Modelling Non – Oil Exports and Foreign Reserves in Nigeria

Chukwunonso S. Ekesiobi   Anne C. Maduka   Ifeoma C. Onwuteaka   Obiageli G. Akamobi
Department of Economics, Chukwuemeka Odumegwu Ojukwu University, Anambra State, Nigeria

Abstract
This paper empirical investigates the relationship between the non-oil exports and foreign reserves in Nigeria. The estimation technique follows through the ordinary least squares (OLS), unit root tests, cointegration tests and ends with an error correction framework. The empirical results show that there exists a long run relationship between the variables under study. The results also found evidence of stability of both long run and short run foreign reserves during the investigated period. Although, a positive relationship exists between the non – oil exports and foreign reserves, this relationship is weak in Nigeria. This means that non – oil exports plays no significant part in determining the level of foreign reserves in Nigeria. However, findings show a strong positive relationship between oil exports and foreign reserves in Nigeria. This implies that oil exports remain the major determinant of foreign reserves in Nigeria, making the economy vulnerable to oil market shocks. Based on these findings, the study therefore recommends an economic revamp of the decaying non-oil sector of the economy through a committed diversification policy.
Keywords: Non-oil Exports, Oil Exports, Foreign Reserves, Economic Growth

1. Introduction
Trade is touted as an outlet that lubricates the production engine and promotes economic growth of a country. The role of trade in promoting industrialization and economic growth cannot be overemphasised. This is because, foreign trade provides impetus for industrial development by enlarging market frontiers for domestic industrial output (exports), thus leading to increased investment, employment, output, and income. Also, foreign trade expands production possibility frontiers and broadens the consumption basket of the people in the participating countries, thereby improving their welfare (Adewuyi and Adeoye, 2008).

Exportation is required by any economy to enhance revenue and usher in economic growth and development and this has informed the idea of export – led growth. According to Abou – Strait (2005), export is a catalyst necessary for the overall development of an economy. This increases the earnings of the country, thereby creating an avenue for growth by raising the national income of the country. It also increases the level of employment in the economy as higher demand for exports requires more production which in turn leads to employment of more people. Exportation also helps a country attain a favourable balance of trade and balance of payment position provided exports reasonably exceed imports.

In a country like Nigeria that is in dire need of investment, foreign capital is very much needed in order to accelerate the rate of economic growth (Adesoji and Sotubo, 2013). However, the feature of Nigeria's external sector has remained basically unchanged for long periods. The external sector is characterized by the dominance of a single export commodity - crude oil. Prior to the 1970s, Nigeria's exports were predominantly non – oil commodities with agricultural commodities accounting for the largest share. With the price appreciation of crude oil in the international market, it became the major export commodity and the major source of foreign exchange and reserves in Nigeria. Table 1.1 shows the dominance of oil export over non-oil export, with percentage share of non-oil remaining below 10%.

Table 1.1: Nigeria Oil and Non-Oil Exports

Year	Oil Export (N' Billion)	Non-Oil Export (N' Billion)	Total (N' Billion)	% Non-Oil Share
2001	1,839.9	28.0	1,868.0	1.49
2002	1,649.4	94.7	1,744.2	5.42
2003	2,993.1	94.8	3,087.9	3.07
2004	4,489.5	113.3	4,602.8	2.46
2005	7,140.6	106.0	7,246.5	1.46
2006	7,191.1	133.6	7,324.7	1.82
2007	8,110.5	199.3	8,309.8	2.39
2008	9,861.8	525.9	10,387.7	5.06
2009	8,105.5	500.9	8,606.3	5.82
2010	11,300.5	711.0	12,011.5	5.91
2011	14,323.2	913.5	15,236.7	5.99
2012	14,260.0	879.3	15,139.3	5.80
2013	14,131.8	1,130.2	15,262.0	7.40
2014	12,007.0	953.5	12,960.5	7.35

Source: CBN Statistical Bulletin, 2014

Foreign reserves are foreign currency deposits of central banks or other monetary authorities; they are assets of central banks held in different reserves currencies such as the dollar, pound sterling, euro and yen (IMF, 2009). These reserve currencies are used to back central bank's liabilities such as the local currency issued, the reserve deposits of various Deposits Money Banks (DMBs), government or other financial institutions. Foreign reserves are used to support monetary and foreign exchange policies in order to meet the objectives of safeguarding currency stability and the normal functioning of both domestic and the external payment systems.

