Can Non-Oil Incomes Outride Oil Incomes in Nigeria? Evidence from Autoregressive Integrated Moving Average

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Abstract

The study employed data from 1970 to 2014 to forecast government non-oil revenues and non-oil exports in Nigeria in an attempt to know the number of years it would take non-oil incomes to outpace the income from oil sources using Autoregressive Integrated Moving Average (ARIMA) Model. The results show that non-oil revenue of government will match the size of 2014 government oil revenue in 2023 (9 years), while it would take 466 years for non-oil exports to achieve the oil exports equivalence. However, it would take non-oil revenues and non-oil exports 14 years and 565 years respectively to achieve the 2011 historic highest oil incomes (oil revenues and oil exports) of 8,878.97 Billion Naira and 14,323.20 Billion Naira. Meanwhile, if non-oil revenue increases annually by 15 percent, using 2014 as base year, the target could be achieved in 2025 (11 years), but it would take non-oil exports annual increase of 18 percent to hit the target in 2030 (26 years). It is thus suggested that, while the current government revenue mobilization and strategies be maintained, the government efforts on export promotions vis-à-vis non-oil diversifications must be more than doubled in order to upturn the oil dependent Nigerian economy to non-oil economic base before the year 2050.

Keywords: Oil Revenues, Non-oil Revenues, Revenue Forecast Nigeria,

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1.0 Introduction

Nigeria is plagued with natural resource curse (Mehlum, Moene, and Torvik, 2006; Ross 1999) basically for its inability to translate the huge resources accrued to the economy through oil exploration over the last four decades to a sustainable development of all and sundry. Skepticism trails all attempt to sympathise with the country on its current economic recess, which is motivated by the dwindling crude oil revenues vis-à-vis global oil price crash. This is due to the fact that it has misused huge opportunities of its enormous oil proceedings. However, it is interesting to discover that while resource course is generally attributed to Dutch diseases in oil rich countries, the Nigeria case is much different. Its resource curse is motivated by waste and corruption, Sala-i-Martin and Subramanian (2008). The whole drama in the country could be summarized in a simple statement that 'only what is earned through hard work is well managed'. If the country put up half of the commitment dissipated over the past one year of economic recession, on the economic management of the past four decades, probably the country would be a proud member of the richest and highly developed countries of the world. It could be concluded that, the reality of recession is fueling the passion of the nation towards anti-corruption crusade and commitment to diversify the economy by providing alternatives to crude oil revenues and exports.

Nigeria has been identified as the world most oil dependent country in 2000 for receiving 99.6 percent of its export income from oil, Ross (2003). The World Bank in its 1999 report estimated Nigeria total earning from oil at about $300 billion over the preceding 25 years, and also received the equivalent amount in the next 12 years till 2011 through various oil and gas related activities. Some other estimates argued for $1 trillion total earnings in current dollars over the thirty-seven years. Nigeria astronomical increase in crude oil production enlist it among the sixteen largest world oil producers and eighth largest exporter. Most of the world largest producers ahead of Nigeria are not major crude oil exporters. Russia, USA, China, Canada and Norway produce more oil than Nigeria, but refine, process into gasoline and other petrochemicals for their domestic use and exports. Oil shocks have little effects on those economy for their logical avoidance of laying foundation on products whose prices are exogenously determined and volatile. Technically, their economies are shield through transformation of the inherent oil volatility, such that the prices of the new derived products could be determined within the domestic economies. In case of Nigeria, the huge deposit of gas and crude oil, estimated at about 184 trillion cubic feet (5^{th} largest gas reserve in the world) and 40 billion barrels respectively is a major illusion leading the country to abandon other sources of income, and more importantly lavish the proceeds through corruption and over dependent on the importation of finished products, including the refined or processed oil. Ideally, the natural blessings of the crude oil could have been utilized to speed up the economic development of the country through appropriate investments into the future vis-à-vis massive infrastructure, quality education and commitment to general wellbeing of the populace. More importantly, to have utilized the huge returns to diversify the economy into other sectors where the country holds comparative advantage over other countries.

It is important to underscore that Nigeria did not start out as the oil dependent economy. In the post independent, non-oil export dominated the sources of foreign exchange to the country, accounting for about 97.4% as against 2.6% oil export in 1960. As presented in fig. 1, it lost out to oil revenues as the exploration increases over the years. Meanwhile, the abandonment of other

sectors especially the agricultural sector which provided almost all the non-oil revenues in the 60s had worsen the case. However, despite the marginalization, the high potential characterizing the sector still remains and appears to be the cornerstone for economic resuscitation in the face of current recession and economic downturn. Government's ability to realize this potentials and work, as it does currently, to revitalize it and reposition it is fundamental to the country's reality of coming out of the trap of the crude oil shocks. To achieve this, government is promoting an increased production in the non-oil sector by creating a level-playing field for private-sector led activities, especially in the areas of agricultural productions and value chains to ensure adequate import substitutions for foreign imported products and prepare the country beyond exportation of raw agricultural products. It is believed that processing of raw farm outputs to semi-finished and finished products appears more stable to generate foreign exchange in a less volatile circumstances than a mere exportation of raw outputs. It is however worth of note that till date Nigeria is a leading player in the committee of countries in terms of key agricultural productions.

