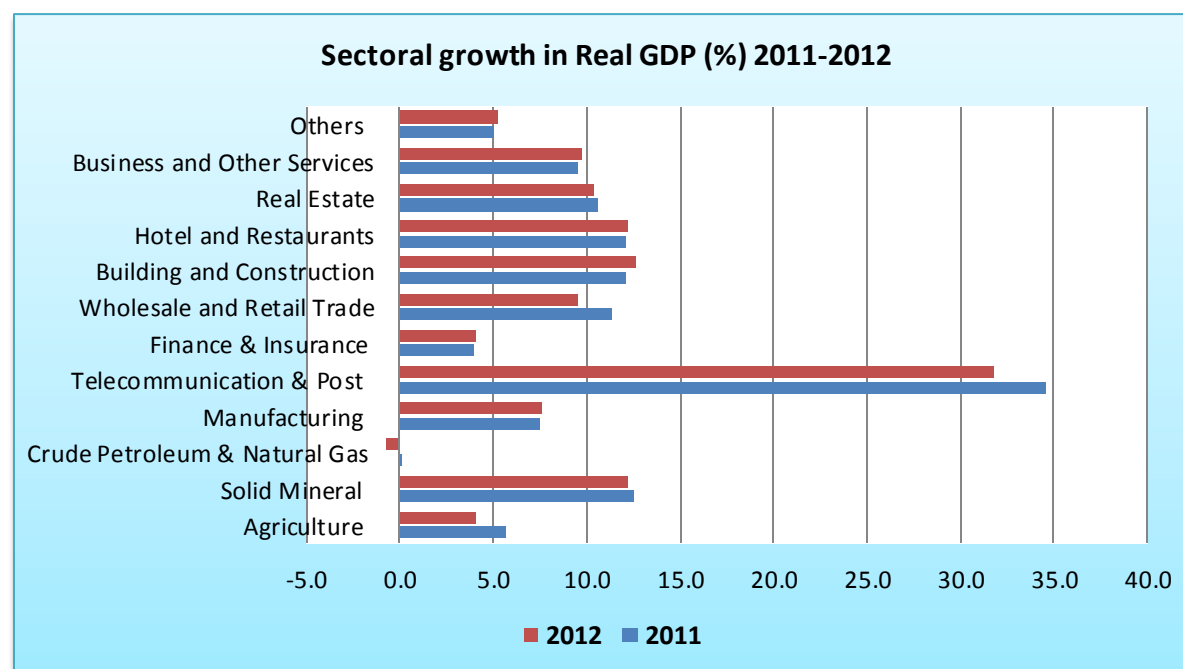
Figure 2: Sectoral contribution to Real GDP growth, 2011-2012, in percentages

Sectoral contribution to Real GDP, % (2011-2012)
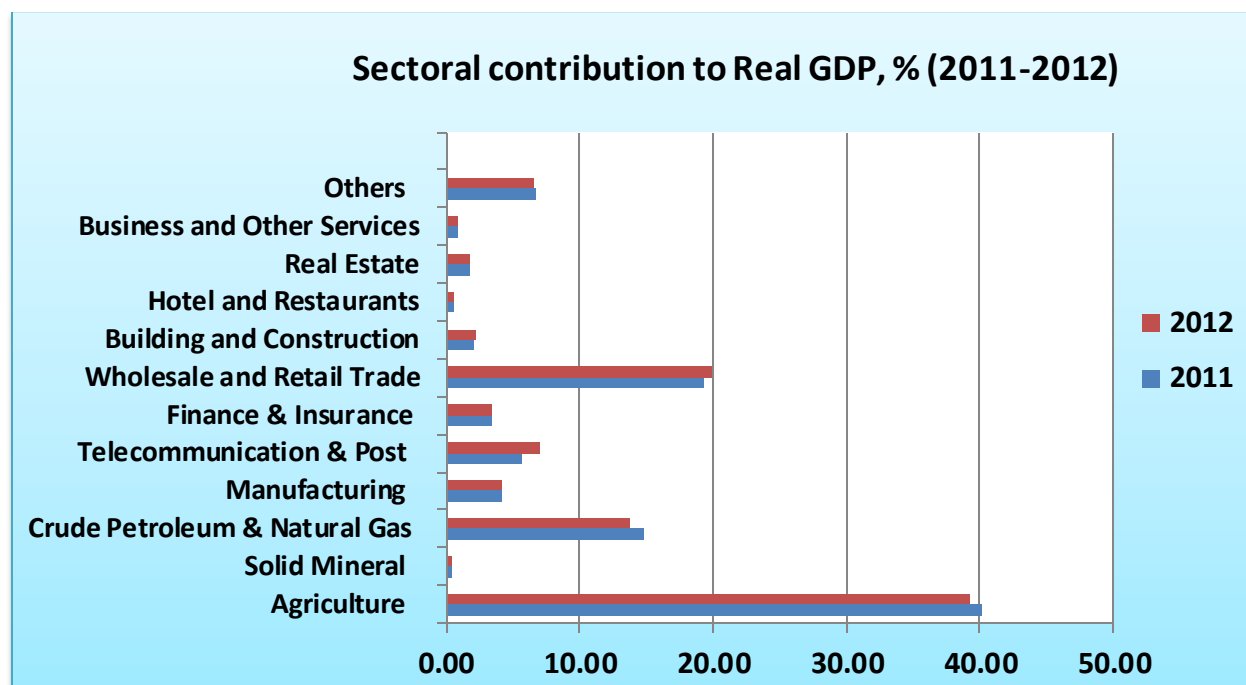
In the third Quarter of 2012, the economy grew at 6.48 percent, a decline of 0.89 percentage points from the 7.37 percent recorded in the third quarter of 2011. During the quarter, the oil sector recorded a gradual uptick, the first time in four quarters, as crude oil production was recorded at 2.52 million barrels per day during the quarter, an increase from the 2.38 million barrels recorded in the third quarter of 2011. The non-oil sector recorded marginal relative declines in growth, as the sector recorded a 7.55 percent growth in the quarter as compared to 8.76 percent in the corresponding quarter of 2011.

In particular, the agricultural sector suffered declines due to the floods, which also affected the Wholesale and Retail sector (as key inputs in the sector are from the agricultural sector). There were also slight declines in the Manufacturing sector due to remaining electricity supply challenges, declines in the Telecommunications sector as a result of lower quality of service delivery, and declines in Real Estate sectors were also recorded.