Originally, foreign reserves were held in gold, but with the advent of the Bretton Wood system, the US dollar was pegged to gold and the gold standard was abandoned. Hence, the dollar appearing as good as gold became fiat and the most significant reserves currency. However, in today's world, large foreign reserves partly symbolizes the country's strength as it indicates the strong backing the currency of the country has in terms of wealth accumulation. Hence, it attracts the confidence of the international community to the country while low foreign reserves elicit the opposite response.

There has been a general consensus among economic researchers that exportation is one of the major generators of foreign reserves for a country. In a resource – based economy such as those dependent on oil, exports are usually of two categories – oil exports and non – oil exports, with the source of foreign reserves usually skewed in favour of oil exports. While the oil exports constitutes over 90 percent of the foreign reserves in Nigeria, economists hold that non – oil export has little or nothing to be desired in terms of generating foreign reserves (Onwe, 2013). This explains why in the recent times, the major policy concern of the Federal government focused on the expansion of non – oil exports in a bid to diversify the Nigeria's export and revenue base. This diversification became necessary for some crucial reasons. Firstly, the fact that crude oil is an exhaustible asset makes it unreliable for sustainable development of the Nigeria economy. Secondly, the volatility of the international oil market with the attendant volatility of foreign reserves lends credence to arguments for the diversification of the Nigeria's export base (Onwe, 2013).

Despite policy efforts by the federal government at revitalising the non – oil sector to boost foreign exchange earnings through diversification of the economy, available data shows a worsening scenario. Foreign exchange reserves in Nigeria averaged $10.29 billion from 1960 until 2016, reaching an all time high of $62.08 billion in September of 2008. However, with the global drop in crude oil prices, Nigeria's foreign exchange reserves decreased to $27.8 billion in February 2016 from $28.2 billion in January 2016, according to the Central Bank of Nigeria. This raises questions on whether there is a significant link between the non – oil export sector and foreign reserves in Nigeria and also lends credence to the relevance of this paper. Thus, estimations based on a suitable model of reserves is used to analyse the existence or otherwise of a significant link between non – oil exports and foreign reserves with a view to proffering policy recommendations. The logical point of entry is to investigate the nature of the interaction between variables of interest to determine the short run and long run relationships between non – oil exports and foreign reserves in Nigeria.

For clarity sake, this paper is divided into five (5) sections, section 1 has the introduction. The next section which is section 2 has the literature review. Section 3 outlines the methodology and, section 4 has the empirical results and discussion. Finally, section 5 concludes the study.

2. Literature Review

Export trade is an instrument for growth. It increases foreign exchange earnings, improves balance of payment position, creates employment and develops export oriented industries in the manufacturing sector it also improves government revenue through taxes, levies and tariffs. These benefits will in turn enhance the process of growth and development in such economy. However, before these benefits can be fully realized, the structure and direction of these exports must be carefully tailored, such that the economy will not depend on only one sector for the supply of needed foreign exchange (Onayemi & Akintoye, 2009).

Abebefe (1995) noted that Nigeria's dependence on crude oil is dangerous for two reasons. Crude oil is a wasting asset with a proven reserve which would eventually become depleted and secondly, that the vagaries of the oil market can result in a significant decline in the earnings because of the exogenously determined price of crude oil.

Osuntogun, Edordu and Oramah (1997), studied the potentials for diversifying Nigeria's non-oil export to non-traditional markets and found that Nigeria could not fully utilize her potentials because the implementation of export promotion policies followed key market concentration strategy i.e. concentration on developed countries like Europe or USA, thereby resulting in less attention to gathering trade facilitating information that may further diversify Nigeria's export market to less developed countries such as the countries in Sub-Saharan Africa. This intra-regional trade, if conducted, will require lower transportation costs and enhance the competitiveness of commodities traded and ensure market clearing of export commodities thereby reducing such problems faced by exports to developed countries.

Lyakurwa (1991) also posited that export diversification is important because it will play an important role in reducing the variability of the export earnings of developing countries and raising the growth rates of both

exports and domestic output. However, the composition of a diversifying country's exports has to match the import structure of the target countries.

Osuntogun, Edordu, and Oramah (1997) discovered that the core of the export-led strategy is the diversification of export products and export markets to minimize risks and ensure a more stable and sustainable current account position. Lewis (1980) also found that diversification of exports will help countries achieve and maintain a high level of economic growth. Opara (2010) posited that exports are the bed-rock of any economic development which is meaningfully centred on non-oil export in most countries of the world. Adding that promoting non-oil export will bring about a reduction of a nation's level of dependence on crude oil or what the study describes as, "monocultural foreign trade product".