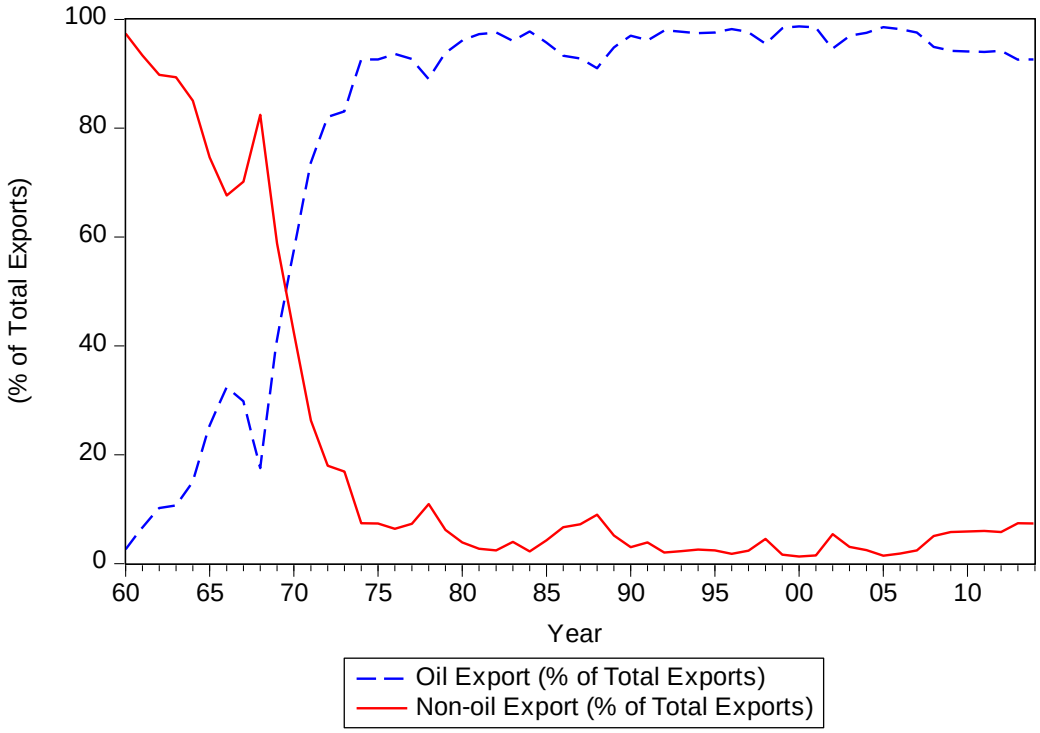


Fig 1: Trends of Oil and Non-Oil Exports (% of Total Exports)

Nigeria is the largest producer of cassava, cowpeas, kola nuts, yam and sorghum and is the second largest producer of cashew after Vietnam and second largest producer of millet and okra after India. More also, it is the third largest producer of palm oil after India and Malaysia and also the third largest producer of palm kernel after Indonesia and Malaysia. As it stands, the country is the fourth largest producer of cocoa beans after Cote d'Ivoire, Indonesia and Ghana and also the fourth largest producer of Ginger after India, China Mainland and Nepal, equally the fourth largest producer of groundnut after China Mainland, India and United States of America to mention but few products in which it holds leading world records. These outstanding performances in the key areas provide convincing premises to support a hope for realistic economic diversification into non-oil sources of income to the country. The potential is also

obvious in fig. 2, showing hundred percent government revenues through non-oil as against zero percent oil revenue in the first eight years of post-independent in 1960s, but shortly after the intervention of oil exploration, the oil revenues took over the trend and relegated non-oil revenues.

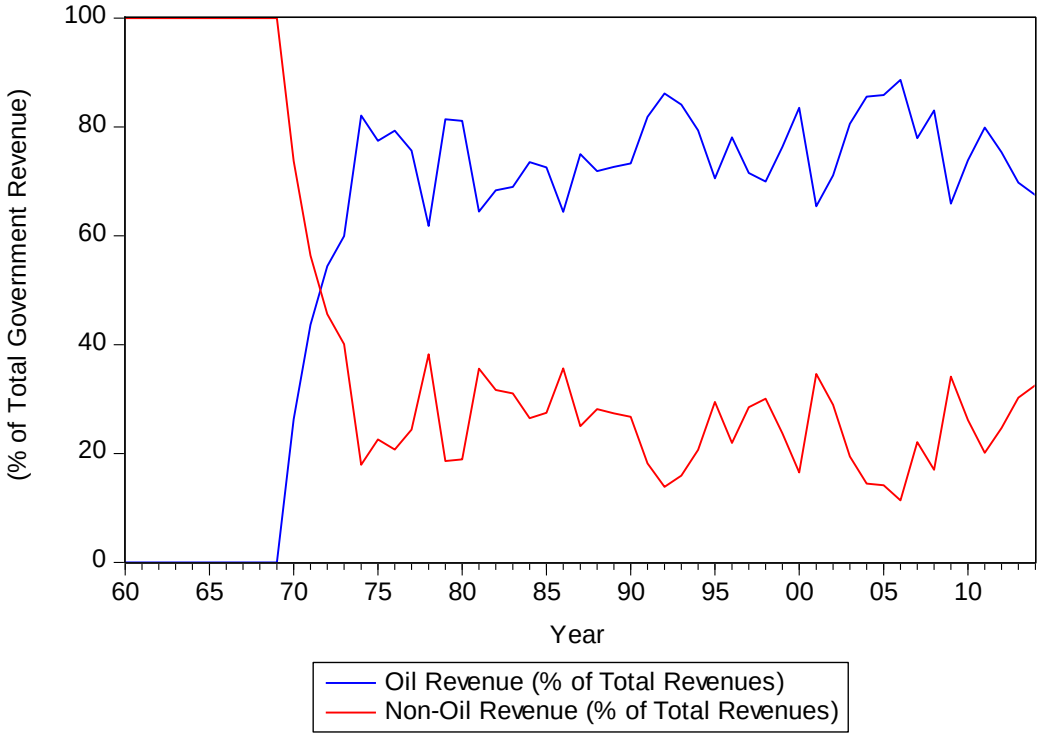


Fig 2: Trend of Oil and Non-Oil Revenue (% of Total Revenues)

Meanwhile, considering the potentials of non-oil sectors and positive disposition of government to economic diversifications, two key issues are fundamental to the reality of redeeming the economy from the current oil price shocks. First, the government commitments towards diversifications to non-oil activities as major sources of foreign incomes to cover up for the shortage of oil income is a long-run reality. Obviously, this questions the short-run possibilities of recovering from the economic recession. Secondly, how long will it take other sources of government revenues, such as boosting non-oil taxes within the economy and incomes from non-oil exports to augment the dwindled revenues from oil sources to meet up with the budgetary needs of the government in the short and medium term?