In the Fourth Quarter of 2012, preliminary estimates suggest that relative declines in the Agricultural sector output which persisted for the most part of the year, likely continued into the quarter. These declines will also affect the Wholesale and Retail Sector. While the decline in the Crude-Petroleum and Natural gas sector may not be as pronounced, the sector is expected to yield a decline in

growth of 0.17 percent. The Manufacturing sector is expected to increase by 7.71 percentage points, while the Telecommunication sector is expected to increase, but at a lower rate, by 32.50 percent, compared to 36.39 percent in the fourth quarter of 2011. The Finance and Insurance sector is expected to grow marginally faster than the fourth quarter of 2011. Other sectors expected to increase are the Building and Construction, Hotels and Restaurants, and Business and Other Services. *For 2012, the economy is therefore expected to grow by 6.61 percent, a relative decline from the 7.43 percent recorded in 2011.*

c. Inflation:

As at December 2012, the **headline inflation rate** showed a general downward trend during the year, despite the economic challenges that the country witnessed. From the 12.6% recorded in January (year-on-year), the headline inflation rate reached12.9% in April and June before slowing to 11.3% through September. It rose further to 12.3% in November before falling slightly to 12.0% in December. As a result, the average inflation rate for the year stood at 12.2%. On a month-on-month basis, the headline inflation rate rose sharpest in March (1.6%). The major sources of inflationary pressure in 2012 still appear to be structural and infrastructural constraints. Nevertheless, the removal of fuel subsidies early in the year, the devastating flood that occurred in the third and fourth quarters of 2012 as well as seasonal effects also played major roles in driving up prices at various times. Tight monetary conditions however appear to have limited the extent of price rises as the headline rate peaked lower than the 14.9% earlier forecast for 2012. Figure 3 shows the trends in measures of inflation rates in 2012.

**Figure 3: Trends inmonthly inflation rates in 2012 (%)**
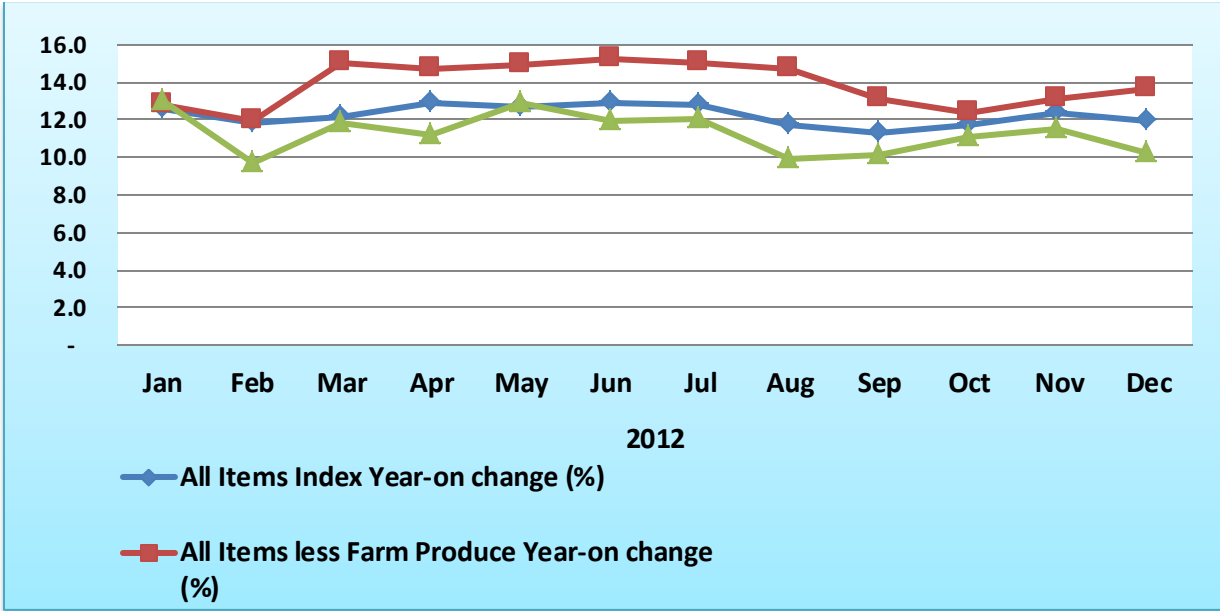
The "all items less farm produce index" (also known as the "core" index) which excludes prices of more volatile agricultural products peaked in June 2012 at 15.2% and trended lower till the end of the year. By December 2012, the rate settled at 13.7 %. The reason for the early build up in the core index was a result of the removal in fuel subsidy at the beginning of the year. Other divisions in the index which witnessed price rises include transportation and housing.

The Food index which records prices of agricultural products generally trended downwards during the year, from the peak of 13.1% recorded in January to 10.2% recorded in December. The increases in prices in 2012 were partially exacerbated by the floods which occurred in the later part of the year, although higher transport costs as well as higher international food prices also fuelled higher food prices in 2012.

d. Value of Total Trade, Trade Balance, Imports and Exports

As at the third quarter of 2012, the value of total Merchandise Trade for the country was estimated at N20,885.4 billion over the first three quarters of the year. Compared to levels recorded during the first three quarters in 2011, the value of total merchandise trade had remained roughly unchanged, increasing marginally by 0.4%. The value of total merchandise trade points to increasing exports over the period while imports have been on the decline. Specifically, imports have continued to trend downwards since the second quarter of 2011, while the value of exports which increased substantially in late 2011, dipped in the first quarter of 2012, but picked up in the second and third quarters of 2012, as shown in See Figure 4 below.

