Impact of energy and economy in Nigeria

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ABSTRACT*: The shortfall in crude oil production, the major source of energy supply and revenue generation in Nigeria, affects all spheres of activities in the country. Activities like politics, economic, budgeting, infrastructural development, standard of living and foreign exchange reserve. Therefore, it is imperative to address the impact of energy (crude oil source) on the economy of Nigeria. Hence, using a linear regression analysis, this paper first established a link between oil production (main energy source) and oil earnings (economic). By way of calibration, the paper examines the amount of oil per barrel needed to be produced in a year that would guarantee an increase in oil earnings in Nigeria. The paper also suggests measures that would enhance the increase in the production of oil from which the country would be able to earn more revenue. The result show that increasing oil production, will simultaneously increase earning from oil and, consequently, overhaul the various activities mentioned earlier for the well-being of mankind.*

Keywords: Crude oil, Poverty, Revenue, Energy, CBN

INTRODUCTION

Nigeria is well endowed with a variety of energy sources which are grouped into conventional and nonconventional energy sources. The conventional sources of energy include crude oil, natural gas, coal, nuclear, bitumen, and hydro-electricity, while the non-conventional sources include geo-thermal energy, biomass, oil shale and sand [1].

Crude oil, which is the most dominant source of energy in Nigeria, was discovered in 1956 with an initial output of 51,000 barrel per day (bpd) [2]. By the 1970s, a sporadic increase in outputs and earnings was witnessed, thus tagging the period the oil boom era, with crude oil constituting about 70% of the total commercial energy consumption and providing more than 90% of Nigeria foreign exchange income. [3]. In 1999, the crude oil output was 778,900 barrels while the earning was N 724,422.5 million (CBN, 1999).

However, despite the large production and its huge foreign exchange earnings, crude oil production and earnings have been very erratic in Nigeria because of the fluctuations in the price of crude oil at the world market, frequent breakdown of the petroleum refineries and incessant stoppage of oil production caused by riots, agitation, politics and communal crisis in the oil-producing areas.

Judging from the above scenario, it is assumed that if the government can increase its crude oil output and find solution to the incessant breakdown of the refineries and socio-political instabilities that causes shortages, there would be an increase in oil production and oil earnings in Nigeria. The required quantity of crude oil that would consequently increase government revenue through oil earnings is therefore the main concern of this paper.

CONCEPTUAL ISSUES: ENERGY, OIL PRODUCTION, AND OIL EARNINGS

Kashkari [4] cited in [5] conceptualizes energy as the capacity to perform or do things. This capacity comes from the various sources of energy, which are grouped into convectional and non-convectional energy sources. The conventional energy sources are also grouped into renewable

energy (such as hydroelectricity and wood fuels), and non-renewable energy (such as coal, lignite, crude oil etc); and non-conventional sources include gee-thermal energy, biomass, oil shale and sand [1].

However, of all the sources of energy, crude oil is the most dominant and important source of energy in Nigeria [6].

Emphasizing its importance to economic development, [7] argues that crude oil makes a significant contribution to the economic development of an endowed country because it generates sizeable revenues, creates jobs and business opportunities, and brings new roads and access to water and power to the isolated rural areas in which they are typically located. Besides, they have the potential to stimulate economic growth, reduce poverty, and raise living standards.

Ayodele [5] also opines that apart from serving as a pillar of wealth creation (export and revenue earnings; contribution to the GDP; employment-generating, etc), it is also the nucleus of operations and the engine of growth for all the sectors of the Nigerian economy [3]. Thus asserts that revenue from crude oil accounts for over 70% of Nigeria's national income, and in 1999 alone accounted for over 90% of foreign exchange earnings of the country, which translates to 76% (N724,422.5m) of the total federally collected revenue (see also CBN 1999). Nwokedi [8] also corroborated this importance when he says that enormous revenue earns from oil forms the basis of the development expenditure of Nigeria [9].

Drawing instances from Equatorial Guinea, the News Magazine [10] cited the case of Malabo, the capital city of Equatorial Guinea, which through oil earnings the city, has witnessed transformation in office buildings, hotels and banking activities. Besides, the country's annual per capita GDP rose from $500 in 1993 to $2000 in the year 2002.