Table 1: Growth Rate of Oil and Non-Oil Revenues and Exports in Nigeria

	Average Annual Growth (%) in 5 Years				5 Years Growth Rate (%)			
Year	Oil Revenue	Non-Oil Revenue	Oil Export	Non-Oil Export	Oil Revenue	Non-Oil Revenue	Oil Export	Non-Oil Export
1971-1975	114.04	23.36	67.96	2.29	737.38	88.74	378.81	6.46
1976-1980	29.58	22.03	29.82	10.21	130.25	105.63	115.65	29.08
1981-1985	-0.11	12.16	-1.4	10.49	27.57	-12.69	5.09	45.01
1986-1990	58.83	48.02	79.95	69.29	786.44	483.96	1174.14	490.4
1991-1995	42.74	58.15	88.82	78.18	292.59	638.9	693.75	393.79
1996-2000	49.76	22.91	23.86	5.48	289.37	173.91	49.35	6.41
2001-2005	30.32	38.89	35.19	52.83	178.9	-13.1	288.09	278.3
2006-2010	11.94	23.54	11.34	55.27	2.05	181.55	57.15	432.21
2011-2014*	9.89	14.69	9.96	3.05	25.9	71.69	6.25	4.38

*four years period

The historical growth rate of oil revenues is astronomical over the years, starting with 114 percent annual average between 1971 and 1975 as presented in table 1. It reduced to annual average of about 30 percent over the following five years till 1980. The average growth rate was negative between 1981 and 1985 which was the period of global crash in the prices of primary products. it later picked up at an average growth of 58.83 percent till 1990. However, from 1996, the average annual growth rate declines progressively till date, settling at average annual growth rate of 9.89 percent between 2011 and 2014. Five-year growth rate of oil revenue was unprecedented between 1971 to 1975 with 737 percent increase, it reached climax between 1986 to 1990 with 786 percent increase. The five-year growth was lowest between 2006 and 2010 with 2 percent increase, settles at 25 percent between 2011 and 2014. Oil exports maintain relatively identical growth pattern, but grew far higher between 1986 and 1990 with 1174 percent and 693.75 percent between 1991 and 1995, but later suffered set back like oil revenue with five-year growth of just 6.25 percent between 2011 and 2014.

Non-oil revenue's five-year annual average growth was 23.36 percent between 1971-1975, it reduced gradually till1985 when it was 12.16 percent, later rose to 58.15 percent between 1991 and 1995, it then staggered around 22.91 percent in 2000, 38.89 percent in 2005 and fell gradually to 14.69 percent between 2011 and 2014. Five-year growth rate of non-oil revenue was 181 percent between 2006 and 2010, but declined to 71.69 percent. The non-oil export growth was relatively low over the period of 1971 till 1985 with the highest five-year average growth of 10.49. Thereafter, it garnered momentum with annual growth of 69.29 between 1986 and 1990 and 78.18 percent between 1991 and 1995, it fell sharply between 1996 and 2000 to 5.48 percent, but rose sharply to 52.83 and 55.27 in 2005 and 2010 respectively before it reduced to 15.92 percent between 2011 and 2014.

It is obvious, government efforts could only be fostered if a blue print on the require growth rate of the key variables are known, so as to enhance its decisions on the level of efforts and commitments expected before attaining any specified revenue and income target. More also the income targets should be time bound under various realistic scenarios. These are the key insights this paper attempt to provide.

The remainder of this study is organized as follows. While Section 2 reviews the literature, section 3 spells out the methodology to be adopted in this study. Section 4 estimates the model. Section 5 gives policy implications. The last section concludes.

2.0 Literature Reviews

Awe and Ajayi (2009) examined the effects of non-oil revenues on economic development in Nigeria and found significant long run relationships between agricultural activities and solid minerals on one hand and economic development on the other hand, thus suggest intensifying efforts towards expanded utilization of agricultural sector as a development drive. This is not far from the submission of Albassam (2015) in his studies of economic diversifications of Saudi Arabia, he argued that, economic diversification is fundamental to building sustainable economic growth, noting that any economy that is highly dependent on income from a natural resource is in danger of instability or even collapse if the price of such commodity decreases in the global market, the fundamental crises many oil dependent countries face in the recent time. The study however concluded that despite four decades of attempt by Saudi Arabia to diversify the economy, it remains heavily dependent on oil revenues. The same is confirmed in a related study by Devaux (2013) when he examined the member countries of Gulf Cooperation council (GCC) in which is confirmed that, all efforts towards economic diversifications from oil in GCC are not yielding significantly.

It is discovered that, economic diversification is not an option but a necessity for oil rich economies considering the widely circulated assumptions on the attributes of oil rich countries. Karl (2004) argued that countries dependent on oil as their major resource for development are characterized by corruption and exceptionally poor governance, a culture of rent seeking, often devastating economic, health, and environmental consequences at the local level, and high incidences of conflict and war. He further argued that, countries that depend on oil for their livelihood eventually become among the most economically troubled, the most authoritarian, and the most conflict-ridden in the world.

In support of Karl (2007), various studies appear to have substantiated the claims. Lopez-Murphy and Villafuerte (2010) analysed the average fiscal policy responses of oil producing countries (OPCs) to oil price cycle and found that OPCs worsened their non-oil primary balances substantially during the period of their studies. The countries were found to engage in increased primary spending. However, it was found that the trend was partially reversed when oil prices went down in 2009. They further argued that fiscal policy has been pro-cyclical and thus, exacerbated the fluctuations in economic activity. It was concluded that a small reduction in oil prices could lead to very large financing needs thereafter. Meanwhile, in an earlier studies, Barnnet and Ossowski (2002) argued that oil producing countries usually face challenges arising from the fact that, oil revenues are volatile and uncertain, as such suggested that non-oil balances should feature prominently in the formulation of fiscal policies, such that the gradual adjustment in line with non-oil balances would allow for accumulation of substantial financial assets over the periods of oil production and where necessary strategies should aim at breaking procyclical fiscal responses to volatile oil prices.