Figure 4: Value of total trade and trade balance, 2008-2012
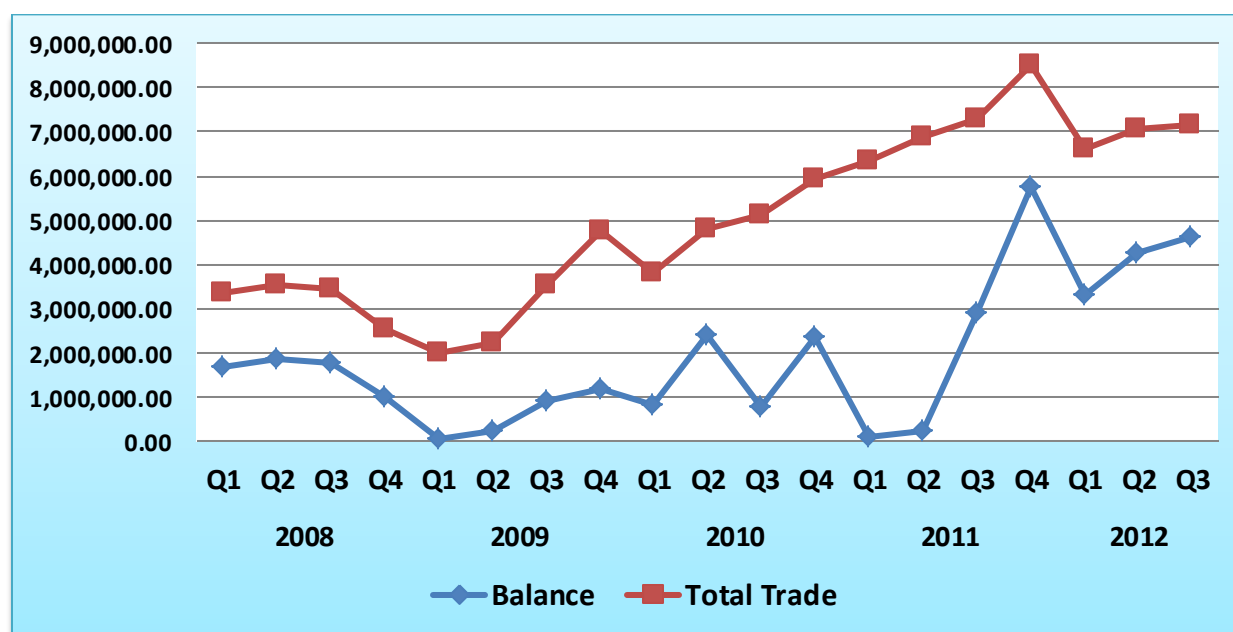

Declining imports and increasing exports led to the balance of total trade increasing over the three quarters of 2012. As of the Third Quarter, the Trade Balance was recorded at N3,812.6 billion, higher than levels recorded over the same period in 2011 by over 200 percent.

e. Imports

As stated earlier, the value of total imports continued the downward trend exhibited since the middle of 2011. Total imports decreased by 46.8% (year-on-year) to N1,652.3 billion in the first quarter of 2012. Import values declined further by 57.6% to N1,408.5 billion in the second quarter, and by 42.3% to N1,271.3 billion in the third quarter. At the end of the third quarter, total imports were valued at N4,332.0 billion, a decline of 49.0% from levels recorded in 2011 (See Figure 5). Imports classified by Standard International Trade Classification revealed that declines were exhibited across major classifications such as Food and Live Animals, Crude inedible materials, Mineral Fuels, Oil fats and waxes, Chemicals & related products, Manufactured goods, and Machinery & transport equipment. An increase was witnessed in Beverages and Tobacco section, which rose by N27.4 billion or 64.1% year-on-year, and the section on commodities-not-elsewhere-specified which surged compared to the same period in 2011.

Figure 5: Value of imports and exports ('000 Naira, 2008-2012)
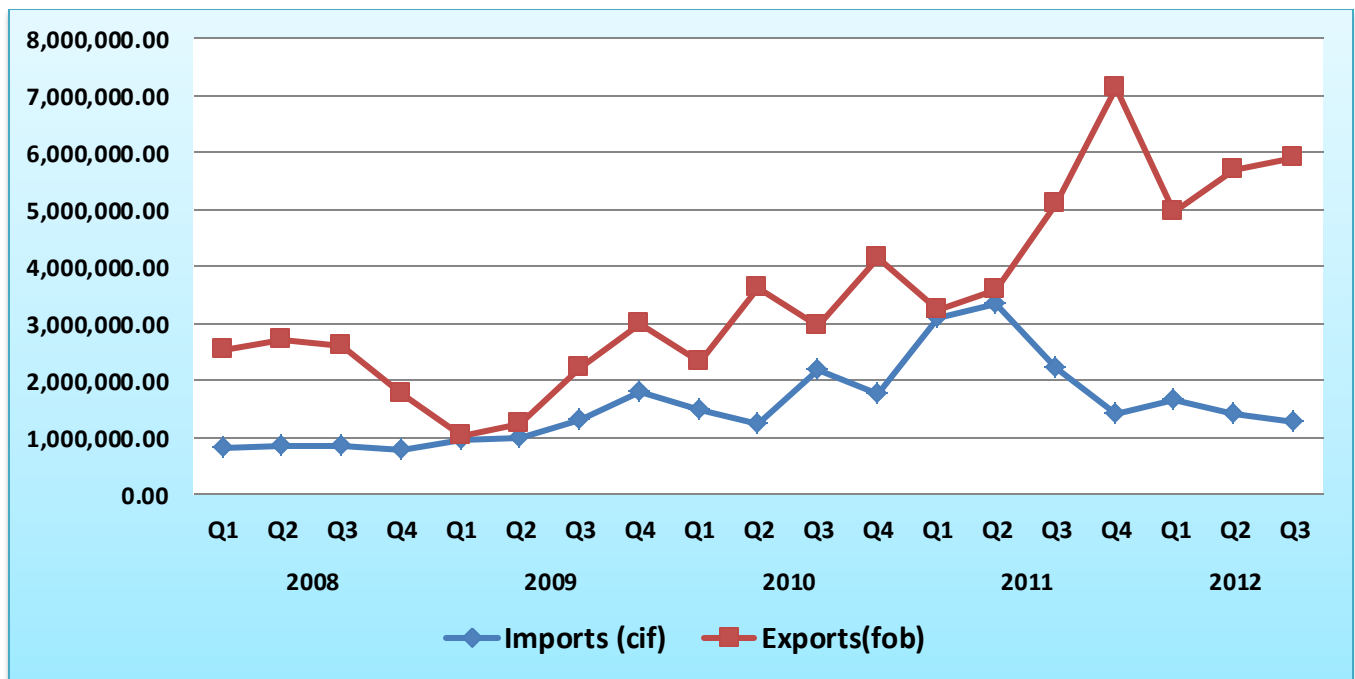
f. Exports