Heller (1966) estimated the optimal stock of reserves by equating the marginal cost and marginal benefit of holding reserves following rational optimizing decision. The study compares actual reserves with results for each country to check for the adequacy of reserves. Frenkel and Jovanovic (1981) determined the actual optimal stock of reserves using a modified Heller's model based on the principles of inventory management. Employing pooled time series for the period 1971-1975 for twenty two countries, they concluded that the estimated elasticities were close to their theoretical predictions.

In their study, Flood and Marion (2002) confirmed the applicability of the buffer stock model in the modern regime of floating exchange rate as it was during the Bretton Woods era. They submitted that with greater exchange rate flexibility and financial openness, the model will perform better if these variables were well represented. Disyatat and Mathieson (2001) adopted Frenkel and Jovanovic model for fifteen countries in Asia and Latin America and found that the volatility of the exchange rate is an important determinant of reserves accumulation and that the financial crisis of the late 1990s produced no structural breaks.

Abdullateef and Waheed (2010) investigated the impact of change in external reserve positions of Nigeria on domestic investment, inflation rate and exchange rate. Using a combination of ordinary least square (OLS) and vector error correction (VEC) methods, the study observed that change in external reserves in the country only influences foreign direct investment (FDI) and exchange rates and no influence of it was found on domestic investment and inflation rates.

Charles-Anyaogu (2012) analyzed time series data on external reserves and macroeconomic variables in Nigeria. The study employed econometric tools of VAR and Wald tests which pointed that past values of gross domestic product were significant in explaining the current values of foreign reserves. The model revealed that external reserve was statistically significant in the current year but statistically insignificant in previous years; while among the macroeconomic variables only inflation was significant to external reserves while trade balance and exchange rate where insignificant.

Osigwe, Okechukwu and Onoja (2015) modelled the determinants of Foreign Reserves in Nigeria. Using the Johansen cointegration approach established a long run relationship among the determinant variables. The results of the study indicated that real gross domestic product and oil exports are positive and significant determinants of foreign reserve in Nigeria. Exchange rate was found to be a significant but negative determinant while foreign direct inflows positively and significantly determined foreign reserve. Lending rate was discovered to be negative and insignificant as well as the coefficient of inflation rate. However, the coefficient of non-oil exports, though positive, was not significant a determinant of foreign reserve.

3. Methodology
3.1. Model Specification
The empirical analysis of this research is based on the augmented buffer stock model of Frenkel and Jovanovic as established and adopted in the empirical review. For a developing country like Nigeria, there is need to extend the models of similar studies (like Abdullateef and Waheed (2010); Irefin and Yaaba, (2012) and Osigwe, Okechukwu and Onoja (2015) to incorporate some other variables that are peculiar in the determination of reserves holdings. Since the study is set to analyse the relationship between the non – oil exports and foreign reserves in Nigeria, variables such as gross domestic products (GDP), oil exports (OE), non – oil exports (NOE), exchange rates (EXR), imports (IMP), and external debts (EXD) are included in the estimating model equation. Thus, the equation becomes:

$logFR = \beta_0 + \beta_1 logGDP + \beta_2 logOE + \beta_3 logNOE + \beta_4 EXR + \beta_5 logIMP + \beta_6 logEXD + \mu$ ------------------ (3.1)

Where FR = foreign reserves, GDP = gross domestic products, OE = oil exports, NOE = non – oil exports, EXR = exchange rates, IMP = imports, EXD = external debts.

Log = logarithm. β_0 = intercept term. $\beta_1 – \beta_6$ = parameters. μ = stochastic error term.

3.2. Apriori Expectation: $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 >< 0, \beta_5 < 0, \beta_6 < 0$.

The apriori signs of the coefficients of the gross domestic products (GDP), oil exports (OE), and non – oil exports (NOE), (β_1, β_2 and β_3) are expected to be positive while that of imports (IMP) and external debts (EXD), (β_5 and β_6) are expected to be negative. However, the apriori sign for the coefficient of exchange rates (EXR),

(β_4) can be either positive or negative. EXR is believed to show a positive sign when there is exchange depreciation while it is negative when there is exchange appreciation. This is because, economic theory believe that exchange depreciation will increase exportation which, in turn increases the foreign exchange earnings. However, the reverse is the case when there is exchange appreciation.

3.3 Data Source
Annual time series data were utilized to investigate the relationship between the non – oil exports and foreign reserves in Nigeria. All the data patterning to the chosen variables were obtained from the CBN statistical bulletin over the period 1982 – 2014. The sample size is large and is less likely to give an unbiased result. A sample size is considered to be large provided that it is greater than or equals 30 observations (ie n $\geq$ 30). In this paper, the sample size is 33 observations (i.e 33 years).