In examining the roles of institutions in the poor performance of oil revenues in the oil rich countries, Mehlum Moene and Torvik (2006) established that countries rich in natural resources

constitute both growth losers and growth winners, claim that the main reason for the diverging experiences is differences in the quality of institutions. It was concluded that more natural resources push aggregate income down when institutions are grabber friendly, while more resources raise income, when institutions are producer friendly. Meanwhile, in order to move the frontier of roles of institutions forward in oil revenue management, Eifert, Gelb, and Tallroth (2003) classified oil producing countries under various institutional settings and argued that mature democracies clearly have some advantages in managing oil revenues for the long term because of their ability to reach consensus, their educated and informed electorates, and a level of transparency that facilitates clear decisions on how to use the money earned over a long horizon. However, it was noted that even in those systems with institutions that were shaped well before oil revenues became large, cautious expenditure management has been a continuing struggle. It is therefore not surprising when Ross (2003) concluded that poor political institutions constitute the poor performances of oil rich Nigerian economy.

It is however interesting to realise that studies have shown that non-oil exports are responsible for industrial growth in Nigeria and not oil exports. Riman, Akpan, Offiong and Ojong (2013) examined the nexus between oil revenue, non-oil export and industrial output in Nigeria using vector autoregressive model. Their long run results show that oil revenue shocks and policy and regime shifts had negative impacts on industrial outputs and non-oil exports. The impulse response functions and variance decomposition analyses suggest that the major drivers of industrial development in Nigeria are non-oil exports and regime shifts.

Unfortunately, the non-oil export is shallow as argued in various studies. Okoh (2004) employed the vector error correction model in a bid to delineate the long run relationship between growth in nonoil exports, growth in import of capital inputs and global integration, which was proxied by the index of openness. The study showed that global integration though positive was not significant in explaining the behaviour of non-oil exports in the long run as well as in the short run. However, it was discovered that growth in import of capital inputs positively impacts on the growth of non-oil exports. It thus implies that the non-oil export of Nigeria is shallow and non-significant in the world trade. More also, Adenugba and Dipo (2013) in another study examines the performance of non-oil exports in Nigeria as well as the reason for existing pattern and level of performances using the operations of Nigeria's export promotion strategies to assess its effectiveness in diversifying the productive base of Nigeria from crude oil. The study reveals that non-oil exports performed below expectations, as such the economy is far from diversifying from crude oil export consequently, crude oil continues to be the single most important base of the economy.

In most instances when attempts are made to attract investment into the non-oil promotions, the impacts are usually not felt due to diversion to the volatile oil sector. This is evidenced in Olayiwola and Okodua (2013) who examines the contributions of foreign direct investment (FDI) to the performances of nonoil exports in Nigeria within the framework of the export-led growth hypothesis. It is evidenced that the bulk of FDI inflow into the country goes to the oil sector of the economy which further confirms shallow non-oil export base in the country.

3.0 Methodology

3.1 Autoregressive Integrated Moving Average (ARIMA) Mode

ARIMA is a single variable forecast model, but is highly sophisticated for the study such as the one under the study. It incorporates the historic characteristic of the data over a long period to predict the future values for the variable.

The forecasting tools that came to existence through the publication of Box and Jenkins (1978) are known as ARIMA. It suggests the analysis of the probabilistic or stochastic features of time series data independent of constructing single or simultaneous equation model. Through the use of ARIMA's model, each variable is able to be explained through its past or lagged values and resulting stochastic error term.

The model is an improvement on the Autoregressive Moving Average Model (ARMA) by allowing the incorporation of the differencing to allow Stationary of data before the application of the ARMA technique. The ARMA (p, q) could be specified as

$$Y_t = \theta + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \cdots + \alpha_p Y_{t-p} + \beta_0 u_t + \beta_1 u_{t-1} + \cdots + \beta_q u_{t-q} \ldots\ldots\ldots\ldots (1)$$

In its procedure, if we have to difference a time series data d times to make it Stationary and then apply the ARMA (p, q) model to it, the data is then a series of ARIMA (p, d, q). Specific with the use of ARIMA model is that the time series must be Stationary or Stationary at one or more difference.

Four steps are involved in the use of ARIMA model; identification, estimation diagnostic checking and forecasting. The identification involves the determination of the model specification parameters which are p, d and q. Autocorrelation function (ACF) and the Partial Autocorrelation function (PACF) are the principal tool in the identification process. The result of ACF and PACF are plotted against its lag length on correlogram for the identification.

ACF is defined as ratio of covariance at lag (say lag k) and the variance which could be denoted as $\rho_k = \frac{\tau_k}{\tau_0}$, ρ_k's value lies between -1 and +1 and has no unit attached because the covariance and variance, that is, the numerator and denominator are in the same units. The PACF on the other hand is defined as a measure of correlation between observations that are k time periods apart, when the correlation at the intermediate lags are controlled for. in other words, the influence of intervening variables is removed. The PAC is the correlation between Y_t and Y_{t-k}, after removing the effect of intermediate Y's.

Formal unit root test or visual observation of correlogram assist to detect if the data is stationary or not, if it is not stationary, the data is difference till the non-stationary disappears. Depending on the number of difference to achieve stationary, the value of p, d, q are then determined for the ARIMA model estimation. The estimated value is subjected to diagnostic check. The data fitness is achieved by collecting the residual of the estimation to verify whether the AC or PAC of residuals is statistically significant. If they are not significant, it can then be concluded that the residuals are purely random, supporting the fact that the ARIMA estimated is a correct fit for the

data. Otherwise, a more appropriate ARIMA specification is sought. Forecasting is conducted based on the fitted model.