In the first quarter of 2012, total value of exports was valued at ₦4,969.7billion, a decrease of ₦2,162.5 billion or 30.3% over the values recorded in the Fourth Quarter of 2011. The value of total Exports

stood at N5,675.5 billion in the Second quarter of 2012, due to a rise in non- oil exports during the quarter which increased by 69.7% to N2,127.1 billion during the period. In the third quarter of 2012, exports further increased by 4.1%, partly from a rise in crude oil exports which increased by N616.4billion or 17.4% to N4,164.8 billion in the corresponding period. By the end of the third quarter of 2012, exports had increased to N12,308.2 billion, an increase of 34.5% from levels recorded over the same period in 2011, driven by both crude oil and non-crude oil exports. Oil exports increased by 9.6 percent to N11, 429.3 million, while non-oil exports increased by more than double levels recorded in 2011 to N5,124.1 million.

In the next section, projections on the likely direction of these key macroeconomic variables are provided, based on developments in 2012 as well as in other related sectors of the economy.
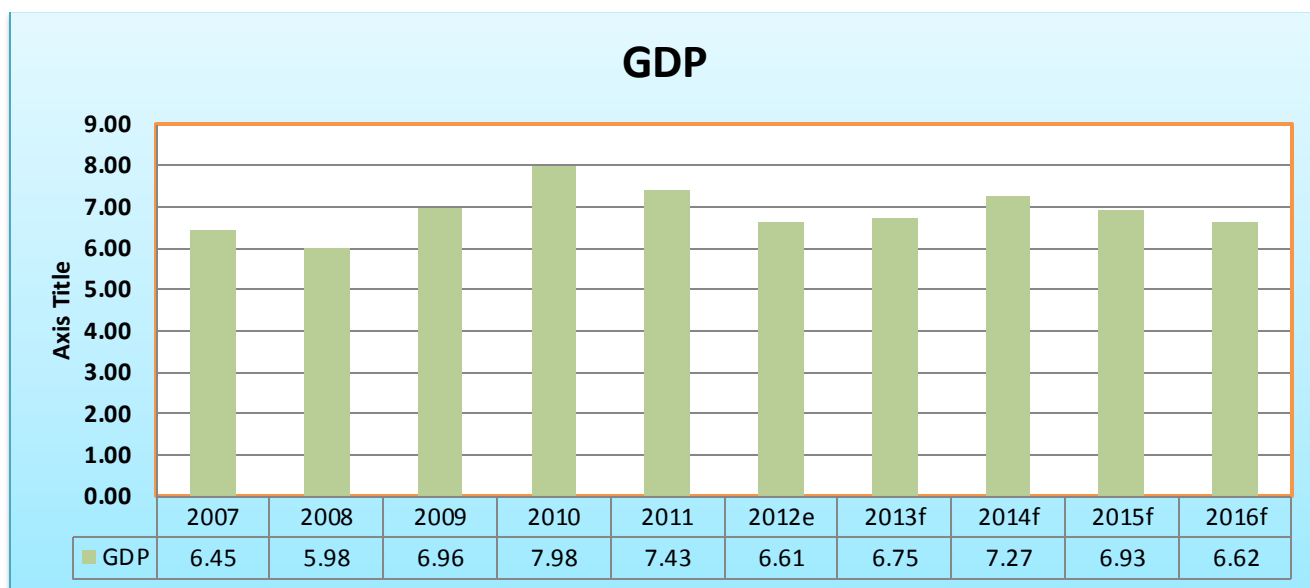
Part II: Macroeconomic Projections for 2013-2016

a. Overview of methodology:

The basis for achieving our stated objectives rests on the macro-econometric model built around the IS-LM-BOP framework. In this framework, the inter-linkages among the real sector, financial sector and the external sector (for an open economy like Nigeria) are captured. The set-up of the typical IS-LM-BOP model begins by directly specifying individual relationships for aggregate production, consumption, investment, government spending, money demand etc. Consequently, the equilibria in the relevant markets are evaluated by solving for relevant parameters to arrive at estimable equations. This model can be used to analyse many issues such as the reaction of the economy to changes in policy variables or to changes in the specifications of the interaction between endogenous variables (details about the model are provided in the appendix).In this section, we provide quarterly projections for the Gross Domestic Product and Total Merchandise Trade, the Consumer Price Index as well as their growth rates.

b. Real Gross Domestic Product (GDP)

The projected growth rate of real GDP in 2013 is forecast to reach 6.75% compared to 6.61% estimated for 2012. Over the period 2013-16, real GDP is expected to average a growth rate of 6.9%.This forecast appears to mirror a consistent growth pattern (when compared to previous statistics) for the Nigerian economy taking cognizance of evident realities in the macroeconomic environment in addition to the gradually improving productive base of the economy. Also, the continued efforts of the government towards revamping the economy through various sectoral policy reforms such as energy reforms, consolidation and post-consolidation exercises going on in the banking and sub-banking sectors, agricultural reforms and oil sector reforms are expected to drive higher growth during the period. Figure 6 provides the growth rate of real GDP projections through 2016.

Figure 6: Projections on growth rate of Real Gross Domestic Product (%, 2013-2016)

GDP

	2007	2008	2009	2010	2011	2012e	2013f	2014f	2015f	2016f
GDP	6.45	5.98	6.96	7.98	7.43	6.61	6.75	7.27	6.93	6.62

c. Inflation Rate

As depicted below, the rate of inflation is expected to maintain some level of stability over the period under review. On the average, the inflation rate is projected to maintain about 9.73%.throughout the forecast period. These trends are premised on the assumptions that the monetary authorities will continue to pursue, as in 2012, managed tightening of monetary policies and stable fuel prices. Similarly, an improvement in production capacity of the economy which is also considered in the modelling of inflation rate appears to be complementing the downward trend in the inflation rate (See Figure 7).