The Chad Republic that is categorized as a poor country by the World Bank will soon benefit from crude oil. The country is expected to earn billions of dollars with which it is expected to improve health, education and infrastructural services critical to an improvement in the standard of living of its people. [7] also cited the case of Papua New Guinea where the communities' schools, health clinics, water supply and sanitation have benefited largely from crude oil earnings.

TRENDS OF OIL OUTPUT AND EARNINGS IN NIGERIA

Since the 1980s, crude oil output has followed a fluctuating trend even though oil has consistently contributed over 60% of the total federally collected revenue. As indicated in Table 1 from 1980 to 1989, total oil production has witnessed a series of fluctuations declining from 760,117 barrels in 1980 to 625,908 barrels in 1989. This decline in output is due partly to OPEC output control measures because of the global oil glut as well as civil disturbances in the oil-producing areas which are induced by environmental damages such as erosion, inundation, denegation, increased Stalinization of surface and groundwater; and health risk associated with vector-borne diseases (Adeoye, 1998).

However, in the 1990s, crude oil production witnessed a continuous increase with the exception of 1993 and 1994 when there was a decline in oil production induced by the political crisis witnessed in the country.

These fluctuations in output also affect the total oil earnings. For instance, the percentage contribution of crude oil to total federally collected revenue declined from 81.0% in 1980 to 72.6% in 1989. This decline can be linked to the fluctuations in the prices of oil at the world market experienced then. The invasion of Kuwait by Iraq in the early 1990s brought a brief near doubling in the nominal price of oil during the third quarter of 1990 which increases oil earnings in the oil-producing countries including Nigeria [11]. While the decline witnessed in oil earnings in 1998 was attributed to the rise in OPEC crude oil supplies and the impact of mild winter associated with the EL Nino phenomenal on the major oil-consuming countries which exerted downward pressure on oil prices in [1]. Apart from these problems, the increase in oil production has continued to increase oil earnings.

Table 1: Crude oil production and total oil earning in Nigeria (1980-1999)

Year	production' (Million Barrel)	Total Fed Revenue[6] (N Million)	Total Oil Earnings[0^] (N Million)	Ratio"
1980	760117	15233.5	12353.3	81.09
1981	525291	13290.5	8564.4	64.44
1982	470638	11433.7	7814.9	68.35
1983	450961	10508.7	7253.0	69.02
1984	507487	11253.3	8269.2	73.48
1985	547088	15050.4	10923.7	72.58
1986	535929	12595,8	8107.3	64.36
1987	483269	25380.6	19027.0	74.97
1988	529602	27596.7	19831.7	71.86
1989	625908	53870.4	39130.5	72.64
1990	660559	98102.4	71887.1	73.28
1991	689850	100991.6	82666.4	81.85
1992	711340	190453.3	164078.1	86.15
1993	691400	192769.4	162102.4	84.09
1994	696190	201910.8	160192.4	79.34
1995	715400	459987.3	324547.6	70.56
1.996	740190	520190.0	408783.0	78.58
1997	759710	585811.1	416811.1	71.52
1998	776190	463608.8	324311.2	69.95
1999	778900	949187.9	724422.5	76.32

Source: (a, b and c) CBN statistical bulletin 1999 and (d) computed by the author from (b) and (c).

DATA SOURCE AND METHODOLOGY

Data Source

Time series data for the period 1980-1999 on crude oil production and crude oil earnings in Nigeria were used. The data were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin for the year 1999 [12].

In specifying the model emphasis is placed on whether crude oil production in Nigeria has a significant impact on its earnings. Since oil cannot on its own influence oil earnings other factors like socio-political factors are used as interaction variables between oil production and oil earnings. Having established this link, the model is therefore formulated thus:

$$OP = f(OE, SPf) \qquad (1)$$

With a linear relationship such as

$$OP = \beta_0 + -\beta_2 OE + \beta_2 SPf + U + a + o \qquad (2)$$

SPf = socio-political factors that determine the amount of oil production and oil earnings. Note that those factors are interactions variables that influence oil productions and earnings in Nigeria.

ao = intercept

a, and o= the estimation parameters

U = disturbance term.