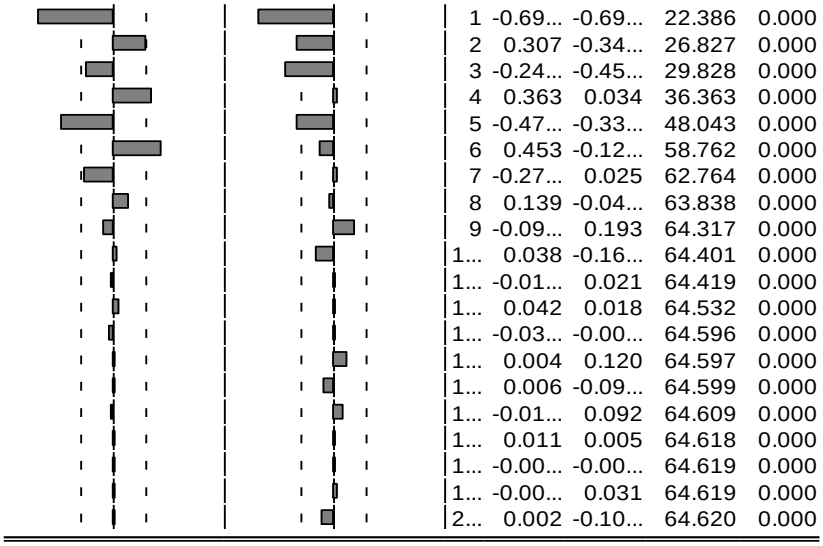
3.2 Data

Annual time series data on Oil Revenue (OR), Oil Exports (OEX), Nonoil Revenue (NOR) and Non-Oil Exports (NOEX) at current prices, over the period from 1970 to 2014 were collected from Central Bank of Nigeria's Statistical Bulletin, Volume 25, published in 2015.

3.3 The Specification

First step in ARIMA analysis is to identify specification, that is, ARIMA (p,d,q). p is the highest lag supported by AR term after the data has been de-trending, d is the level of differencing to remove the data trending, in order word the times of differencing to ensure data stationarity while q is the identified moving average. the correlogram of non-oil revenue (NOR) and non-oil Exports (NOEX) up to 16 lags presented in figure 3a and 3b ensure stationarity at second and first difference respectively. The stationarity is further ascertained through a formal Philip-Perror unit root test. It is observed through the figure that ACF and PACF at lag 1, 2, 3 and 5 are significant, while they are not jointly significant at any other lag value. Through PACF and ACF, it could be said that the process that generate the second difference non-oil revenue is at most 5, that is Autoregressive AR (5), thus the AR term at lag 1, 2, 3 and 5 shall be included in the model. The PACF and ACF for non-oil export (NOEX) are significant at 2, 3, 4, and 5, it could be said that the process that generate the first difference non-oil exports is at most 5, that is AR (5). To conclude step one of ARIMA modeling process, it is summarized that NOR series is ARIMA (5,2,0) and NOEX series is ARIMA (5, 1, 0).

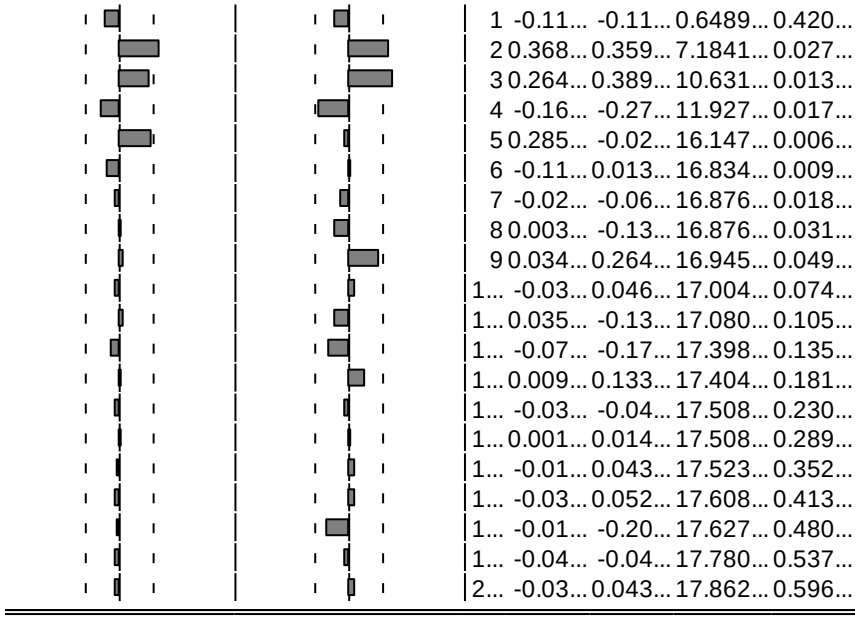
Date: 11/04/16 Time: 10:01
Sample: 1970 2014
Included observations: 43



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.69...	-0.69...	22.386	0.000
		2	0.307	-0.34...	26.827	0.000
		3	-0.24...	-0.45...	29.828	0.000
		4	0.363	0.034	36.363	0.000
		5	-0.47...	-0.33...	48.043	0.000
		6	0.453	-0.12...	58.762	0.000
		7	-0.27...	0.025	62.764	0.000
		8	0.139	-0.04...	63.838	0.000
		9	-0.09...	0.193	64.317	0.000
		1...	0.038	-0.16...	64.401	0.000
		1...	-0.01...	0.021	64.419	0.000
		1...	0.042	0.018	64.532	0.000
		1...	-0.03...	-0.00...	64.596	0.000
		1...	0.004	0.120	64.597	0.000
		1...	0.006	-0.09...	64.599	0.000
		1...	-0.01...	0.092	64.609	0.000
		1...	0.011	0.005	64.618	0.000
		1...	-0.00...	-0.00...	64.619	0.000
		1...	-0.00...	0.031	64.619	0.000
		2...	0.002	-0.10...	64.620	0.000