Figure 7: Inflation Projections (2013-2016)

Nigeria: Projected average annual inflation rates (%)

	2007	2008	2009	2010	2011	2012	2013f	2014f	2015f	2016f
Average Inflation rates	5.57	11.98	11.97	13.59	10.91	11.98	9.76	9.49	9.76	9.95
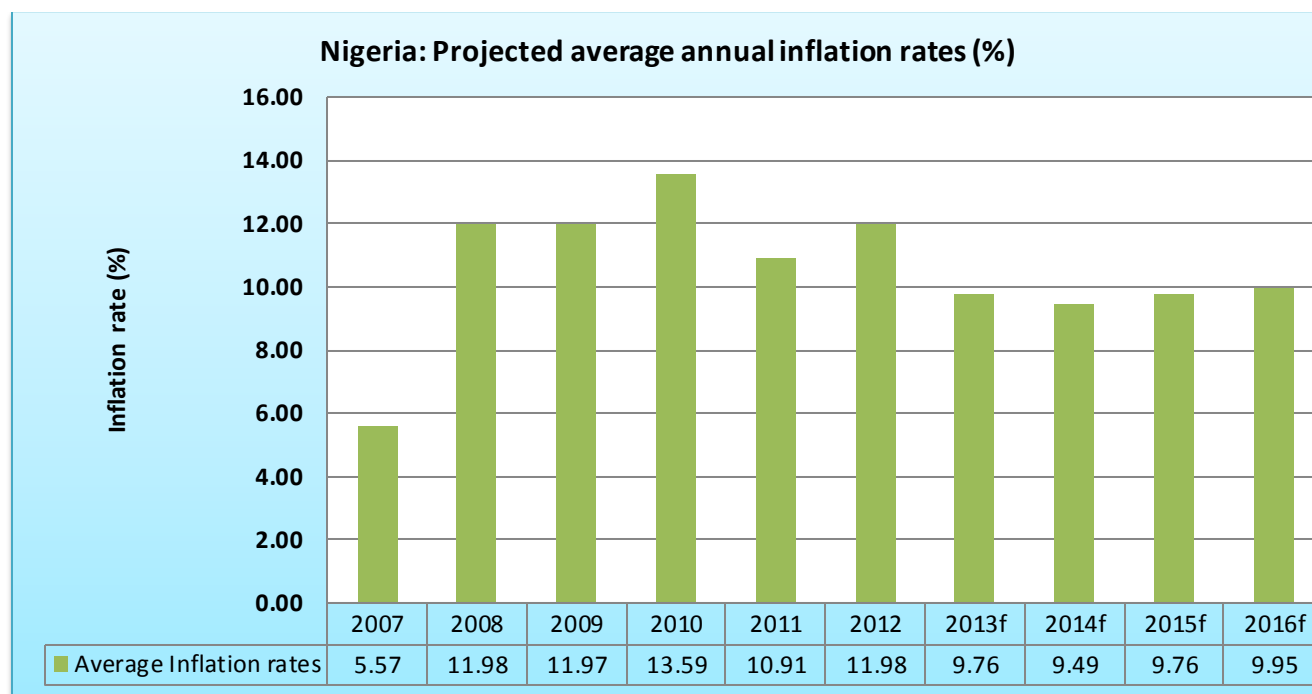
Theoretically, the growth rate of GDP is negatively related to the price level; and with gradual improvements in the growth of GDP, the rate of inflation is projected to be modest.

d. Total Merchandise Trade

The recent declines in imports are expected to carry on till the third quarter of 2013. Beyond this point, the growth rate in imports is expected to yield positive year-on-year changes. By the fourth quarter of 2013, growth in the value of total merchandise trade will be driven by both higher imports (relative to Fourth Quarter 2012) as well as oil and non-oil exports. In this view, there is less likely to be pressure on Nigeria foreign reserves as there will be decreasing demand for foreign exchange to settle high import bills. Therefore, the projected increases in the value of total merchandise trade are expected to equally generate higher external reserves via higher exports thereby increasing the supply of foreign exchange than the demand for it for the purpose of importation. Figure 8 below shows the expected trend in growth rate of total trade through 2016.

Figure 8: Value of Total Merchandise Trade Projections (2013-2016)

Nigeria: Projected growth in total trade (%)

	2007	2008	2009	2010	2011	2012e	2013f	2014f	2015f	2016f
■ Trade	5.08	16.88	-3.00	57.49	47.87	-11.57	-11.94	25.09	23.00	21.2283

Y-axis: Percentage Growth (from -20.00 to 70.00)

e. Conclusion

This report provides a review of developments in key economic variables and sectors in 2012, and discusses projections on selected macroeconomic variables such as real GDP, inflation rate, values of imports and exports as well as total trade over the period 2013 to 2016. On the whole, the economy is projected to follow a steady growth pattern in the next four years with real GDP growth expected at 6.74% in 2013 and inflation rate of 9.74%, coupled with rising exports and imports. Rising imports and exports are expected to lead to higher trade merchandise trade values over the forecast period. These projections are however premised on the continued monetary stance, stable fuel prices across the country and stable external environment over the forecast period.

APPENDIX I: 2013- 2016 PROJECTIONS

Table 1: Historical and Projected Annual Growth rates for real GDP, Inflation and Total trade (%)

Year	2008	2009	2010	2011	2012f	2013f	2014f	2015f	2016f
Real GDP	5.98	6.96	7.98	7.43	6.61	6.75	7.27	6.93	6.62
Trade	16.88	-3.00	57.49	47.87	-11.57	-11.94	25.09	23.00	21.23
Inflation	11.98	11.97	13.59	10.91	11.98	9.76	9.49	9.76	9.95

Table 2: Projected Quarterly Growth Rates for the period 2013- 2016 (%)

	2013Q1f	2013Q2f	2013Q3f	2013Q4f	2014Q1f	2014Q2f	2014Q3f	2014Q4f
Real GDP	6.63	6.66	6.71	6.96	7.44	7.34	7.24	7.15
Inflation	10.61	9.77	9.39	9.27	9.36	9.45	9.53	9.61
Total Trade	-24.61	-25.11	-21.64	23.59	26.15	25.37	24.71	24.14
	2015Q1f	2015Q2f	2015Q3f	2015Q4f	2016Q1f	2016Q2f	2016Q3f	2016Q4f
Real GDP	7.06	6.97	6.89	6.80	6.73	6.66	6.59	6.52
Inflation	9.67	9.73	9.79	9.84	9.89	9.93	9.97	10.00
Total Trade	23.65	23.20	22.77	22.35	21.93	21.48	21.01	20.50

Table 3: Historical and Projected estimates for Real GDP and Trade (N' Millions)

Year	2011	2012f	2013f	2014f	2015f	2016f
Real GDP	834,000.83	888,893.00	948,935.13	1,017,959.23	1,088,343.04	1,160,308.53
Trade	29,069,147.00	25,862,305.00	21,880,800.00	27,360,460.00	33,644,170.00	40,776,250.00

APPENDIX II: Macro-econometric Model for Projections

The theoretical basis for these projections largely hinged on the Keynesian IS-LM-BP framework. For a standard Keynesian model, a real economy is described by IS equation; $Y = C + I + G + NX$, where Y – output (GDP), C – consumption level, I – investment, G – public expenditure , NX – Net export (Export minus Import).