3.4 Estimation Techniques
The paper employs the Ordinary Least Sqaures (OLS), cointegration and error correction techniques. These methods are believed to overcome the problem of spurious regression while at the same time provide consistent and good estimates of both long run and short run elasticities that satisfy the properties of the classical regression method, given the fact that all variables in the error correction model (ECM) are integrated of order zero, I (O). The techniques are also unique and preferred to the traditional adaptive expectation and partial Adjustment models because the latter are associated with the problems of spurious regression, inconsistent and indistinct short run and long run elasticity estimates.

The aim of the cointegration analysis is to establish long run equilibrium relationship between variables. In the Engle-Granger cointegration analysis, variables of consideration are said to be cointegrated if in the regression of one variable on the others, their residuals as the proxy for their combination are integrated less than original variable. For instance, if the variables are integrated of order one, I(1), then, their residuals should be integrated of order zero, I(O). Such as the residuals are stationary; I(O). Alternatively, cointegration exists among the variables if they are integrated of the same level. The implication of this analysis is that deviation or drift may occur between the variables, but this is temporary as equilibrium holds in the long run for them.

The error correction model (ECM) represent an alternative way of presenting long run equilibrium relationship between variables. It shows the dynamic error analysis of the cointegrated variables. As such, in this paper, the first step to the ECM analysis is the estimation of the static foreign reserves function given by equation (3.1). Upon rejection of the null hypothesis of no cointegration, the lagged residuals from the cointegration equation are imposed as the error correction term (ECT$_{t-1}$) in an error correction equation. This is given thus:

$\Delta logFR = \beta_0 + \beta_1 \Delta logGDP + \beta_2 \Delta logOE + \beta_3 \Delta logNOE + \beta_4 \Delta logEXR + \beta_5 \Delta logIMP + \beta_6 \Delta logEXD + ECT_{t-1} + U$ ---------------------- (3.2)

Where Δ is the difference operator, ECT$_{t-1}$ is the vector of stationary residuals from the cointegration equation (3.1), U is the error term.

All variables in equation (3.2) are I(0) or stationary, this implies that the t-ratio can now be applied to test for the significance of error correction term or any of the explanatory variables. The error correction term in the equation represents the speed of adjustment from one period to another. If it is significant carrying with it a negative sign and that all other variables in equation (3.2) are jointly significant, then the variables jointly are said to have significant effect on the dependent variable.

4. Empirical results and discussion
4.1 Unit Root Test
Table 4.1 presents the results for Foreign Reserves (FR), Gross Domestic Products (GDP), Oil Exports (OE), Non-oil Exports (NOE), Exchange Rates (EXR), Imports (IMP), and External Debts (EXD). The tests were carried out on levels and first differences of all variables and were performed by including both a constant and a deterministic trend in the regression.

Table 4.1: Unit Root Tests

Variable	ADF Statistics	Order Of Integration
FR	-3.724201*	I(1)
GDP	-4.375796**	I(1)
OE	-5.053066**	I(1)
NOE	-6.008060**	I(1)
EXR	-5.253427**	I(1)
IMP	-6.374882**	I(1)
EXD	-3.910250*	I(1)

Note: **(*) = significant at 1%(5%) level.

Source: Author's Computation from Eviews 8.

The results in table 4.1 shows that the hypothesis of non-stationarity is rejected for GDP, OE, NOE, EXR, and IMP at 1% level of significance while it is rejected for FR and EXD at 5% level of significance. This shows that all the variables are integrated of the same order, I(1). It then portends the possibility of a longrun relationship between variables under consideration.

4.2 Cointegration Analysis

The primary objective here is to test for the cointegration of variables whose order of integration were determined in sub-section 4.1. If cointegration of these variables is confirmed, it portends that a non-spurious long run relationship exist. When this is combined with the error correction model (ECM), consistent estimates of both long run and short run elasticities is evident.

For cointegration analysis, the Engel & Granger (1987) residual – based procedure was employed. However, the residual – based test is suitable for a single equation, hence it is called single – equation approach, the Johansen reduced rank approach is a system approach in that it tests for the existence of more than one cointegrating equations. The Engel & Granger (1987) approach is applied in this paper. This approach posits that, if variables of interest are integrated of order one, I(1), then there residual is integrated of order zero, I(0).

Having found that variables of interest are all integrated of order one, I(1), we then proceed to the second stage of estimating the cointegration equation for foreign reserves. The results are given in table 4.2. The results of the ADF statistic for the residual shows that it is integrated of order zero, I(0) and therefore, rejects the null hypothesis of no cointegration (at 1% level) between foreign reserves and the chosen explanatory variables. This implies that there exists a stable longrun equilibrium relationship between the series.