Figure 3a: Correlogram of Non-Oil Revenue

Date: 11/07/16 Time: 17:36
Sample: 1970 2014
Included observations: 44



Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1	-0.11...	-0.11...	0.6489...	0.420...
		2	0.368...	0.359...	7.1841...	0.027...
		3	0.264...	0.389...	10.631...	0.013...
		4	-0.16...	-0.27...	11.927...	0.017...
		5	0.285...	-0.02...	16.147...	0.006...
		6	-0.11...	0.013...	16.834...	0.009...
		7	-0.02...	-0.06...	16.876...	0.018...
		8	0.003...	-0.13...	16.876...	0.031...
		9	0.034...	0.264...	16.945...	0.049...
		1...	-0.03...	0.046...	17.004...	0.074...
		1...	0.035...	-0.13...	17.080...	0.105...
		1...	-0.07...	-0.17...	17.398...	0.135...
		1...	0.009...	0.133...	17.404...	0.181...
		1...	-0.03...	-0.04...	17.508...	0.230...
		1...	0.001...	0.014...	17.508...	0.289...
		1...	-0.01...	0.043...	17.523...	0.352...
		1...	-0.03...	0.052...	17.608...	0.413...
		1...	-0.01...	-0.20...	17.627...	0.480...
		1...	-0.04...	-0.04...	17.780...	0.537...
		2...	-0.03...	0.043...	17.862...	0.596...

Figure 3b: Correlogram of Non-Oil Exports

4.0 The Estimation

The second step in ARIMA process is estimation. Second difference and first difference data of non-oil revenue and non-oil exports data are estimated. If D2NOR represent second difference of NOR, while DNOEX represents first difference of NOEX. The models are specified as follows respectively;

$$D2NOR_t = \delta + \beta_1 D2NOR_{t-1} + \beta_2 D2NOR_{t-2} + \beta_3 D2NOR_{t-3} + \beta_4 D2NOR_{t-5} + u_t \quad (2a)$$

$$DNOEX_t = \delta + \beta_1 DNOEX_{t-2} + \beta_2 DNOEX_{t-3} + \beta_3 DNOEX_{t-4} + \beta_4 DNOEX_{t-5} + u_t \quad (2b)$$

Estimating parameters in eq. 2a and 2b through OLS produces eq.3a and 3b as follows;

$$D2NOR_t = 29.1 - 1.01 D2NOR_{t-1} - 0.71 D2NOR_{t-2} - 0.38 D2NOR_{t-3} - 0.17 D2NOR_{t-5} \quad (3a)$$

$$DNOEX_t = 10.8 + 0.6 DNOEX_{t-2} + 0.38 DNOEX_{t-3} - 0.59 DNOEX_{t-4} + 0.16 DNOEX_{t-5} \quad (3b)$$

Eq. 3a and 3b are the models that forecast second difference and first difference data of non-oil revenue and non-oil export data respectively.

4.1 The Diagnostic Checking

To perform diagnostic test, residuals are obtained from eq. 3a and 3b using correlogram to determine the fitness of the data, the ACF and PACF outputs are not individually statistically significane which means, the correlogram of both AC and PAC affirm the residuals from regression eq.3a and 3b are pure random noise, thus, the ARIMA models estimated are adequate.

4.2 The Forecasting Model

The final stage is forecasting. The process requires integrating the second and first difference equations to obtain the substantive equations of NOR and NOEX respectively. This produces;

$$NOR_t = 29.1 + 0.99NOR_{t-1} + 0.32NOR_{t-2} + 0.03D2NOR_{t-3} + 0.05NOR_{t-4} - 0.55NOR_{t-5} + 0.35NOR_{t-6} - 0.17NOR_{t-7} \quad (4a)$$

$$NOEX_t = 10.8 + NOEX_{t-1} + 0.6NOEX_{t-2} - 0.22NOEX_{t-3} - 0.96NOEX_{t-4} + 0.75NOEX_{t-5} - 0.16NOEX_{t-6} \quad (4b)$$

4.3 The Model Validation

The models in eq. (4) are validated for accuracy using the most recent original observed values. Five-year data range from 2010 to 2014 are used. As presented in table 2, the average percentage deviation between the forecast and actual values is 4.57% and 6.02% for non-oil revenue and non-oil export respectively.

Table 2: Non-Oil Revenue and Non-Oil Export ARIMA Models Validation

		Non-Oil Revenue		
			Deviation (Absolute)	
Year	***Forecast Values***	***Actual Values***	***Value of Deviation***	***Deviation (% of Actual)***
2010	1825.43	1907.58	82.15	4.31
2011	2332.45	2237.88	94.57	4.23
2012	2352.34	2628.78	276.44	10.52
2013	3046.97	2950.56	96.41	3.27
2014	3257.4	3275.12	17.72	0.54
		Non-Oil Export		
2010	713.5	711	2.5	0.35
2011	796.27	913.5	117.23	12.83
2012	858.86	879.3	20.44	2.32
2013	1157.27	1130.2	27.07	2.4
2014	1069.88	953.5	116.38	12.21

4.4 The Variable Forecast

The models forecast is conducted to ensure the number of years require for the non-oil income (revenues and exports) to attain the current size of oil income (oil revenues and oil exports). Table 3 presents non-oil revenue forecast under various scenario.