The standard Keynesian model suggests that:

$$Y = C(Y^d) + I(r, Y) + G + NX(e, Y) \tag{1}$$

This signifies that consumption is a function of disposable income while interest rate and the level of domestic product drive investment with net export majorly determined by exchange rate and output. However, Mundell-Fleming model modified IS-LM model for analysis of open economies. The equation of the goods market is therefore enriched by net export NX being influenced by exchange rate (e) and outside demand – denoted as FD – (see Parke; Felderer, Homberg, 1995; Luptáčik et al; 2006; Morvay et al; 2005 and Palenik; 2012).

$$Y = C(Y^d) + I(r, Y) + G + NX(e, FD, Y) \tag{2}$$

Behaviourally, the components of the IS equation can further be decomposed into;

$$C = a_o + a_1 Y^d \tag{3}$$
$$I = b_o + b_1 i + b_2 Y \tag{4}$$
$$G = \overline{g} \tag{5}$$

Where; a_o is the level of consumption independent of income, b_o is the level of investment independent of both the rate of interest and income. Equation (5) denotes that government expending on an autonomous spending in Nigeria (i.e exogenously determined).

Anchoring on the Mundell-Fleming framework, the net export is a function of exchange rate, foreign demand and income such that;

$$NX = f(e, FD) \tag{6}$$

Putting equations (3), (4), (5) and (6) into (2) yields the IS-BP equilibrium such that;

$$Y = \lambda_o + \lambda_1 Y^d + \lambda_2 i + \lambda_3 Y + \lambda_4 \overline{g} + \lambda_5 e + \lambda_6 FD + \lambda_7 Y + \mu \tag{7}$$

Simplifying equation (7) further and expressing in real terms gives;

$$y = \delta_o + \delta_1 T + \delta_2 i + \delta_3 \overline{g} + \delta_4 e + \delta_5 fd + \delta_6 \pi + \mu \tag{8}$$

Where; T is the government revenue and others are as previously defined.

Also,

LM Equation (Money Market) Equation: At equilibrium; the money market equation gives:

$$\frac{M^s}{P} = \frac{M^D}{P}, \text{ or } \quad m^s = m^D \qquad (9)$$

Where; M^s is the nominal money supply; M^D is the nominal money demand and P is the price level. Also, m^s and m^D are the real money supply and real money demand respectively.

The demand for real money balances is assumed to be a function of one or some of the following variables

$$m^d = f(i, y) \qquad (11)$$

Where; y is real income, and i is the nominal interest rate.

Putting equation (11) into (10) yields;

$$m - p = f(i, y) \qquad (12)$$

With further simplifications;

$$M = f(i, y, \pi) \qquad (13)$$

Where M is nominal money balances and π is the expected rate of inflation while other variables are as previously defined. The expected rate of inflation does not follow the random walk hypothesis as economic agents seem to repose confidence in the government policies and tend to anticipate the effect of these policies.

Behaviourally, the LM equation above is expressed as;

$$M = b_0 + b_1 i + b_2 y + b_3 \pi \qquad (14)$$

Simplifying for π and substituting the resulting equation into equation (8) yields the ***IS-LM-BP*** equation as follows;

$$y = \vartheta_o + \vartheta_1 T + \vartheta_2 i + \vartheta_3 \bar{g} + \vartheta_4 e + \vartheta_5 fd + \vartheta_6 M + \mu \qquad (15)$$

1. **Derivation of Price Equations**

Prices are value of economic resources. At the aggregate level, the price for money is the consumer price index; the price for capital is interest rate while the price for foreign currency is the exchange rate. Stemming from this, a need becomes imperative to specify the equations for these prices thus;

(A) Price Level Equation

The price level in the economy is considered both a demand-side and supply-side phenomenon. A demand-side issue as it borders on non-tradeable goods. And monetary policies influencing the prices of non-tradeable goods are directed at stimulating aggregate demand in the economy through the transmission mechanism on the interest rate. On the other hand, it is a supply-side phenomenon as it captures the activities in the tradeable sector in that the prices of the tradeable goods are driven majorly

by the movements in the exchange rates and foreign prices. The equilibrium of both the tradeable and non-tradeable goods yields the general price level.

The supply side equation is given as

$$P = eP_T^\gamma P_{NT}^{1-\gamma} \dots 0 < \gamma < 1 \tag{16}$$

Where e is the nominal exchange rate. We can re-write (16) as:

$$P = eP_T^\gamma P_{NT} * \frac{1}{P_{NT}^\gamma} \tag{17}$$

The parallel exchange rate is excluded in this model since, in Nigeria, it is largely driven by the official exchange rate and also that the Central Bank of Nigeria (CBN) regulates other independent exchange market such as the bureau de change etc.

And then; $P = E\dfrac{P_T^\gamma}{P_{NT}^\gamma} P_{NT} = e^\gamma P_{NT}$; where $e^\gamma = \dfrac{EP_T^\gamma}{P_{NT}^\gamma}$ (18)

Now, $P_{NT} = P_{NTF}^\sigma P_{NTO}^{1-\sigma}$ (19)

Note that *NTF* and *NTO* represents nontraded food and nontraded other goods.
Expressing equation (19) in log-linear form and using lower case letters to denote logs, we have:

$$p_{NT} = \sigma p_{NTF} + (1-\sigma) p_{NTO} \tag{20}$$

Substituting (19) into (18) gives;

$$P = e^\gamma P_{NTF}^\sigma P_{NTO}^{1-\sigma} \tag{21}$$

Expressing (21) in log-linear form and using lower-case letters to denote logs, again we have:

$$p = \gamma e + \sigma p_{NTF} + (1-\sigma) p_{NTO} \tag{22}$$

On the other hand, the demand-side equation is analyzed as thus;

At equilibrium; the money market equation gives: $\dfrac{M^s}{p} = \dfrac{M^D}{P}$, or $\quad p = \log(M^s) - m^D$ (23)

Where p and m^D are the logs of P and real money demand, respectively, and M^s represents the nominal stock of money.