Table 4.2: Longrun Regression Results

Dependent Variable: logFR

Constant	logGDP	logOE	logNOE	logEXR	logIMP	logEXD
6.763	0.552	0.542*	0.251	0.514	-0.328	-0.478**
(0.2227)	(0.5519)	(0.0228)	(0.2748)	(0.5117)	(0.2904)	(0.0001)

Note: figures in () are the p-values. *(**) = significant at 5%(1%) level.

R^2 = 0.907, Adj R^2 = 0.886, F-value = 42.248, prob.(F-value) = 0.000000

DW = 1.603, Residual ADF = -5.904128, prob.(Residual ADF) = 0.0002

Source: Author's Computation from Eviews 8.

A close inspection of table 4.2 shows that the model has a high coefficient of determination. This can be seen from the R-squared of about 91 percent and the Adjusted R-squared of about 89 percent. This shows that the data is well fitted on the model, and the fitness of every regression results is based on its R-squared. The estimated coefficients of logGDP, logOE, logNOE, logIMP and logEXD all conform to apriori expectations. However, the significant variables are oil exports and external debts which are significant at 5% and 1% levels of significance respectively. The coefficeint of oil exports 0.542 suggests that oil exports remains the major determinant of foreign reserves in Nigeria. The coefficent of non-oil exports 0.251 has the expected sign but did not pass the statistical significance test. Thus, there is a weak positive relationship between foreign reserves and the non-oil exports in Nigeria. This implies that the non-oil exports play no significant part in determining the level of foreign reserves in Nigeria. Also, to be noted is the coefficient of the exchange rates which is positive but not significant. However, the positive relationship between foreign reserves and the exchange rates is an evidence of exchange depreciation. The overall significance of the explanatory variables which is explained by the F-value is that they jointly explain variations in the dependent variable (foreign reserves). Finally, the value of Durbin-Watson (1.6) shows that our model is free from the problem of serial dependence or autocorrelation. This means that the model can be reliable for making inferences.

4.3. Error Correction Model (ECM)

Following the estimation of the longrun relationship between foreign reserves and the explanatory variables, the results of the error correction model are reported in table 4.3. Here, the model was regressed on the first difference of all variables plus the lagged value of the error term. The coefficient 0.991 of the error term is statistically significant at 1% level with the expected negative sign. A significant error term with the right sign indicates a strong feedback effect of deviation of foreign reserves from its longrun growth path. The value of the coefficient of the error term measures the speed of adjustment from one period to another. Thus, we can say that about 99 percent of the discrepancies between the actual and the equilibrium value of foreign reserves is corrected in each period for Nigeria.

Table 4.3: Error Correction Regression

Dependent Variable: ΔlogFR

Constant	ΔlogGDP	ΔlogOE	ΔlogNOE	ΔlogEXR	ΔlogIMP	ΔlogEXD	ECT(-1)
-0.057	0.664	0.780**	0.167	2.118*	-0.648*	-0.602**	-0.991**
(0.6401)	(0.3697)	(0.0047)	(0.4001)	(0.0344)	(0.0509)	(0.0008)	(0.0000)

Note: figures in () are the p-values. **(*) = significant at 1%(5%) level.

R^2 = 0.693, Adj R^2 = 0.604, F-value = 7.747, prob.(F-value) = 0.000064, DW = 1.73

Source: Author's Computation from Eviews 8.

5. Conclusion

This paper is an empirical investigation of the relationship between the non – oil exports and foreign reserves with evidence from Nigeria during the period 1982 – 2014. Upon the need to draw a clear line on the link between non – oil exports and foreign reserves, the study estimated foreign reserves as a function of GDP, oil exports, non – oil exports, exchange rates, imports as well as the external debts. The empirical analysis began with the tests for unit roots, passed through cointegration tests and ended with an error correction frame. The empirical results showed that there exists a longrun relationship between the variables under study. The results also found evidence of stability in both longrun and shortrun foreign reserves during the investigated period.

More importantly, although a positive relationship exists between non – oil exports and foreign reserves in Nigeria, this relationship is very weak as the coefficient of non – oil export is not significant. This means that non – oil exports plays no part in determining the level of foreign reserves in Nigeria, little wonder the clamour for a renewed diversification effort. However, the results showed a strong positive relationship between oil exports and foreign reserves in Nigeria. This implies that oil export remains the major determinant of foreign reserves in Nigeria.

The implication of these findings from the stand point of policy is that there is an immediate need to fine-tune the decaying state of the non-oil sector of the economy through committed diversification of the economy. This is expected to effectively open other potential sectors with foreign exchange earning potential to guarantee the change the economy craves.

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