Table 3: Forecast of Non-Oil Revenues*

		Percentage Increases	
	The Forecast	Scenario 1 (10%/Annum)	Scenario 2 15%/Annum
Year	*Non-Oil Revenue (N'Billion)*	*Non-Oil Revenue (N'Billion)*	*Revenue (N'Billion)*
2014	3,275.12	3,275.12	3,275.12
2015	3,662.65	3,602.63	3,766.39
2016	4,026.71	3,962.90	4,331.35
2017	4,387.48	4,359.19	4,981.05
2018	4,785.45	4,795.10	5,728.21
2019	5,185.62	5,274.61	6,587.44
2020	5,576.66	5,802.08	7,575.55
2021	5,994.47	6,382.28	8,711.88
2022	6,420.50	7,020.51	10,018.67
2023	6,845.38	7,722.56	
2024	7,284.19	8,494.82	
2025	7,737.30	9,344.30	
2026	8,190.98		
2027	8,656.37		
2028	9,133.39		

* The forecast aims at identifying number of years required under various scenario to attain the value of Oil Revenue in 2014 and the higest value in Nigeria history which are, **6,793.72 Billion Naira** and **8,878.97 Billion Naira** in 2011 respectively

Table 3 shows that government will generate in 2023, the non-oil revenues equivalent to oil revenues size in 2014, if the historical trend is maintained, and will generate the amount equivalent to the highest oil revenues ever, which is 8,878.97 billion Naira by 2028. However, a consistent annual increase of 10 percent using 2014 as a base year would reduce the duration to 2022 and 2025 respectively. The period could be fast track if government's pace of revenue mobilization in the past five years is maintained, which is average of 14.69 percent annually between 2010 and 2014. As estimated, the 15 percent annual increase in the non-oil revenue mobilization will reduce the duration to 2020 and 2022 respectively and this could be achieved given the current government aggressive revenue mobilization from non-oil sources.

It is not out of content to recount the efforts of internal revenue mobilization agency who has been maintaining unprecedented increase in the non-oil revenue generation in the recent time. Recently, the chairman of the Federal Inland Revenue Service (FIRS), Babatunde Fowler argued

that 70 percent of the revenue shared among the three tiers of government in a month accrued from non-oil revenue sources. In his statement;

"it was the first time in 2016 that the federal government shared over 500 billion naira among the three tiers of government during the federal account allocation committee meeting. Of the sum, 70 percent came from non-oil sources, while only 30 percent came from oil sources. We are proud of the development and we tell ourselves that this is the time to fund the budget of the federal government from non-oil sources" Gazell News (2016)

The oil shocks on government revenues are likely to be short lived, and thereafter leave behind a strong, formidable and dependable income sources that could be insulated against the volatility that are associated with the oil revenue sources. However, a major limitation is that, most of the non-oil revenues currently being mobilized are domestic taxes and less are from non-oil exports. The implication is the persistent in the shortage of foreign exchange which could still aggravate free fall in the value of domestic currency (Naira).

The story is different when the forecast trends of non-oil exports are examined. Table 4 shows much longer periods than it appeared under the non-oil revenues of government.

Table 4: Forecast of Non-Oil Export*

		Percentage Increases			
	The Forecast	**Scenario 1 (10%/Annum)**	**Scenario 2 16%/Annum**	**Scenario 3 18% /Annum**	**Scenario 4 24%/Annum**
Year	***Non-Oil Export (N'Billion)***	***Non-Oil Exports (N'Billion)***	***Non-Oil Exports (N'Billion)***	***Non-Oil Exports (N'Billion)***	***Non-Oil Exports (N'Billion)***
2014	953.50	953.50	953.50	953.50	953.50
2015	1,015.75	1,048.85	1,106.06	1,125.13	1,191.88
2016	1,068.88	1,153.74	1,283.03	1,327.65	1,489.84
2017	897.28	1,269.11	1,488.31	1,566.63	1,862.31
2018	1,107.29	1,396.02	1,726.45	1,848.63	2,327.88
2019	971.07	1,535.62	2,002.68	2,181.38	2,909.85
2020	1,020.89	1,689.18	2,323.10	2,574.03	3,637.31
2021	1,139.18	1,858.10	2,694.80	3,037.35	4,546.64
2022	977.33	2,043.91	3,125.97	3,584.07	5,683.30
2023	1,191.09	2,248.30	3,626.12	4,229.21	7,104.13
2024	1,099.10	2,473.13	4,206.30	4,990.46	8,880.16
2025	1,114.60	2,720.45	4,879.31	5,888.75	11,100.20
2026	1,265.42	2,992.49	5,660.00	6,948.72	13,875.25
2027	1,099.23	3,291.74	6,565.60	8,199.49	
2028	1,294.04	3,620.92	7,616.10	9,675.40	
2029	1,239.01	3,983.01	8,834.67	11,416.97	
2030	1,216.98	4,381.31	10,248.22	13,472.02	
2032	1,226.27	5,301.38	13,790.01		
2042	1,489.76	13,750.42			
2480	12,014.43				
2579	14,376.29				

* The forecast aims at identifying number of years required under various scenario to attain the value of Oil Export in 2014 and the higest value in Nigeria history which are, **12,007 Billion Naira** and **14,323 Billion Naira** in 2011 respectively

As presented in table 4, it would take 466 years and 565 years for non-oil export values to equate the size of oil export values in 2014 and the historic highest oil export income in 2011 respectively. The long periods suggest two key attributes of the non-oil export activities. First,

the annual growth rate is low thus, retarding the pace of the forecast. For instance, non-oil exports income only increase by 4.38 percent in four years between 2011 and 2014. Secondly, the gap between the value of oil exports and non-oil exports is too wide, preventing ease of convergence. In 2014, non-oil export was 7.94 percent of oil exports, that is oil exports and non-oil exports values were 12,007 billion naira and 953.5 billion naira respectively. The non-oil export potential in the country is yet to be harnessed, it remains shallow and neglected. Adenugba and Dipo (2013) identified ineffective operations of Nigerian export promotion council (NEPC) as the key reason for the poor performance of non-oil exports. However, current economic recession is changing the course of export policies towards non-oil export promotions, as such, government attention is on the operations of all stakeholders in the non-oil sectors of the economy including the NEPC. The government efforts are yielding positively and are expected to yield more in the coming years. Thus, the forecast analysis is further projected under various scenarios.