To obtain the equation for the price level in the economy through the consumer price index, both the demand-side and supply-side equations are equalized such that equations (22) and (23) are brought together and then solved for p_{NTO} to yield;

$$p_{NTO} = \xi\left[\log(M^s) - m^D - \gamma r - \sigma p_{NF}\right] \tag{24}$$

Where; $\xi = (1-\sigma)^{-1}$ (25)

The demand for real money balances is assumed to be a function of one or some of the following variables

$$m^d = f(i, y)$$ (26)

Where; y is real income, and i is the nominal interest rate. The expected rate of inflation does not follow the random walk hypothesis as economic agents seems to repose confidence in the government policies and tend to anticipate the effect of these policies.
Writing equation (26) explicitly, we have:

$$m^d = \tau_1 i - \tau_2 y$$ (27)

Substituting (27) into (24) yields;

$$p_{NTO} = \xi \left[M^s - \tau_1 i - \tau_2 y - \gamma e - \sigma p_{NTF} \right]$$ (28)

Again substituting (28) into (20) gives:
$$p_{NT} = \gamma_1 M^s - \gamma_2 i + \gamma_3 y + \gamma_4 e$$ (29)

This removes the possibility of regressing food prices, which is a component of CPI, on CPI. From (18):
$$p = \gamma e + p_{NT}$$ (30)

Substituting for p_N using the expression in (30) yields;
$$p_t = \gamma_1 + \gamma_2 m^s + \gamma_3 i_t + \gamma_4 y_t + \gamma_5 e_t$$ (31)

Considering the possible linkage of international oil prices with the domestic price level, Equation (31) is augmented by international oil prices in domestic currency, say d, to obtain:
$$p_t = \gamma_o + \gamma_1 m^s + \gamma_2 y_t + \gamma_3 i_t + \gamma_4 e_t + \gamma_5 d_t + \mu_t$$
(32)

Where; γ_o is a constant and μ_t is a well-behaved error term. This equation gives the estimable price level equation.

(B)   Exchange Rate Equation

Under the purchasing power parity (PPP) condition and in tandem with the general equilibrium framework advanced by Keynes (1936), simultaneity exists between the price level equations and the exchange rate equation as given by:

$$e_t = \beta_o + p_t \tag{33}$$

e is the log of exchange rate; p is the log of price level.
Substituting equation (32) into (33) gives;

$$e_t = \beta_o + \beta_1 m^s + \beta_2 y_t + \beta_3 i_t + \beta_4 d_t + \nu_t \tag{34}$$

(C)   Interest Rate Equation

This follows the Taylor's rule where the interest rate is said to respond to economic fundamentals in order to 'beat the random walk model' coupled with the feature of improved forecasting ability (Li, 2010). According to the Taylor's rule, the interest rate is determined by economic growth (y), inflation rate (π) and one-lag interest rate (i_{t-1}). Hence, we set the interest rate as a linear function of economic variables:

$$i_t = \alpha_o + \alpha_t y_t + \alpha_\pi \pi_t + \alpha_{i1} i_{t-1} \tag{35}$$

2.   <u>External Sector Equation</u>

The external sector model is a product of the net export given as;
Since the $NX = EX - IM$ (36)
Recall from equation (3) above that; $NX = f(e, FD, Y)$ (37)
Therefore; $EX(e, FD) = z_1 + z_2 e + z_3 FD + \mu$ (38)
On the other hand, $IM(e, Y) = m_1 + m_2 e + m_3 Y + \mu$ (39)

Where; NX is the net export, EX is the total export, e is the nominal exchange rate, FD is the foreign demand, IM is import while Y is the value of gross domestic product.

3.   Underlining Assumptions
- Money supply and government spending are exogenously determined.
- Price level in the economy is both demand-side and supply-side phenomena.
- It is assumed that the parallel exchange rate is largely driven by the official exchange rate in Nigeria.
- The international oil prices determine significantly the level of economic activities (and by extension, price level) in the Nigeria economy.
- Exchange rate is ceded on the purchasing power parity (PPP) condition.
- The interest rate follows the Taylor's rule.
- CBN will continue to pursue managed tightening monetary policies
- Price of PMS will not increase further beyond the current N97 per litre.

4.   Major Macroeconomic Identities
Many macroeconomic identities are employed in this forecast. However, the major ones comprise:
$$Y = C + I + G + NX$$

$$NX = EX - IM$$

5. Macroeconomic Indicators for forecast

The indicators for employed for this macroeconomic forecast majorly include the output, interest rate, exchange rate and inflation.

6. Definition of Variables
6.1 Exogenous Variables

FD - Foreign Demand

M^s = Nominal nominal supply

T = Government tax revenue

P_{NT} = Price of Non-tradable goods

P_T = Price of tradable goods

P_{NTF} = Price of 'Non-tradable food' goods

P_{NTO} = Price of 'Non-tradable other' goods

m^s = real money supply

$\bar{g}$ = government expenditure

6.2 Endogenous Variables

e = nominal exchange rate.

π = the rate of inflation

p = consumer price index

IM = import

EX = Export

NX = Net Export

m^d = real money demand

6.3 Parameters

ϑ_o = level of output net of the determinants of real gross output.

ϑ_1 = contribution of government tax revenue on the real gross output.

ϑ_2 = coefficient for the effect of interest rate on real gross output.

ϑ_3 = contribution of government spending to national output.

ϑ_4 = impact of net capital inflow on gross domestic product

ϑ_5 = effect of world output on gross domestic product

ϑ_6 = contribution of money supply on output

b_1 = the impact of interest rate on monetary liabilities

b_2 = impact of output on monetary liabilities

b_3 = effect of inflationary tendencies on monetary liabilities.

$\gamma_1 =$ the effect of money supply on general price level of the economy.