OP= oil production

OE= oil earning

The a-prior expectations between dependant variable (oil productions) and the independent variables (oil earnings and socio-political factors) are:

$\dfrac{\partial OP}{\partial OE} > 0$; $\dfrac{\partial OP}{\partial Spf} > 0$

These indicate that as the quantity of oil production increases, the amount earned from oil will also increase, while a stable socio-political situation in the country will lead to an increase in oil production. The tests are conducted at 5% level of significance.

EMPIRICAL RESULTS AND DISCUSSIONS

The results of regression analysis are presented in Table 2.

Table 2: Regression Results of Oil Production and Oil Earnings in Nigeria

Variables	Co-efficient Estimates
Intercept	591139
(t)	(9.03)
OE	0.43
(0	(2-42)
SPf	-72142.4
(0	. (-1.03)
R^2	0.60
F	4.98

A look at the table shows that the model is fairly good since it has an R-Square of 60%. At 5% level of significance, the F-statistic shows that the model is useful in determining the impact of oil production on oil earnings, as the computed F-statistic which is 4.98 is greater than the tabulated F-statistic valued at 3.94.

For the individual variables, the t-test at 5% level of significance showed that oil production is directly related to oil earnings thus satisfying our a-priori expectations.

Given the results obtained from the model, the calibration analysis of oil production on oil earnings in Nigeria is presented thus.

OP=591139 + 0.43OE-72142.4SPf   (3)

Since our concern is to find out the impact of oil production on oil earnings, we, therefore, hold SPf constant.

Equation (3) then becomes:

OP = 591139 + 0.430E   (4)

The appropriate (1 - oo) 100% prediction interval for OP when OE=OP is OP ± tdj SN^ where the distribution oft is based on (n-2) degree of freedom. The results of the calibration of the impact of

oil production on oil earnings at 5,10,15 and 20 per cent increase on the annual average of 632,800 barrels of oil are presented in column 3 and 4 of Table 3.

Table 3: Calibration Results of oil Production and Oil Earnings.

Mean of the value of oil Production (632800 Barrels) per annum	Level of value the of Oil Production (Barrels) (N Million)	Point Estimate of Increase in Oil Earnings (N Million)	9 5% Prediction Interval of Oil Earnings
5% increase	664,440	876,848.2	876,838.3-896,858.1
10% increase	696,080	890,453.4	890,443.5-890,463.3
15% increase	727,720	904,055.6	904,045.7-904,065.5
20% increase	759,360	917,663.8	917,653.9-917,673.7

Source: Author's Computation

As shown in Table 3, the government will be required to increase oil production by about 664,440 barrels per year (i.e. 5% increase average value of oil production) to increase oil earnings by N876,848.2 million. At this rate, there is a 95% confidence that government earnings from oil production will increase to between N876,835.3 million and N896,858.1 million. If the government decides to increase oil production by 20% of the annual average which represents 759,360 barrels, the amount of oil earnings will increase by N917,653.8 million. At this rate, there is a 95% confidence that government will earn between N917,653.9 million andN917,673.7 million.

RECOMMENDATIONS AND CONCLUSION

Having established a link between oil production and oil earnings in Nigeria and the estimated rate of oil production that is needed to increase oil earnings, it is important to draw the attention of the government and oil-producing companies on the need to put in place appropriate measures that would enhance the increase in oil production and at the same time increase oil earnings.

Therefore, the government should provide a freer rein to the private sector by providing it with a more flexible regulatory framework and infrastructural services that are critical to the production of oil.

Furthermore, oil production has potential environmental and safety risks, these need to be investigated and managed, although major oil companies do apply in-house standards and act as custodian for environmental concerns, there is a need for a clean and transparent standard in the country. This would reduce civil disturbances that are induced by environmental problems which often lead to oil shortages, and consequently bring about an increase in oil production.

In addition, the government should apart from paying adequate compensation to the host communities, ensure that benefits are equitably shared, not only between the government and oil companies but also between the host communities and the government. This would also bring the restiveness in these areas to a low level which consequently would give the oil-producing companies' time to concentrate on oil production.

The new Niger Delta Development Commission [NNDC] should be well funded to provide projects that would meet local needs and build a sense of ownership among the rural communities in the Niger Delta. The government should also honour its joint venture projects with oil companies by fulfilling its cash contribution.

Besides, a sinking fund should be created from where the money would be released to execute the turn-around maintenance of the country refineries in order to ensure a throughout the year supply of oil products.

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