An annual increase of 10 percent using 2014 as a base year would reduce the duration to 2042 and the period could be shortened to 2032 if the export promotional drive is enhanced to allow 16 percent annual increase. Meanwhile, 18 percent annual increase will further shorten the period to 2030, while 24 percent would make 2026 a real deal. The long run effects of promoting non-oil exports over the oil-exports may have higher multiplier effects. For instance, Abogan, Akinola and Baruwa (2014) provide evidences to justify the effectiveness of non-oil exports on the economy over the income through the oil exports.

5.0 Policy Implications

Oil income is dominant in Nigeria and obviously it has gained ground and serves as a monolithic means of revenue to the government and the main source of foreign exchange to the country. While there are evidences to support increasing government non-oil revenues, the income through non-oil exports still lag far behind. The current government non-oil revenue mobilization trend is promising, with high possibility of overtaking oil revenues within a few years. Currently, much of the federal revenues accrue through mobilization efforts of the federal inland revenue service in the non-oil sector, it is therefore, not surprising when the minister of finance acknowledged that about 70 percent of the monthly income shared by the federal account allocation committee in the recent months are through non-oil revenues. If the current pace is maintained, there is light at the end of tunnel for Nigerian government revenues.

However, unlike government revenues, the non-oil export requires strategic repositioning of the sector. At present, the gap between the oil exports and non-oil exports is too wide, staggering between 5 and 10 percent of total exports, while oil exports provide more than 90 percent of total exports of the country. Meanwhile, given the dwindle revenues, orchestrated by global crude oil price crash, the country is involving concerted efforts to diversify the economic base using non-oil export as strategy. To achieve this, Nigerian export promotion council developed road map for improving Nigeria's export trade, which is contained in the action plan for accelerated implementation of the Nigerian national export strategy document to map out the strategic milestone for the operation of the council.

One of the strategies is to diversify export base from raw materials to value added, thus be able to achieve $706m non-oil exports to the West African sub-region by 2017 and increase non-oil exports to ECOWAS from 9 per cent in 2014 to 20 per cent in 2017. Another target is to increase

non-oil export as percentage of total export from 5 per cent to 20 per cent by 2018; and also increase the participation of the small and medium enterprises in export trade by 50 per cent by 2020.

The proposed strategy is to building capacity for the micro, small and medium enterprises (MSMEs) through the government sponsored trainings, to instill international best practice in exportation. The joint efforts of all relevant agencies, ministries and parastatals are to be harnessed and provide common facilities for clusters of the MSMEs in terms of infrastructure, equipment for processing and packaging and transportation with conditioning facilities. The availability of the facilities is expected to reduce production cost to the minimum, thus allowing the locally made products to thrive in the international markets. Another critical strategy is the acquisition of indigenous shipping line to facilitate ease of trading within the African countries which is planned to be the immediate target of bulk of export promotion of Nigeria non-oil products.

NEPC identified key products to use as building blocks to the consolidation of its plan towards economic diversification, and also highlighted key countries and forecast the income expected to accrue as the proposed activities garners momentum. In a statement, the head of NEPC, explained;

> "NEPC identifies strategic products, sectors and 21 countries for Nigerian goods, to grow non-oil foreign exchange from $2.7bn today to $30bn. We have set clear output targets for products in agriculture, manufacturing, solid minerals and create clear mechanisms to get these non-oil products to our ports and into foreign markets". The Punch (2016)

The adequacy of the strategies and possibility of achieving the target is not in doubt, given high potentials of non-oil sector in agriculture and solid minerals. Agricultural products contribute about 39 % of total non-oil exports, while the semi-manufactured goods that are essentially value-added products from agricultural produce, such as leather and processed skin, cocoa products and others also accounts for 31%. It is noted that, the increased non-oil revenues of government will have little impact on the economic revitalization if it is not augmented by effective diversification of non-oil exports. The current economic recession is aggravated by the shortage in the foreign exchange to meet the ever increasing desires of the country for imported goods. The locally mobilized revenue for the government without adequate import substitutions would prolonged the effects of the recession through naira free fall in the foreign exchange market and persistent inflation.

By implication, the promotion of value chain in the agricultural sector, SME and cottage industries, would provide import substitutions, thus relief pressure on the domestic currency at the foreign exchange market and also generate foreign exchange for the economy through export promotions. In a nutshell, the roles of non-oil export promotion through effective non-oil sector revitalization is fundamental to the ability of Nigeria to exit current economic recession, more than how the government domestic mobilization of non-oil revenue through various taxes could do.

6.0 Conclusion

The study examines the possibilities of non-oil incomes (though export and government revenues) in Nigeria overtaking the oil incomes using Autoregressive Integrated Moving Average (ARIMA) model. The result shows that it is easier for federal government's non-oil revenues to rise above the oil revenues than non-oil exports to rise above the oil exports. Specifically, the non-oil revenue is expected to hit the 2014's oil revenue of government in 9 years by 2023, while it would take non-oil export 466 years to generate the 2014's equivalent income of oil exports. The study also identified the highest oil revenue (government expenditure and oil exports) in history and project non-oil income to identify the number of years to hit the records. While it will take government revenues 12 years to attain the historic highest revenue from oil, non-oil export will achieve it in 565 years as suggested by ARIMA forecast. However, the periods could be shortened depending on the nation's commitment to the ongoing diversification efforts.

However, the study acknowledges the ongoing efforts of government on non-oil revenue mobilization which is yielding positive results, such that most of the recent government revenues are dominated by non-oil sources. The study, therefore recommends that the tempo should be maintained and where possible it should be further enhanced. However, it is argued that government non-oil revenue mobilization is not a standalone hypothesis to scale the economy through the current recession, instead, non-oil exports have critical roles to play in dowsing the current pressure on the Nigeria foreign exchange. It is identified that, non-oil export promotion would not only increase income to the country, but provide additional foreign exchange and also create effective domestic substitutions for imported goods, which would relieve pressure on the domestic currency in the foreign exchange market. Consequently, the foreign exchange motivated inflation would be easier to manage. As it stands, the percentage of non-oil exports to total export is below 8 percent, while non-oil revenue to total government revenues staggered around 33 per cent in 2014.

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