$\gamma_2 =$ effect of real gross output on consumer price index

$\gamma_3 =$ effect of the nominal interest rate on the general price level

$\gamma_4 =$ exchange rate effect on the general price level

$\gamma_5 =$ impact of the international oil price on the general price level

$\beta_1 =$ impact of money supply on the nominal exchange rate

$\beta_2 =$ the effect of the real gross income on the nominal exchange rate.

$\beta_3 =$ effect of the interest rate movement on the rate of exchange

$\beta_4 =$ the oil price effect on the nominal exchange rate

$\alpha_t =$ the impact of output on the rate of interest

$\alpha_\pi =$ the impact of inflation on the rate of interest

$\alpha_{i1} =$ the effect of previous rate of interest on the current period

7.   Simplification of the IS-BP Equation in Nominal Terms

From equation (7);

$$Y = \lambda_o + \lambda_1 Y^d + \lambda_2 i + \lambda_3 Y + \lambda_4 \bar{g} + \lambda_5 e + \lambda_6 FD + \lambda_7 Y + \mu$$

Since; $Y^d = Y - T$ and substituting appropriately yields;

$$Y = \lambda_o + \lambda_1 (Y - T) + \lambda_2 i + \lambda_3 Y + \lambda_4 \bar{g} + \lambda_5 e + \lambda_6 FD + \lambda_7 Y + \mu$$

With further expansion;

$$Y = \lambda_o + \lambda_1 Y - \lambda_1 T + \lambda_2 i + \lambda_3 Y + \lambda_4 \bar{g} + \lambda_5 e + \lambda_6 FD + \lambda_7 Y + \mu$$

Solving for Y;

$$Y - \lambda_1 Y - \lambda_3 Y - \lambda_7 Y = \lambda_o - \lambda_1 T + \lambda_2 i + \lambda_4 \bar{g} + \lambda_5 e + \lambda_6 FD + \mu$$

Factoring out Y;

$$Y(1 - \lambda_1 - \lambda_3 - \lambda_7) = \lambda_o - \lambda_1 T + \lambda_2 i + \lambda_4 \bar{g} + \lambda_5 e + \lambda_6 FD + \mu$$

Completing the factorization;

$$Y = \frac{\lambda_o - \lambda_1 T + \lambda_2 i + \lambda_4 \bar{g} + \lambda_5 e + \lambda_6 FD + \mu}{(1 - \lambda_1 - \lambda_3 - \lambda_7)}$$

Further deflating both sides by the price level yields;

$$y = \delta_o + \delta_1 T + \delta_2 i + \delta_3 \bar{g} + \delta_4 e + \delta_5 fd + \delta_6 \pi + \mu$$

8.   Derivation of the IS-LM-BP Model

From equation (14); we have:

$$m = b_o + b_1 i + b_2 y + b_3 \pi$$

Simplifying for π;

$$b_3 \pi = m - b_o - b_1 i - b_2 y$$

$$\pi = \frac{1}{b_3}(m - b_o - b_1 i - b_2 y)$$

Substituting for π into the IS-BP model of equation (8) gives;

$$y = \delta_o + \delta_1 T + \delta_2 i + \delta_3 g + \delta_4 e + \delta_5 fd + \delta_6 [\frac{1}{b_3}(m - b_o - b_1 i - b_2 y)]$$

Where; $\theta_7 = \delta_6(\frac{1}{b_3}); \theta_1 = \delta_6(b_1); \theta_2 = \delta_6(b_2)$ and substituting appropriately gives;

$$y = \delta_o + \delta_1 T + \delta_2 i + \delta_3 g + \delta_4 e + \delta_5 fd + \theta_6 m - \theta_1 i - \theta_2 y$$

Factoring out y and i yields;

$$y(1 + \theta_2) = \delta_o + \delta_1 T + \delta_3 g + \delta_4 e + \delta_5 fd + \theta_6 m + i(\delta_2 - \theta_1)$$

Letting, $(\delta_2 - \theta_1) = \Psi_2$ and substituting appropriately;

$$y(1 + \theta_2) = \delta_o + \delta_1 T + \delta_3 g + \delta_4 e + \delta_5 fd + \theta_6 m + i\Psi_2$$

Solving for y gives;

$$y = \frac{\delta_o + \delta_1 T + i\Psi_2 + \delta_3 g + \delta_4 e + \delta_5 fd + \theta_6 m}{(1 + \theta_2)}$$

$$y = \vartheta_o + \vartheta_1 T + \vartheta_2 i + \vartheta_3 g + \vartheta_4 e + \vartheta_5 fd + \vartheta_6 m + \mu$$

9. Definition of Reduced Form Parameters

$$\theta_7 = \delta_6(\frac{1}{b_3}); \theta_1 = \delta_6(b_1); \theta_2 = \delta_6(b_2)$$

$$(\delta_2 - \theta_1) = \Psi_2$$

$$\vartheta_o = \frac{\delta_o}{(1 + \theta_2)}; \vartheta_1 = \frac{\delta_1}{(1 + \theta_2)}; \vartheta_2 = \frac{\Psi_2}{(1 + \theta_2)}; \vartheta_3 = \frac{\delta_3}{(1 + \theta_2)}; \vartheta_4 = \frac{\delta_4}{(1 + \theta_2)};$$

$$\vartheta_5 = \frac{\delta_5}{(1 + \theta_2)}; \vartheta_6 = \frac{\delta_6}{(1 + \theta_2)}; \vartheta_7 = \frac{\delta_7}{(1 + \theta_2)}$$

$$\delta_o = \frac{\lambda_o}{(1 - \lambda_1 - \lambda_3 - \lambda_7)}; \delta_1 = \frac{\lambda_1}{(1 - \lambda_1 - \lambda_3 - \lambda_7)}; \delta_2 = \frac{\lambda_2}{(1 - \lambda_1 - \lambda_3 - \lambda_7)};$$

$$\delta_3 = \frac{\lambda_4}{(1 - \lambda_1 - \lambda_3 - \lambda_7)}; \delta_4 = \frac{\lambda_5}{(1 - \lambda_1 - \lambda_3 - \lambda_7)}; \delta_5 = \frac{\lambda_6}{(1 - \lambda_1 - \lambda_3 - \lambda_7)}$$